Sigridur Sia Jonsdottir

# Effects of perinatal distress, satisfaction in partner relationship and social support on pregnancy and outcome of childbirth

**LINNAEUS UNIVERSITY PRESS**

Effects of perinatal distress, satisfaction in partner
relationship and social support on pregnancy
and outcome of childbirth

# Effects of perinatal distress, satisfaction in partner relationship and social support on pregnancy and outcome of childbirth

Sigridur Sia Jonsdottir

# Abstract

Jonsdottir, Sigridur Sia (2019). *Effects of perinatal distress, satisfaction in partner relationship and social support on pregnancy and outcome of childbirth*, Linnaeus University Dissertations No 352/2019, ISBN: 978-91-88898-60-9 (print), 978-91-88898-61-6 (pdf).

**Aim**: The aim of this thesis was to achieve a deeper understanding of the situation among women experiencing perinatal distress during pregnancy and childbirth and the effects that dissatisfaction in partner relationship and weak social support from family and friends could have on pregnancy and childbirth.

**Methods**: Following screening for perinatal distress, 562 expecting mothers came for a semi-structured interview. This screening, done with the Depression Anxiety Stress Scales and the Edinburgh Postpartum Depression Scale, categorized 360 (64.1%) women into the perinatal distressed group (PDG) and 202 (35.9%) into the non-distressed group (NDG). During the interview women answered the Dyadic Adjustment Scale and the Multidimensional Scale of Perceived Social Support. Data were collected with these instruments for study I. Additional data for the three other studies were gathered from the women´s pregnancy records (II), electronic medical records (II, III), and childbirth records (IV). Results of the four studies were obtained by using descriptive statistics; parametric and nonparametric statistics and regression modeling.

**Results:** Women in the PDG were significantly more likely than the NDG to be dissatisfied in their partner relationship, continue smoking during pregnancy, be dissatisfied with division of household tasks and child-rearing, have elementary or lower education, and to be students or unemployed. They were also significantly more likely to experience fatigue, vomiting and pelvic girdle pain during pregnancy. Women in the PDG who received weak family support reported nausea and heartburn more frequently than those with strong family support. Women in the PDG utilized more antenatal care service and were allocated more part time as well as earlier sick leaves during pregnancy, than those in the NDG. Women in the PDG were significantly more likely to use epidural anesthesia as a single pain management during labor.

**Conclusion:** Perinatal distress affects pregnancy and childbirth. It is more common among women who are dissatisfied in their partner relationship and with the division of household tasks and child-rearing. Perception of weak social support also affects pregnancy among distressed women. Distressed women along with their partners and families should be offered support and consultation to relieve distress and strengthen their bonds during pregnancy and childbirth.

Keywords: perinatal distress, partner relationship, social support, pregnancy, sick leave certificates, childbirth, midwifery, self-reported scales, DASS, EPDS, DAS, MSPSS

# Contents

# ORIGINAL PAPERS

This thesis is based on the following papers, referred to in the text by their Roman numerals

I.     Jonsdottir, SS., Thome, M, Steingrimsdottir, Th. Lydsdottir, LB, Sigurdsson, JF, Olafsdottir, H, and Swahnberg, K. (2017). Partner relationship, social support and perinatal distress among pregnant Icelandic women. *Women and Birth*, 30(1), e46-e55. DOI: 10.1016/j.wombi.2016.08.005

II.    Jonsdottir, SS.; Swahnberg, K.; Thome, M.; Oskarsson, G.K.; Lydsdottir, L.B.; Olafsdottir, H.; Sigurdsson, J.F., and Steingrimsdottir, Th. Pregnancy complications, sick leave, and service needs of women who experience perinatal distress, weak social support, and dissatisfaction in their partner relationships [Under review].

III.   Jonsdottir, SS.; Steingrimsdottir, Th.; Thome, M.; Oskarsson, G.K.; Lydsdottir, L.B.; Olafsdottir, H.; Sigurdsson, J.F.; and Swahnberg, K. Effect of perinatal distress and dissatisfaction in partner relationship on issuing of sick-leave certificates during pregnancy. A cohort study among pregnant Icelandic women [Manuscript].

IV.    Jonsdottir, SS.; Steingrimsdottir, Th.; Thome, M.; Oskarsson, G.K.; Lydsdottir, L.B.; Olafsdottir, H.; Sigurdsson, J.F.; and Swahnberg, K. (2019). Pain management and medical intervention needs during childbirth among perinatal distressed women and women dissatisfied in their partner relationship: A prospective cohort study. *Midwifery,* 69, 1-9, DOI: 10.1016/j.midw.2018.10.018

The papers have been reprinted with permission from the respective journals.

# DECLARATION OF CONTRIBUTION

The Icelandic Study of Perinatal Mental Health (ISPMH) was designed by Halldora Olafsdottir (HO), professor Jon Fridrik Sigurdsson (JFS), Dr. Linda Bara Lydsdottir (LBL), professor emerita, Marga Thome (MT), Petur Tyrfingsson, and Dr. Arnar Hauksson. JFS was the Primary Investigator (PI) of the ISPMH. The doctoral candidate, HO, and LBL conducted the interviews for the ISPMH. Studies II, III and IV, were designed by the doctoral candidate with supervision from professor Katarina Swahnberg (KS), main supervisor, and the two co-supervisors, professor emerita Marga Thome (MT) and professor Thora Steingrimsdottir (TS). They were involved in conducting all four studies. A statistician, Gudmundur Kristjan Oskarsson (GKO), joined the research group for the three latter studies. KS, MT, ÞS, GKO, JFS, HO, and LBL critically reviewed all manuscripts and approved final manuscripts.

# ABBREVIATIONS

AEI = Adverse Experience Interview

AOR = Adjusted Odds Ratio

C/S = Cesarean section

CI = Confidence Interval

DAS = Dyadic Adjusted Scale

DASS = Depression, Anxiety, Stress Scales

EPDS = Edinburgh Postpartum Depression Scale

GP = General practitioner, a physician employed at primary health care center

ISPMH = The Icelandic Study of Perinatal Mental Health

MSPSS = Multidimensional Scale of Perceived Social Support

NDG = None-distressed Group

NICE = The National Institute of Clinical Excellence, UK

OR = Odds Ratio

PDG = Perinatal Distressed Group

# DEFINITIONS

Perinatal period      The term 'peri' means around. The perinatal period is therefore a period that goes around pregnancy and is divided into three parts 1) during pregnancy, 2) childbirth and 3) postpartum. The focus in this thesis is on the first two parts.

Perinatal distress      A psychological situation that results from symptoms of anxiety, depression or stress in any combination, measured by screen positive scores on psychological scales and can last through all three parts of the perinatal period.

Screen negative      Scoring below the cut-off scores on the self-report psychological scales used for assessing perinatal distress.

Screen positive      Scoring above the cut-off scores on the self-report psychological scales used for assessing perinatal distress.

Partner relationship      An intimate physical and emotional relationship with another person.

Pregnancy records      Consist of: 1) Handwritten documentation on standardized sheets and used in all primary health care stations around Iceland, and 2) Handwritten sonographic records

| | |
|---|---|
| Childbirth records | Consist of: 1) Partogram where progress of childbirth is documented, 2) Handwritten documentation from the childbirth, and 3) The newborn's records. |
| Index pregnancy | The participating women´s pregnancy studied in this thesis |
| Child-rearing | To care for and meet the needs of one's children. |
| Pregnancy trimesters | First trimester = gestation up 12 weeks |
| | Second trimester = $12^1$ – 28 weeks |
| | Third trimester = $28^1$ weeks – childbirth |

# INTRODUCTION

Pregnancy and childbirth involve major changes for the pregnant mother, the expectant father, older children, their families and even friends. This is the time when the parents start to plan a future with the new expected family member. As a practicing clinical midwife for many years, I have witnessed major changes in the antenatal care of pregnant women and their families. In the early eighties the focus from midwives and obstetricians was almost entirely on the women´s physical condition, with the aim to detect pregnancy related illness. Neither staff nor women mentioned mental well-being except on rare occasions and the pregnant women were hardly ever asked about mental well-being. Childbirth was viewed practically as a blessing for women, and a newborn was only expected to bring along happiness, joy and tightening of the parents' bonds.

Since then there have been enormous changes and developments in caring for expectant parents, and currently midwives and other health care professionals aim towards preparing the women and their families for the future. I have however witnessed several women expressing that they struggle with the changes that come with pregnancy and childbirth. They have verbalized that they do not feel to be in a euphoric state "on the pink cloud" as society is often expecting, but that they are rather concerned about what lies ahead and even feel overwhelmed and distressed. Today's lifestyle could add to this burden of life as modern Icelandic women often have to juggle their pregnancy, childbirth, caring for the newborn and older children along with career and social life. I have speculated that there might be a connection between perinatal distress and complications during pregnancy and childbirth. From a caring perspective this clinical experience has stimulated interest in further exploring this situation.

# BACKGROUND

## Conceptualization and definition of perinatal distress

Historically, the conceptualization of mental well-being in relation to childbearing has changed with the accumulation of research evidence. As seen in Figure 1, earlier research focused on postpartum depression among women (Bennett, Heather, Einarson, Taddio, Koren, & Einarson, 2004; Cox, Holden, & Sagovsky, 1987; Howard, Piot, & Stein, 2014). As the field advanced, research on antenatal depression increased (Rubertsson, Waldenström, & Wickberg, 2003) and a link was established between antenatal and postpartum depression (O'Hara, Wisner, & Asher, 2014). Anxiety was later added (both with/without depressive symptoms) to research on antenatal mental health illness (Andersson, Sundstrom-Poromaa, Wulff, Astrom, & Bixo, 2004; Rubertsson, Hellström, Cross, & Sydsjö, 2014). Currently, the symptoms of stress, depression, and anxiety are a major topic of research on the mental well-being of childbearing women (Dunkel Schetter & Tanner, 2012; Glover, 2015; Van den Bergh et al., 2017). This progress has occurred in parallel with increased research on the impact of women's mental well-being during pregnancy on children's development and health (Glover, 2015; Van den Bergh et al., 2017).
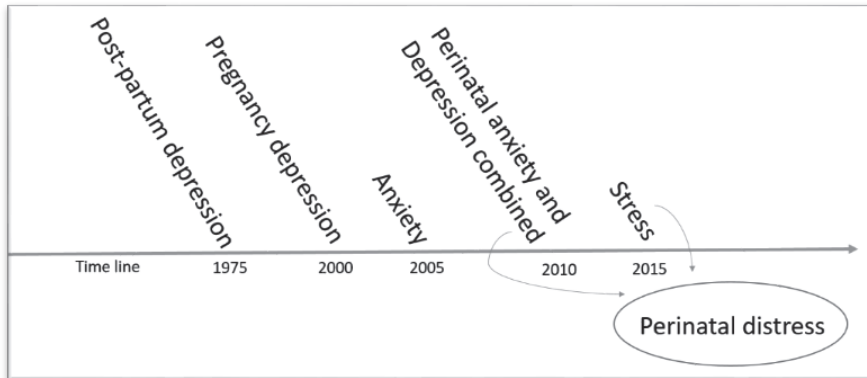
*Figure 1. From postpartum depression to perinatal distress. The history–timeline of research focus on the concept of childbearing women´s mental well-being.*

Distress symptoms negatively affecting the women´s mental well-being was identified among postpartum women as symptoms of depression and fatigue (Thome & Alder, 1999). Furthermore, there is an association between perinatal distress and adverse outcomes for the fetus or child (Glover, 2014; Van den Bergh et al., 2017). Psychological distress among individuals was further identified as a symptom of change in emotional status along with having stress and unmet needs, feeling loss of control and ineffective coping and communication of discomfort. (Ridner, 2004). Maternal distress in transition to motherhood has been conceptualized as a stress response, starting with low stress and anxiety symptoms and increasing to severe anxiety and depression. As the distress increases, the woman´s adaptation to the maternal role decreases, and she experiences increased difficulties with functioning and control response. She also experiences difficulties in connecting with others (Emmanuel, & St. John, 2010). Relationship dissatisfaction has also been found to increase maternal emotional distress (Rosand, Slinning, Eberhard-Gran, Roysamb, & Tambs, 2011). Low self-esteem among couples during pregnancy might also indicate distress (Thome & Arnardottir, 2012). Perinatal distress has also been identified as subclinical depression/anxiety along with stress (Rallis, Skouteris, McCabe, & Milgrom, 2014).

When the mental well-being of childbearing women is discussed, a distinction is commonly made between clinical levels of depression and/or anxiety and milder forms of mental health problems that include symptoms of anxiety, depression, or stress (i.e. psychological distress). Distress during pregnancy can be categorized into mild/transient distress and severe/pervasive distress (Emmanuel, & St. John, 2010). In this thesis severe/pervasive distress, is considered to be perinatal distress. The situation is most commonly assessed with self-report psychological scales, which are useful tools if they have been

11

validated in that cultural society. Cut-off scores are used in these psychological scales to differentiate between screen negative and screen positive individuals. Figure 2 gives an indication on how women with negative screening results are found to experience a range from no distress to mild distress. Screen positive women are found to experience distress from mild to severe.
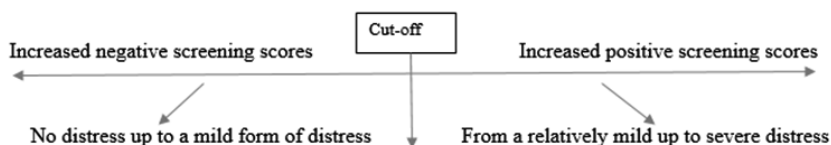


*Figure 2. Demonstration of difference in screening results for distress.*

Women on the lower positive side might not meet a diagnostic level of mental health illness but may need help in dealing with the situation. It is important that help or assistance is offered by health care services to persons who suffer from distress without being diagnosed for mental illness (Mirowsky & Ross, 2012), This matters when pregnant women are assessed and perinatal distress is identified. A theoretical model of midwifery (Berg, 2005) with focus on holistic care supports the view by Mirowsky and Ross. The holistic model emphasizes that midwives are responsible in balancing natural and medical perspectives in the care of pregnant women.

Diversity is found in the literature regarding the use of terms for the condition here referred to as 'perinatal distress'. A term 'perinatal' is denoted for the entire pregnancy, childbirth and up to a year after the childbirth. Researchers have argued that it is important to integrate pregnancy and the postpartum period when it comes to mothers' mental health (Austin, 2004; Matthey, 2010; O'Hara et al., 2014; Rallis et al., 2014). A diversity is also found regarding terms used in the literature to describe mental health problems. An overview of the terms included in the literature search for the thesis development is listed in Table 1.

In this thesis, perinatal distress is defined as being screen positive on self-reported psychological scales used for assessing anxiety, depression and stress. The identification of distress by Rallis et al (2014) is used here together with the view by Mirowsky of Ross (2012) that a distressed person does not need a diagnosis of a mental health problem in order to be offered help from health care professionals. The detection of symptoms of anxiety, depression and stress, will be used to distinguish women for the perinatal distressed group (PDG) as the basis for the thesis and to conceptualize perinatal distress further.

*Table 1. Terms found in the scientific literature in connection with discussion regarding women´s mental well-being during pregnancy*

| Distress terms | Mental health terms | Depression, anxiety and stress terms | Illness/ disorder terms | Other terms |
|---|---|---|---|---|
| • Emotional distress<br>• Maternal distress<br>• Maternal psychological distress<br>• Maternal psychosocial distress<br>• Pregnancy distress<br>• Prenatal distress<br>• Psychiatric distress<br>• Psychosocial distress<br>• Psychological distress<br>• Perinatal distress | • Maternal mental health problems<br>• Mental health problems<br>• Perinatal mental health<br>• Women´s mental health | • Depression during pregnancy<br>• Maternal depression<br>• Maternal stress<br>• Perinatal depression<br>• Prenatal depression<br>• Prenatal stress<br>• Postpartum depression<br>• Pregnancy anxiety<br>• Pregnancy depression<br>• Pregnancy stress | • Perinatal mental illness<br>• Mental disorder<br>• Perinatal disorder<br>• Psychiatric disorder<br>• Mood disorder | • Maternal mental wellbeing<br>• Psychological well-being<br>• Prenatal mood states<br>• Psychological pregnancy status |

# Identification and prevalence of perinatal distress

It is still unclear how best to identify people, including pregnant women, who suffer from distress and mental health problems. It is estimated that half the population with depression never consults a physician about it (NICE, 2011). In clinical practice today, the most common way to assess perinatal distress is to ask women whether they are experiencing a depressive or anxious mood (O'Hara et al., 2014). The instructions from the National Institute of Clinical Excellency (NICE) in the UK suggest that a woman should be asked during her initial antenatal visit about past or present severe mental health problems or psychiatric treatment (NICE, 2017). Midwives and other health care professionals in antenatal care are also instructed to further assess the woman's health using self-report psychological scales if she is complaining about her current mental health or has a history of mental health problems (NICE, 2014). These same guidelines apply in Iceland.

The Edinburgh Postpartum Depression Scale (EPDS) (Cox et al., 1987) is the most commonly used scale in research on perinatal distress. The EPDS has shown satisfactory psychometric properties (Cox & Holden, 2003). It is also extensively used during pregnancy and has been found to have satisfactory psychometric properties for that period (Bergink et al., 2011). Two Icelandic translations of the EPDS are available (Lydsdottir et al, 2019; Thome, 2000). The positive predictive value of the EPDS for diagnosing mental illness ranges from 50 to 60% (Bergink et al., 2011; Lydsdottir et al., 2014; Matthey, 2010). In other words, approximately 40 to 50% of women who screen positive will not have a clinical level of mental health problems but are reporting perinatal distress.

The comparison of outcome measures employed in past studies is, however, complicated because the list of self-report psychological scales used is long and it is difficult to compare the reliability among them. Researchers' professional background most likely has the strongest influence on which instrument is used.

## Prevalence of perinatal distress

In past research, the prevalence of perinatal distress as revealed by self-report depression psychological scales among pregnant women from several countries has commonly been 12–15% (Matthey, 2010). A recent study in Iceland found that 9.7% of women screened positive on the EPDS at 16 weeks during pregnancy (Lydsdottir et al., 2014). A systematic review of 98 studies showed a prevalence between 2.6% and 36.9% (Leach, Poyser, & Fairweather-Schmidt, 2017) and results from a Swedish study showed anxiety among 15.6% of women in their first trimester (Rubertsson et al., 2014). A study of 1603 pregnant women in the Netherlands indicated that 14% had experienced symptoms of anxiety and 6% had experienced symptoms of depression (Meijer et al., 2014). A study among 1522 healthy pregnant women in the USA

indicated that over 75% of them had experienced stress (Woods, Melville, Guo, Fan, & Gavin, 2010). These results differ from a study of 263 healthy pregnant women in Northern Ireland where, 15.1% of the women reported symptoms of stress (Lynn, Alderdice, Crealey, & McElnay, 2011). A study on 197 healthy pregnant women in Taiwan who were screened three times during pregnancy indicated that around 17% of them were stressed, while 11% had symptoms of depression and 43% symptoms of anxiety (Liou, Wang, & Cheng, 2014).

## Symptoms of perinatal distress during pregnancy

A woman dealing with perinatal distress is actually dealing with similar symptoms as other individuals dealing with distress. They can include mood symptoms, such as fearfulness, unhappiness, sadness, the feeling of being unable to cope or that they are out of control, irritability, and tension (Emmanuel, & St. John, 2010; Mirowsky & Ross, 2012). The woman might complain about tiredness or that everything is an effort, sleep difficulties, or changes in appetite. She might also experience episodes of rapid heartbeat, shortness of breath, and dizziness (Mirowsky & Ross, 2012). A qualitative study of 18 women with perinatal distress indicated that they often felt overwhelmed, confused, tired, and out of control (Staneva, Bogossian, Morawska, & Wittkowski, 2017).

In many western societies, relief from distress is commonly sought through the use of alcohol, drugs, or tobacco, which can all have numerous adverse outcomes for the child when expectant mother continue to take illegal drugs, drink alcohol or use tobacco during pregnancy (Hauge, Torgersen, & Vollrath, 2012; Henrichs et al., 2010; Whitworth & Dowswell, 2009). Addiction was found to be the strongest predictor of the likelihood for women to continue to smoke during pregnancy, even if they smoked ≤ nine cigarettes per day. Other predictors have been identified as pleasure, habit, social function and depression (De Wilde et al., 2016) and distressed women have been found to face more difficulty in quitting compared to those who are not distressed (Hauge et al., 2012; Jeong et al., 2013). Continuing to smoke during pregnancy might therefore be used to identified women who are dealing with distress (Hauge et al., 2012) and women who continue to drink alcohol during pregnancy are also more likely to be experiencing distress (Henrichs et al., 2010).

# Pregnancy complications and perinatal distress

Research has predominantly been focused on women with diagnosed mental problems during pregnancy and its effect on pregnancy- and childbirth-related outcomes until recently (Andersson, et al., 2003; Andersson, et al., 2004; Tan, Vani, Lim, & Omar, 2010). One prospective cross-sectional study conducted in Sweden examined the outcomes during pregnancy and childbirth among women

with perinatal mental illness, in comparison to healthy subjects (Andersson, et al., 2003; Andersson, et al., 2004). The total sample size was 1065 women, all of whom agreed to participate when they came for a routine ultrasound checkup at 15–17 weeks' gestation. Participants completed a self-report instrument. After 2 weeks, 815 (50.8%) who screened positive for distress were interviewed by telephone, during which their mental health was assessed based on Diagnostic and Statistical Manual of Mental Disorder (DSM-IV criteria). These women's medical records were then thoroughly reviewed for pregnancy and childbirth outcomes. The results showed that women diagnosed with mental illness (14%) needed more health care services during pregnancy and took more sick leave from work. Furthermore, they were likely to experience nausea and vomiting and need >2 ultrasounds during the pregnancy. They were also more likely to report fatigue, nausea, headache, bowel complaints, back pains, dizziness, abdominal pain, insomnia, joint or limb pain, palpitations, chest pain, dyspnea, and fainting. Women with depression and anxiety were also likely to develop pre-eclampsia during pregnancy (Kurki, Hiilesmaa, Raitasalo, Mattila, & Ylikorkala, 2000).

The results of these studies suggest that women with perinatal distress will experience similar complications. Knowledge is gradually emerging on the effects of perinatal distress on complications during pregnancy. Women with perinatal distress are more likely to suffer from nausea and vomiting (Tan et al., 2010), develop pre-eclampsia (Zhang et al., 2013) and report vaginal bleeding (Dunkel Schetter, Niles, Guardino, Khaled, & Kramer, 2016). Cause and effect between perinatal distress and pregnancy complications, however, has not been clearly established. Furthermore, researchers have also identified factors that may contribute to an increase in perinatal distress. Women hospitalized for hyperemesis were more likely to develop perinatal distress due to the hospitalization (Kjeldgaard, Eberhard-Gran, Benth, & Vikanes, 2017). A higher total perceived risk of complications was found to increase distress in women (Dunkel Schetter et al., 2016), and poor physical health is associated with perinatal distress (Lynn et al., 2011).

# Childbirth complications and perinatal distress

Previous studies have mainly been focused on the outcomes of childbirth among women with diagnosed depression or anxiety. The results of these studies have indicated an increased likelihood of preterm birth in such women (Bansil et al., 2010). Particularly, in a systematic review of 12 cohort studies, perinatal anxiety was found to be associated with pre-term labor and low birth weight (Ding et al., 2014). Research from the period when the focus was on depression and anxiety, found that women diagnosed with anxiety or depression had longer admissions to the childbirth unit and more frequently needed epidural analgesia and cesarean section (C/S) compared to women who have not been diagnosed

with anxiety or depression (Andersson, et al., 2004). Knowledge is sparse on the effect of perinatal distress on pain management and medical interventions during childbirth. One study showed a link between distress and use of analgesia during childbirth (epidural/IV opiates) and acute C/S (Saunders, Lobel, Veloso, & Meyer, 2006). An association between perinatal distress and preterm childbirth and low birthweight has been found in a systematic review (Staneva, Bogossian, Pritchard, & Wittkowski, 2015). These findings were contradicted by another study finding no association between distress and increased likelihood of preterm birth, low birthweight, emergency-induced childbirth or C/S, use of forceps or vacuum extraction, or newborn admission to the neonatal intensive care unit (NICU) (Staneva, Morawska, Bogossian, & Wittkowski, 2017).

## Partner relationship, social support and perinatal distress

Social support has been defined as assistance and protection coming from an individual or a group of people to another individual (Shumaker & Brownell, 1984). When operationalizing social support for research, it is important to discuss the nature of the support, how it operates to enhance health, and how it is perceived by individuals (Zimet, Dahlem, Zimet, & Farley, 1988). Emotional support can give people the feeling that they are being cared for and belong to a network that values them (Cobb, 1976). The type of social support arises from different origins, i.e., emotional, instrumental/practical, appraisal or informational (Bäckström et al., 2017; Langford, Bowsher, Maloney, & Lillis, 1997).

With increased research and collaboration among the medical, midwifery, and social sciences, researchers have identified a link between perinatal distress and social support. Significant associations have been found between good perinatal mental health and strong social support (Emmanuel, St. John, & Sun, 2012). Social support has also been found to be a buffering factor for dealing with the adjustment of pregnancy (Nylen, O'Hara, & Engeldinger, 2013) and with life stress (O'Hara et al., 2014). Women found informational support in sharing their experience with other pregnant women (Bäckström et al., 2017) and also found that informational and emotional support from midwives helped them mentally prepare for childbirth and motherhood (Bäckström, Mårtensson, Golsäter, & Thorstensson, 2016). For both mothers and fathers, received social support increased the perceived level of satisfaction in their relationship (Bäckström, Kåreholt, Thorstensson, Golsäter, & Mårtensson, 2018). Effective mental support from the partner resulted in decreased anxiety for women in late pregnancy (Rini, Schetter, Hobel, Glynn, & Sandman, 2006) and women who perceived strong support from the partner felt that their relationship was strengthened (Bäckström et al., 2017). A significant correlation (p <.02) was

also found between strong partner support during pregnancy and lower maternal postpartum and infant distress scores (Stapleton et al., 2012).

As seen above, partner support and satisfaction with one's partner relationship are commonly discussed as the same variable. In this thesis, however, a partner relationship is viewed as an intimate physical and emotional relationship with another person. Good quality of a partner relationship is important for improving well-being among individuals in the relationship, or marriage, bringing feelings of security and being cared for (Mirowsky & Ross, 2012). Limited studies are available on partner relationship and its effect during pregnancy, but a systematic review and a meta-analysis showed that partner factors are associated with distress (Pilkington, Milne, Cairns, Lewis, & Whelan, 2015), among expectant fathers as well as mothers (Figueiredo, et al., 2008). In a Norwegian epidemiological study, it is suggested that dissatisfaction in partner relationship predicts perinatal distress (Rosand et al., 2011). Findings from a recent study indicate that partners are less involved during pregnancy among women with perinatal distress (Boekhorst et al., 2019). Researchers have known for long that expectant parents who are dissatisfied in their relationship might be at risk of not developing a loving relationship with their children (Mercer, 1990). In a recent Swedish study an association between divorce rate of couples with young children and dissatisfaction in their partner relationship was shown when the child was 6 months and 2 years old (Hansson & Ahlborg, 2016).

## Stigma of perinatal distress

Could stigma related to mental health hinder pregnant women from declaring that they are experiencing distress? According to the NICE clinical guidelines for mental health care in the UK, health care professionals are advised to expect that women might be unwilling to report or discuss their mental health illness due to fear of stigma (NICE, 2014). Stigma is an attitude that an individual develops towards someone or a group of people who are not considered 'normal' (Goffman, 1963). Goffman identifies three different categories of stigma. First, there is stigma towards physical deformities; second, stigma toward individuals who are seen as weak; and third, there is stigma of particular races, religions, or other groups of people who are not considered normal in a given society. A person who is dealing with mental disorders tends to be categorized as a weak individual and those who do not fit these diagnoses are viewed by society as normal.

The glamorous side of pregnancy as shown by the media might readily nourish our mental image of pregnant women as people who seem happy and healthy. Distressed pregnant women have however described themselves as feeling incompetent in comparison to media depictions of pregnancy (Staneva,

et al., 2017). A pregnant woman who is not excited about her child and is not showing happiness might be seen by society as abnormal. Interviews 12–18 months after childbirth with women who had experienced depression during pregnancy revealed that they had often felt ashamed of this experience. They decided not to admit their situation to their friends or even their family, to avoid being judged for not being happy (Bennett, Boon, Romans, & Grootendorst, 2007). Similar results were found in an Australian qualitative study with 18 distressed pregnant women (Staneva, et al., 2017). These results reflect self-stigma and the shame that follows when a person who has stigmatized others becomes one of them (Goffman, 1963). The women in the Australian study felt relieved that they could participate in a study wherein they could freely speak about their situation (Staneva, et al., 2017). Stigma has been found to interfere with help-seeking behavior (Corrigan, 2004), particularly if stigma is sensed from health care professionals (Sartorius, 2002).

# Effect of perinatal distress on fetuses and children

The antenatal period is a vulnerable time for fetal development, and knowledge is accumulating on the related adverse outcomes associated with maternal perinatal distress (Glover, 2015; Talge, Neal, & Glover, 2007). Research on effect of maternal distress on the fetus indicates that there might be a link between different adverse outcomes and different gestational age when the fetus is exposed to distress (Glover, O'Connor, & O'Donnell, 2010; Van den Bergh et al., 2017). Physiological stress response in humans stimulates the Hypothalamic-pituitary-adrenal (HPA) axis, resulting in increased production of cortisol, glucocorticoid and other stress hormones. The expectant mother's distress can alter the fetus HPA (Glover, et al., 2010; Glover, 2015; Nagle, Green, & Walker, 2017). A meta-analysis revealed that distress is associated with changes in motor activity; social, emotional, and cognitive performance and functioning; and increased risk of psychiatric disorders in adulthood (Glover, 2014) and influences fetal growth (Glover, 2015). Mothers' distress is also linked to several mental health illnesses in children, such as attention deficit hyperactivity disorder (ADHD), phobias, and conduct disorders, all of which tend to persist into adolescence and to adulthood (Stein et al., 2014). One hundred twenty-one pregnant women who experienced distress after a natural disaster reported that the children showed signs of being fussy and difficult at 6 months of age (Laplante, Brunet, & King, 2016). A study of 4848 children in the Netherlands indicated that children of mothers who reported perinatal distress during pregnancy were more likely to be diagnosed with asthma at 6 years of age (Guxens et al., 2014) and another study showed a link between distress and asthma and digestive illnesses in children up to around three years of age (Zijlmans, Beijers, Riksen-Walraven, & de Weerth, 2017).

# Impact on fetal biology

Increasing attention has been given on the possible relationship between maternal distress and fetal genes (Ryan, Mansell, Fransquet, & Saffery, 2017). The human genome is made up of genes, which are in turn formed by deoxyribonucleic acid (DNA). The DNA makes up our chromosomes and carries our genetic information. The fetus gets its genome from its parents, and each person has a unique genome which is responsible for making that individual a unique person. The genome receives instructions on how to behave through a large quantity of chemical compounds called the epigenome, which attaches to and influences DNA by instructing it, for example, to turn off or control the production of cells and proteins in the human body. The epigenome can be altered in response to exposures to certain environments and diseases. Researchers are now in increasing quantities trying to map out the human epigenome with the aim of better understanding the human body and using this knowledge to improve health (National Human Genome Research Institute, 2016; Szyf, Tang, Hill, & Musci, 2016).

Arguably, the most researched mechanism in the epigenome is named DNA methylation. Studies on antenatal stress have shed light on how this epigenetic mechanism can mediate biological processes involved in stress regulation in the fetus. Since 2012, there has been a strong emphasis on studying the effect of distress on the 'early human epigenome' in the fetus/newborn (Ryan et al., 2017). A review of 16 studies was conducted on the link between possible perinatal distress and children's DNA (Cao-Lei et al., 2016). The studies all assessed mother-child dyads, and focused on maternal anxiety, depressed mood, or adverse life stress. The results indicated different epigenetic effects (i.e., different modifications to the epigenome), most of which were linked to DNA methylation changes. The authors concluded that distress in utero could lead to changes in the epigenome, which then might lead to developmental changes in the child's body and health. However, more studies are needed to define these associations in this rapidly growing research field (Cao-Lei et al., 2016). Large cohort studies on women during pregnancy are needed to identify the epigenetic links between perinatal distress and child health outcomes (Ryan et al., 2017). Other epigenetic mechanisms need to be studied as well (Cao-Lei et al., 2016).

# Midwives and other health care professionals' role in the care of perinatally distressed women

The aim of antenatal care is to secure a safe pregnancy and childbirth and to promote well-being (NICE, 2017). It is therefore important to evaluate the needs of pregnant women and to offer them counseling, referral, or simple advice and active listening according to needs (O'Hara et al., 2014). This requires systematic assessment of their physical and mental health on behalf of the midwife, who at the same time needs to balance the act between medical, caring and natural perspectives (Berg, 2005). An important work by Renfrew et al., published in 2014, introduced key essential elements to promote positive outcomes for women and children. The evidence shows that midwifery is essential in securing quality of care for women, children and their families. Midwives should be the leaders and organizers of the teamwork needed in caring for pregnant women (midwifery led care). The focus ought to be on supportive, preventative care where health care professionals aim to balance the possible pathological issues of pregnancy with the support necessary to empower the women, with the aim to promote normal processes during pregnancy and birth (Renfrew et al., 2014). Midwives should therefore be in a key position during pregnancy to develop a therapeutic relationship with the pregnant woman and her significant other and to offer empowering support during this transitional experience (Bäckström et al., 2016). To be able to offer care such as this, solid midwifery knowledge is needed (Berg, 2005). Studies, however, indicate that midwives need further support to take on this important leadership role. Results from a recent study among 438 Irish midwives indicated their need for increased education regarding screening tools for the assessment of distressed women. Only 40% of the midwives in the study included the woman's partner or family into information gathering regarding perinatal distress. Less than half of these midwives offered support to the partner/family when perinatal distress was assessed among pregnant women (Carroll et al., 2018).

Researchers in the Netherlands evaluated midwives' attitude towards screening for distress during pregnancy and toward the management of antenatal care for distressed women. One hundred twelve midwives answered their questionnaire, and the results showed that although midwives were not motivated to screen for perinatal distress, they were willing to assist women who experienced such distress. Additionally, midwives who found perinatal distress to be an interesting topic had a more positive attitude towards attending distressed women (Fontein-Kuipers, Budé, Ausems, de Vries, & Nieuwenhuijze, 2014). It is not only midwives who need education regarding perinatal distress, as was seen in a systematic review of 10 studies. The aim of this review was to explore whether physicians detect, assess and manage anxiety and depression of pregnant women. Results indicated that there is a lack of

recognition of distress and of its management by physicians in this group of patients (Ford, Shakespeare, Elias, & Ayers, 2016). These findings were confirmed in a study conducted in the UK where the researchers explored the perspectives on mental health needs during pregnancy among 17 women and 15 professionals. The results indicated that the professionals underestimated the women's need for help during pregnancy (Franks, Crozier, & Penhale, 2016).

Distress-reducing interventions might be effective if the focus is on the pregnant woman and her partner/family (Nylen et al., 2013). In a prospective study of 39 distressed Icelandic couples, a brief family centered intervention was shown to be effective in lowering levels of distress and increasing the satisfaction with the partner relationship. Furthermore, it was shown that midwives who had referred these women for the intervention had been able to identify distress without use of any self-report psychological scales (Thome & Arnardottir, 2012). More studies are however needed to test further brief distress-relieving primary care interventions that could be provided by midwives.

## The Icelandic system

Iceland is a relatively homogeneous country when it comes to race, income, and educational level. Furthermore, it has been found to have the greatest equality between genders in the world (World Economic Forum, 2016). Despite that, family responsibilities have been bigger obstacle to women than men when it comes to education (Einarsdóttir, 2013) and women do have, on average, lower salary in comparison to men. Table 2 provides an overview of some measurable facts on gender equality of Icelandic women during the thesis study years and 2016.

*Table 2 Overview of fact on women´s gender equality in Iceland*

|  | 2007 – 2013* | 2016 |
|---|---|---|
| Women´s equality in relations to men's | 86%[a] | 87.4%[b] |
| Percentage of women with a basic salary lower than that of men | 18%[c] | 14%[d] |
| Ratio of male to female university students | 1:1.5 | 1:1.5 |
| Women's mean age of childbirth | 29.7 years[e] | 30.1 year[e] |
| Women's median age of childbirth | 29.6 years[e] | 29.9 years[e] |
| Fertility rate among Icelandic women | 2.10[a] | 1.75[g] |
| Mean births per year | 4725[f] | 4279[f] |

*The years when the study was conducted a) World Economic Forum, 2013;
 b) Statistics Iceland, 2016; c) World Economic Forum, 2016; d) Statistics Iceland, 2016; e) Statistics Iceland, 2017d; f) Statistics Iceland, 2017a; g) Statistics Iceland, 2017c.

Perinatal care is free of charge to all women who are Icelandic citizens and foreigners who are residents of Iceland and have been so for at least six months prior to requesting the service (Althingi, 2008). The Icelandic healthcare system is among the best in the world (Murray, 2017) and infant mortality rate is among the lowest in the world (Statistics Iceland, 2017b). The maternity and paternity leaves are both 13 weeks, with an additional 13 weeks of shared leave; during both periods, the parents receive 80% of their salary up to a salary roof (World Economic Forum, 2013). When the nine months of maternity/paternity leave is over, there is however, no guarantee of community-funded daycare services (Evans, 2011). The availability of such services differs by counties across Iceland. Children as young as 12 months are offered a childcare service in some towns/communities, but usually all children ≥2 years of age are offered community daycare (with a service fee). The gap that is anticipated between maternal/paternal leave and daycare service might lead to distress, in particular, to the expectant mother. Parents often try to lengthen their leave of absence from work with both working 50% or take their 4 weeks summer vacation as part of the maternity/paternal leave. If that is not possible, parents have to find someone to babysit until daycare service is available. In examining distress among Icelanders ≥18 years old, the Icelandic Directorate of Health reported that 31% of Icelandic women experience distress on a regular basis in their daily lives (Gisladottir et al., 2016). The fertility rate has been traditionally high in Iceland, but it has been declining over the past 10 years and is expected to continue to do so (Asgeirsdottir, 2009). In 2016 it was down to record low, 1.75 children per woman (Statistic Iceland,2017c). The Icelandic health care system is a welfare system with a similar structure to that of other Nordic countries. Quality health care and good access to health services are a priority for the country leaders, regardless of where people live. Individuals pay a small co-payment upon receipt of health care services (Asgeirsdottir, 2009).

Treatment by a psychologist however was totally excluded from the welfare system until 2016. At that time an action plan to offer psychologist services within primary health care centers was launched. Antenatal care is offered in primary health care centers, and midwives are employed by the government as other staff at the health care centers. The midwives are the primary caregivers of pregnant women, with GP and obstetricians assessing women at the request of midwives or the women themselves. Midwives undergo a 6-year university education program which includes a BSc degree in nursing as a prerequisite followed by a 2-year midwifery program. Although midwifery education is currently solid, it might fail to sufficiently emphasize the importance of perinatal mental health. This might result in possible limited provision of care for distressed women by midwives.

# THEORETICAL FRAMEWORK

In this thesis, the doctoral candidate develops knowledge regarding perinatal distress among women. The interest is to determine if perinatal distress has an effect on pregnancy and outcome of childbirths as well as to explore the possible mitigating factors of weak social support and dissatisfaction in the partner relationship. The aim is to bring the results of this thesis to midwives and obstetricians for improvement of clinical professional care for women and their families during the perinatal period.

## Dualism as a pathway of care during pregnancy

Organized antenatal care dates back to around 1900 when it was initiated within the medical field. During that time, diseases such as eclampsia during pregnancy, which often ended with deadly results, were the main drive in antenatal care structure (Alexander & Kotelchuck, 2001). The science behind the medical field is based on natural science positivism, in which emphasis is on observation, experiments, cause and effect. Its grounding reached back to Descartes' dualism, the philosophy which divides the human being into body versus mind (Benton & Craib, 2011). This dualism distinguishes between the body, as a physical thing, and the mind, as a nonphysical thing. This view led to the "Mind-Body Problem" as the body and the mind were found to be two different objects with no connection (Benton & Craib, 2011). A debate is still very much alive regarding the fact that a dualistic view continues to be strong within medicine (Mehta, 2011). Medical diagnosis, where the focus is only on either the mind or the body, is a clear exemplar of this. Physicians might gather information based on technology, rather than from the patient, to identify the problem or the illness and clarify it with diagnoses. Treatment suggested to the patients is then based on the diagnoses (Marcum, 2005). The care of a distressed woman during pregnancy, seen through the lens of dualism, would only offer

specialized care for women with a medical diagnosis of mental illness. Other alternatives to routine care might not be offered (O'Hara et al., 2014).

Recently, Jonathan Westphal, a philosopher, offered a new solution to the Mind-Body Problem. This is a new way of explaining "neutral monism," which was first introduced in 1887 by Ernst Mach, an Austrian physicist and philosopher (Blackmore, 1972). Westphal´s conceptualization of neutral monism is that both the mind and the body are elements of perception or power which are experienced as a physical and/or mental/psychological sensation (Westphal, 2016). A pregnant woman who experiences that she is not receiving helpful social support or is dissatisfied in the relationship with her partner would, according to Westphal's explanation, feel it both physically and psychologically. Accordingly, a woman who is experiencing pregnancy complications or difficulties around childbirth would then feel it both physically and psychologically.

Bodily distressed symptom is a relatively new term used among health professionals for describing a health condition that presents with physical symptoms without any recognized diseases (Creed et al., 2011). The bodily distressed syndrome concurs with Westphal´s neutral monism of the mind and the body. This condition has been studied in only a few scientific research studies but has been proposed to be included in the 11th version of the International classification of disease (ICD-11) as a diagnosis of medically unexplained symptoms (Budtz-Lilly, et al., 2015). This resulted from a Danish research project by Budtz-Lilly et al., that led to a development of a self-report questionnaire called the Bodily Distressed Syndromes Checklist (BDS-checklist). It is of particular interest that pregnant women were not included in the research project. The researchers give no explanation but most likely it is related to the fact that many of the symptoms identified as the bodily distressed symptoms coincide with what has generally been called "common complaints of pregnancy." These are symptoms such as fatigue, pain, nausea, vomiting, diarrhea, constipation, heart burn and so on. On the other hand, might these symptoms actually be bodily distress symptoms of pregnancy?

# Existentialism and embodiment in the pregnant body

An important view of the body and the mind comes from Merleau-Ponty (1945/2012) an existential philosopher, who took us away from the mind-body dualism and into the unity of the body – mind. Merleau-Ponty emphasized that we are our bodies and that an individual will experience the body as he/she is an embodied being. Heidegger (1927/2010), another existential philosopher, focused on how we sense the world. The world as the everyday lived experience is the basis for our understanding of the world as it is experienced through the

body (Heidegger, 1927/2010; Svenaeus, 2000). Based on this existential phenomenology, we can picture a pregnant woman being embodied in her pregnant condition and she will study her relationship with the world, to make sense of it. The Lifeworld Theory, based on Heidegger and Merleau-Ponty´s work, explains how we experience things/objects that frame our relationship with the world and this becomes our lived experience (Dahlberg, Dahlberg, & Nyström, 2008). The changes in the pregnant woman´s body during pregnancy together with social support or the lack of it and satisfaction or dissatisfaction in her partner relationship will be, according to Dahlberg et al (2008), her lived experience of the pregnancy and situate her in the everyday world. Therefore, we could say that the body is our connection with the world and, as Dahlberg (2019) emphasized, an individual does not know his/her body from the outside; he/she has to experience it.

Embodiment during pregnancy is the experience and awareness of the pregnant body (Dahlberg, 2019). According to Dahlberg (2019) The woman will sense the world from her point of view, through interaction with other people. At the same time, the pregnancy changes her relationship to her world. Dalberg continues to explain how a woman who knows her body and is in touch with it, trusts it. She feels herself capable of going through pregnancy and childbirth, although she does not know in the beginning how the "lived experience" will be, and what the future brings. This could also be the opposite, i.e., a woman might distance herself from the body if she does not trust it, for example in an unfamiliar or frightening situation, like a pregnancy and childbirth could be expected to be. Accordingly, this might also happen if she experiences that she cannot trust the people around her such as family, her partner or professionals. Feelings of distrust can indicate that the woman is distancing herself from her body and bring on more distress.

One of the key elements in a theoretical midwifery model for care of pregnant women who need specialized medical care, is that the midwife should balance the natural and medical perspective while caring for them (Berg, 2005). According to Berg, this might be accomplished through strong midwifery knowledge, reciprocal trust and a caring relationship as well as helping the woman to identify her situation and needs.


## Transition to motherhood

This thesis also draws upon the Transitions theory by Meleis (2010). Pregnancy marks the beginning of an important transition to one of the fundamental developmental stages in the rite of passage in an individual's life (Van Gennep, 2013/1960). The journey to motherhood constitutes a special role in the transitional process (Meleis, 2010). Neiterman (2012) explains this from a sociological standpoint, i.e., that the pregnant woman takes on the role and

during the transition, she is "doing pregnancy," the first step of which is to adjust and learn to be pregnant. The role transition for the pregnant mother consists of interaction and validation from others involved (Meleis, 2010). Women master pregnancy by self-care and finally they do pregnancy by making sure that they perform as a pregnant woman (Neiterman, 2012). Women do this for example, by stopping smoking and drinking alcohol, if that has been part of their lifestyles (Whitworth & Dowswell, 2009). They seek information on the process of pregnancy and come for antenatal care offered from midwives and other health care professionals (Bäckström et al., 2016).

   As a part of the normal role transition process, the woman may experience insecurity about the pregnancy or her ability to become a mother, which might cause mild stress. This mild stress is positive and gives the woman a drive to seek information and support (Meleis, Sawyer, Im, Hilfinger Messias, & Schumacher, 2010). How she succeeds may set the tone for her place in the social context on how she is graded in "doing pregnancy" (Neiterman, 2012). The woman might feel vulnerable and in need of encouragement, motivation and increased support. If she does not receive that, her adjustment might be jeopardized, and she might experience severe or pervasive distress that may be detrimental (Meleis et al., 2010). A woman who is experiencing perinatal distress might experience that she is bad at "doing pregnancy" as she is not doing it "right" (Neiterman, 2012) which then could affect her interaction with her social surroundings. According to Dahlberg, this could cause a vicious cycle within the woman, as discrepancy of expectation might feed into this feeling, which again could increase distress.

# RATIONALE FOR THIS THESIS

There is evidence that perinatal distress negatively influences maternal mental and physical health. Severe and pervasive distress has adverse consequences for the fetus and later the child and can even influence adult development and health. There is a relationship between perinatal stress and pregnancy- and childbirth-related outcomes. Based on this evidence, it is important to identify women who suffer from perinatal distress in order to implement appropriate interventions aimed to alleviate stress and thereby prevent adverse outcomes. Distress can be buffered by social support and satisfaction with one´s partner's relationship. However, more evidence is needed to understand perinatal distress in pregnant women and its effect.

By conducting research in this field, knowledge will be generated for health care professionals, to determine if women who are experiencing perinatal distress do indeed require increased care and evaluate if routine screening for perinatal distress should be launched during pregnancy. Symptoms accompanying perinatal distress might be mistaken as 'common complaints' during pregnancy and therefore midwives need deeper knowledge about perinatal distress and how to bring up appropriate questions in a caring way.

It is important to obtain more knowledge for midwives and other health care professionals caring for these women. With the research results, we might be able to improve the care offered to the distressed women and their families. Via sensitive care and conversation, we could offer more support and guidance to expectant women who experience distress during pregnancy. More accurate identification of perinatal distress might also enable health professionals to provide better support to prospective parents in order to prevent adverse outcomes.

# AIM

## Overall Aim

To achieve a deeper understanding of the situation among women who experience perinatal distress during pregnancy and childbirth and the effects that dissatisfaction in partner relationship and weak social support from family and friends have on pregnancy and childbirth.

## Specific Aims

The aims of the studies were:

I.      To generate knowledge about the possible association with satisfaction in the partner relationships and social support among Icelandic women who are dealing with perinatal distress.

II.     To: 1) determine the association between perinatal distress and pregnancy complications; 2) explore possible associations between pregnancy complications and satisfaction/dissatisfaction in the partner relationship and perceived support from family and/or friends; 3) investigate the associations between service and sick leave needs during pregnancy, perinatal distress, satisfaction/dissatisfaction with the partner relationship, and perceived support from family and friends.

III.    To assess the possible association between sick leaves certificates issued by physicians and perinatal distress during pregnancy. The aim was also to shed light on the possible influence of women's satisfaction with the relationship with her partner and social support from family and friends on sick leaves certificates issued for distressed and non-distressed pregnant women.

IV.    To explore the association between distress and pain management as well as medical interventions during childbirth among expectant mothers. Furthermore, we investigated the effects of weak social support or dissatisfaction in their partner relationship on the three outcome variables: use of pain management, medical interventions and mode of childbirth.

# MATERIAL AND METHODS

This thesis is based on four quantitative studies each represented in one of the four papers (see Table 3). Study I is solely based on data from The Icelandic study of perinatal mental health (ISPMH). Additional data were gathered from handwritten pregnancy records for study II and from handwritten childbirth records for study IV. Electronic sick leave certificates were obtained from the women´s electronic medical records for studies II, and III.

*Table 3. Overview of the studies in this thesis*

| Study | Design | Participants* | Data collection | Analyses |
|---|---|---|---|---|
| I | Cross sectional | 562** | Self-report psychological scales and Semi-Structured interview. | Descriptive statistic, independent samples $t$-test, Pearson's chi–square test and Multiple logistic regression. |
| II | Prospective cohort design | 503 | Self-report psychological scales. Semi-structured interview. Handwritten pregnancy records and Electronic sick leave certificates. | Descriptive statistics, correlation, independent-samples $t$-test, Mann-Whitney $U$-test, Pearson's chi-square test, and Backward logistic regression. |
| III | Prospective cohort design | 560 | Self-report psychological scales, Semi-structured interview, Electronic sick leave certificates and diagnoses accompanying each one of them. | Descriptive statistics, Mann-Whitney $U$-test, Pearson's Chi-square, and Fisher's exact tests |
| IV | Prospective cohort design | 442 | Self-report psychological scales. Semi-structured interview. Handwritten childbirth records. | Descriptive statistics, independent sample $t$-test, Pearson's Chi-square, Fisher's exact tests, two proportional tests, Spearman's rho correlation, and Logistic regression |

*The four studies were all based on data from the same 'participants. **Two women withdrew from the study after the completion of Study I.

# Design

This thesis is a prospective cohort study. The definition of a cohort study is a study design when a group of people (cohort) is followed over time. These people have some things in common but differ in certain factors and a non-experimental method is used to assess the outcome (Polit & Beck, 2018). In the thesis the women are followed during pregnancy and childbirth and "perinatal distress" is the presumable risk factor for problems during pregnancy and childbirth.

# Settings

This thesis was based on pregnant women who received their antenatal care from participating health care centers in Iceland. An invitation for participation was sent to directors of the Reykjavík Primary Health Care Center. A total of 17 different health care centers belong to the Reykjavik Primary Health Care Center. An invitation was also sent to the directors of the only Primary Health Care Center in Akureyri, Iceland's second largest urban area. A total of 11 primary health care centers participated, the one in Akureyri and 10 in Reykjavík. Midwives who are employees of each health care center offer antenatal care to women who live in the catchment area of each center. In Reykjavik, the catchment area is different from center to center, based on the location and population of the section of the city it serves. In Akureyri, the primary health care centers' catchment area is the town and the rural area around.

Antenatal care is offered from around the 12th week of pregnancy and women carrying their first child (primipara) are offered 10 visits, but women who already have children (multipara) are offered 7 visits. This routine is based on the NICE Clinical Guidelines on Antenatal care for uncomplicated pregnancies (NICE, 2017). These guidelines are based on women with uncomplicated pregnancy and normal previous childbirths, traditionally categorized as women in low–risk pregnancy. At these primary health care centers, women with medical needs (traditionally categorized as high–risk pregnancy) are also cared for. Women with perinatal distress are categorized as low risk pregnancy women in the guidelines if no medical diagnosis accompanies the distress. Midwives are the primary care takers of women with uncomplicated pregnancy but for women with medical needs, midwives share the care with a GP or obstetricians. At some of the participating primary health care centers women are seen by GP congruent with the booking visit by the midwife. If need for a sick leave certificate arise during pregnancy, the woman must be seen by a physician.

# Procedure for data collection

Women participating in ISPMH were screened three times during pregnancy as seen in Figure 3. Midwives at the participating health care centers introduced the research project to the women verbally and handed out the information letter and a package with self-report psychological scales. The women were encouraged to take the first package home and at the next antenatal visit, to deposit it into a specially closed mailbox located at the health care center service desk. The women could choose if they answered the second and the third package of the self-report psychological scales while they were at the health care center or bring it with them the for the subsequent visit.

A woman who accepted participation in a semi-structured interview could choose from three options for the interview location. This was 1) The health care center, where a private office was available for the interview; 2) The interviewer's working place, where also a private office was available for the interview; 3) A private setting, like home or working place, selected by the woman. The interviewers were female clinicians, one psychiatrist, two psychologists and the doctoral candidate, all with several years' experience in caring for pregnant women. During the interviews, the women's mental health was further assessed with the MINI-plus (Mini International Neuropsychiatric Interview) (Sheehan et al., 1998). The doctoral candidate received training on how to administer the MINI-plus, since she was the only one who had not administered it before. The interviewers had extensive clinical experience in distinguishing between symptoms of physical discomfort during pregnancy or mental health symptoms. Inter-rater reliability between the two main interviewers was high (Kappa = .86 [p <0.001], 95% CI 0.75, 0.97). During the interview either the woman's perinatal distress or non-distress status was confirmed by the interviewer, who was blind on the screening results before the interview.

In this thesis, along with background variables, two self-report psychological scales were used to identify the women reporting perinatal distress. Three questionnaires along with background questions were also applied to assess satisfaction in their partner relationship and their perceived social support during the second and third trimesters (marked with **bold** in Figure 3). These instruments are furthered described under the Instrument section on page 38.

| 12 weeks | 16 weeks (T-1) | 25 weeks (T-2) | 36 weeks (T-3) |
|----------|----------------|----------------|----------------|
| **Information letter handed out** | **DASS, EPDS** | **DASS, EPDS** | **DASS, EPDS** |

**Semi-structured interview**

The interviewer enquired: **Background Questions**, MINI-plus, SAPAS, **AEI**

The woman filled out: **MSPSS, DAS** and QLS
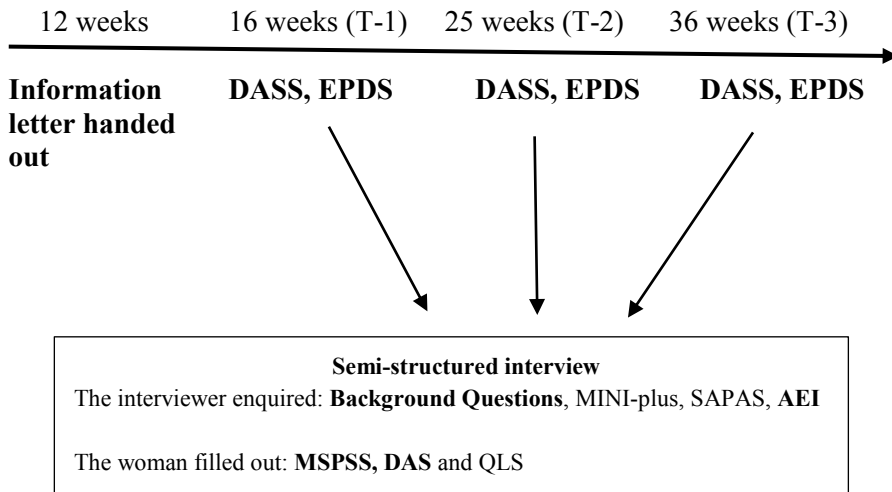
**Those** written in "**Bold**" are the **ones used in this thesis**.
Names of the scales:
**AEI: The Adverse Experiences Interview** (Lydsdottir et al., 2018)
**DAS: Dyadic Adjustment Scale** (Spanier, 1989)
**DASS: Depression Anxiety and Stress Scales** (Lovibond & Lovibond, 1995)
**EPDS: Edinburgh Postnatal Depression Scale** (Cox et al., 1987)
MINI-plus: Mini International Neuropsychiatric Interview Plus (Sheehan et al., 1998)
**MSPSS: Multidimensional Scale of Perceived Social Support** (Zimet et al., 1988)
QLS: Quality of Life Scale (Burckhardt & Anderson, 2003)
SAPAS: Standardized Assessment of Personality – Abbreviated Scale (Moran et al., 2003)

*Figure 3. Overview of psychological scales, questionnaires, screening time-points and interview.*

Data collection from the medical records was conducted after the ISPMH project was completed. The participants gave birth at a total of 7 hospitals around Iceland or had homebirths. In Iceland, pregnancy and childbirth records are archived at the hospital where a woman gives birth or by midwives who attend homebirths. Data were collected from three hospital archives in Iceland: The National University Hospital in Reykjavik (identified in this thesis as Hospital 1), the Akureyri Hospital (Hospital 2) and The Health Care Institution of West Iceland, Akranes (Hospital 3). Permission for data collection was not sought for the homebirth midwives' records and for records at four rural hospitals (see Table 4). Data were collected by the first author and two experienced midwives not involved with any other part of this thesis. A list of

the women´s names and ID-numbers was handed over to the hospital's archives personnel, who collected the requested records.

## Participants in the thesis

Participants in this thesis were 562 women, who came for a semi-structured interview during the pregnancy after being screened with self-report phycological scales. Totally 2523 pregnant women participated in the ISPMH and were screened for distress. Data were collected from late 2006 – 2012 and the first participants gave birth in 2007 and the last one in 2013. Women who screened positive for depression or anxiety at any of the three T- time points were contacted and after the first positive screening offered to participate in a semi-structured interview, around two weeks post screening. They were categorized as the Perinatal Distressed Group (PDG). According to the ISPMH protocol, the research assistant contacted every fourth woman who screened negative and offered participation in the Non-distressed group (NDG) which was the comparison group throughout the thesis. Evaluation of stress symptoms on the DASS Stress Subscale was conducted as a secondary analysis after recruitment of the sample, resulting in moving 21 women from the NDG to the PDG. In Figure 4 the recruitment and drop-out of the ISPMH are described.

The criteria for inclusion in the study were: (a) being at least 16 years of age and receiving parents' permission to participate if younger than 18 years (b) being able to read and speak Icelandic. Exclusion criteria in the ISPMH were being younger than 16 years, language barrier towards written and spoken Icelandic, already diagnosed with Schizophrenia, acute psychotic symptoms, and/or cognitive impairment symptoms, assessed by midwives recruiting the women.

The Total number of participants in studies I - IV varied as described in Table 4. No exclusions were used in Study 1 and III. A decision was made to exclude women carrying twins in studies II and IV, due to their expected medical needs during pregnancy. In Study II women with an increased likelihood of multiple visits and complicated pregnancies were excluded since our focus was to assess the service needs in relation to perinatal distress. In Study IV we excluded women with an increased likelihood of needing induction, since a known side effect of induction is an increased likelihood of intervention.

```
┌─────────────────────────────────────────────────┐
│     2523 women screened for depression and anxiety │
└─────────────────────────────────────────────────┘

┌───────────────────────┐     ┌───────────────────────────────┐
│ 632 (25.95%)          │     │ 1891 (74.05%) screen negative  │
│ screen positive       │     │                               │
│                       │     │ Every fourth woman was asked to│
│                       │     │ participate in the comparison  │
│                       │     │ group = 462 (24.43%)          │
└───────────────────────┘     └───────────────────────────────┘

┌───────────────────┐                     ┌───────────────────┐
│ Dropout           │                     │ Dropout           │
│                   │                     │                   │
│ 293 (46.36%)      │                     │ 239 (51.73%)      │
└───────────────────┘                     └───────────────────┘

┌───────────────────────┐     ┌───────────────────────┐
│ 339 (53.64%) agreed to│     │ 223 (48.27%) accepted to│
│ come for an interview │     │ come for an interview  │
│ during pregnancy.     │     │ during pregnancy       │
└───────────────────────┘     └───────────────────────┘

            ┌───────────────┐
            │ 562 (100%)    │
            └───────────────┘

                    ┌───────────────────────────────┐
                    │ Secondary analysis conducted   │
                    │ with DASS stress scale.        │
                    │ 21 women transferred to the    │
                    │ PDG                           │
                    └───────────────────────────────┘

┌───────────────────────┐     ┌───────────────────────┐
│ 360 (64.06 %)         │     │ 202 (35.64 %)          │
│ women in the PDG      │     │ women in the NDG       │
└───────────────────────┘     └───────────────────────┘
```
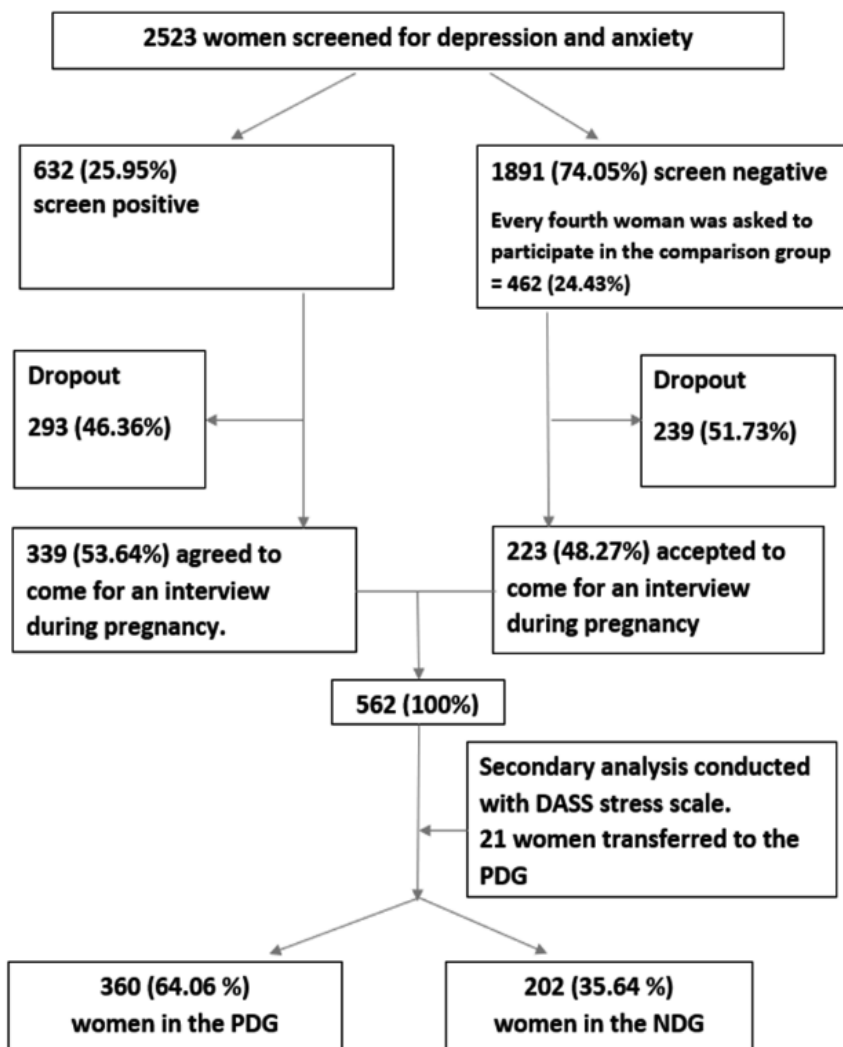
*Figure 4 Recruitment and drop-out of the Icelandic Study of Perinatal Mental Health*

*Table 4. Overview of sample, missing records and exclusion criteria in each of the studies.*

| Study | Sample | Exclusion | Reason for exclusion |
|---|---|---|---|
| I | 562 | 0 | |
| II | 503* | 57 | • ICD-10 diagnosed expected to involve amplified antenatal care for the women (n = 25) <br> • Multiple pregnancy (n = 9) <br> • Pregnancy records not available (n= 23) ** |
| III | 560* | 0 | |
| IV | 442* | 120 | • Gestational diabetes (n=16) <br> • Hypertensive diseases (n=31) <br> • Previous C/S (n=31) <br> • Various severe medical problem (n=8) <br> • Multiple pregnancy (n = 9) <br> • Childbirth records not available (n= 23) ** |

*Two women withdrew from the ISPMH project after Study I was completed.
** Missing pregnancy and childbirth records (n=23)
  i. Gave birth at home (n=10)
  ii. Birth at a rural hospital (n=4)
  iii. Information missing about the birthing place (n=7)
  iv. One woman miscarried after participating in an interview
  v. One pregnancy record was lost during pregnancy

# Instruments

The identification of perinatal distress in this thesis is based on two self-report psychological scales. These are the Depression, Anxiety, Stress Scale (DASS) (Lovibond & Lovibond, 1995) and the Edinburgh Postpartum Depression Scale (EPDS (Cox et al., 1987). During the semi-structured interview, the women answered two questionnaires, the Dyadic Adjustment Scale (DAS) (Spanier, 1976) and the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988).

## DASS

*The Depression, Anxiety Stress Scales (DASS)* are self-report psychological scales consisting of three subscales that measure negative emotional states of depression, anxiety, and stress (Lovibond & Lovibond, 1995). Each scale consist of 14 items and individuals are asked to rate each item as experienced during the previous week. Scores for each item range from number 0 – 3 so the lowest score is zero and the highest 42 for each subscale. Participants pick the number that best applies to them: (0) did not apply at all; (1) applied to some

degree, or some of the time; (2) applied to a considerable degree, or a good part of time; (3) applied very much, or most of the time. Cut off scores for anxiety was ≥ 8, for depression ≥ 10 and for stress ≥15. These cut-off scores indicate a mild state of either of these three conditions. Individuals scoring above ≥ 10 for anxiety, ≥ 14, for depression and ≥ 19 for stress indicate a moderate anxiety (Lovibond & Lovibond). Psychometric properties for DASS were found to be acceptable among a study of 439 outpatients in Canada. The Cronbach's alpha in that study was for Anxiety α =0.89, Depression α = 0.96, and Stress α = 0.94 (Clara, Cox, & Enns, 2001). DASS was available in Icelandic and is used extensively in Icelandic health care centers by GP but not specially aimed for use in perinatal care. Cronbach´s alphas (α) in the ISPMH study are presented in Table 5.

## EPDS

*The Edinburgh Postpartum Depression Scale (EPDS)* is a 10–item self-reporting psychological scale originally designed to screen for symptoms of postnatal depression (Cox et al., 1987) but has been used and tested during pregnancy with satisfactory psychometric properties. EPDS is the most widely used method to identify symptoms of current depression in childbearing women (Cox et al., 1987). The scale focuses on depression. Women are asked to reflect on the previous seven days and the scale covers symptoms such as self-blaming, feeling sad, ability to laugh, feeling unhappy, a feeling of panic, sleep disturbance and crying due to unhappiness. Scoring is from 0 – 30, higher scores indicating more symptoms of depression (Cox et al., 1987). A cut-off score of 10 to 13 is most commonly used to differentiate between screen positive and screen negative women (O'Hara & Wisner, 2014). Scores of ≥ 12 were used in this study. Cronbach's alpha for all three T- time points is presented in Table XB There are two Icelandic translation of EPDS available (Lydsdottir et al., 2019; Thome, 2000). The first one was translated by Thome (2000) but the latter was translated as part of the ISPMH design and used in this thesis.

*Table 5 Cronbach's alpha (α) in the ISPMH for DASS and EPDS*

| Scales | T1 (16 weeks) | T2 (25 weeks) | T3 (36 weeks) |
|---|---|---|---|
| **DASS** | α; (95% CI) | α; (95% CI) | α; (95% CI) |
| Depression | 0.92 (0.91 - 0.92) | 0.92 (0.91 -0.92) | 0.92 (0.91 – 0.92) |
| Anxiety | 0.85 (0.84 – 0.86) | 0.86 (0.85 – 0.87) | 0.87 (0.86 – 0.88) |
| Stress | 0.92 (0.92 – 0.93) | 0.93 (0.92 – 0.93) | 0.93 (0.93 – 0.94) |
| **EPDS** | 0.85 (0.84 - 0.86) | 0.84 (0.83 – 0.85) | 0.84 (0.83 – 0.85) |

## DAS

*Dyadic Adjustment Scale (DAS)* is a 32-item questionnaire assessing several components of a marital or partner relationship (Spanier, 1976). It was developed as a tool for measuring quality of dyadic relationship with a focus both on married couples and unmarried cohabiting couples. The list consists of four subscales: (a) consensus on matters of importance to marital functioning is assessed by 13 items, (b) dyadic satisfaction by 10 items, (c) dyadic cohesion by 5 items, and (d) affection expression by 3 items. (Spanier, 1976; Spanier & Thompson, 1982). Twenty-three items are answered on Likert scale: always agree (5), almost always agree (4), occasionally disagree (3), frequently disagree (2), almost always disagree (1) and always disagree (0). Five items have a Likert scale from not at all (0), most of the time (1), more often than not (2), occasionally (3), rarely (4) and never (5). Two items have completely opposite Likert scale coding, (0) never to (5) most of the time. One item has a seven item Likert scale and one question is dichotomized. The DAS instrument has been widely used and has satisfactory psychometric test results in a sample of married and divorced American people with Cronbach's alpha = .95 - .96 (Carey, Spector, Lantinga, & Krauss, 1993; Spanier, 1976). The instrument was translated into Icelandic by the ISPMH team and Cronbach's alpha was α = 0.92.

The total scoring of the DAS ranges from 0 – 151 and satisfaction with the partner relationship increased with higher the scores (Spanier, 1976; Spanier & Thompson, 1982). A study was conducted to dichotomize DAS and compare it with two other dichotomized scales, the Martial Adjustment test (MAT) and the Revised Marital Adjustment test (RMAT). The aim was to make clarity conceptually and statistically of the DAS scale. Results demonstrated that a score of ≤ 107 indicates a status between dissatisfaction and satisfaction in the relationship (Crane et al., 1990). A decision was made in the conception and design of this thesis to dichotomize DAS. Accordingly, scores of ≤ 107 indicate dissatisfaction in relationship with partner and scores of ≥ 108 indicate satisfaction in relationship with partner. The argument for using the DAS scale this way was to make the distinction between satisfaction vs dissatisfaction convenient for use in antenatal care practice.

## MSPSS

*Multidimensional Scale of Perceived Social Support (MSPSS)* is a 12-item self-report questionnaire assessing perceived social support (Zimet et al., 1988). It consists of three subscales: The family subscale, the friend's subscale and significant other's subscale. The instrument was developed to evaluate an individual´s self-assessment of social support from friends, family and significant other. Definition of who is the significant other is solely left to the respondent. In an e-mail conversation with Dr. Zimet on April 4th, 2016 he commented:

40

*When we developed the MSPSS we chose to leave the "Significant Other" items somewhat vague, to allow respondents to choose. For some it may refer to a spouse or romantic partner, for others it could be a close friend, a priest, a rabbi, or some other specific individual who might provide support*

The MSPSS is developed based on the hypothesis that higher levels of perceived social support will be associated with lower levels of depression and anxiety. It has satisfactory psychometric test results with Cronbach's alpha = .92 in a sample of 265 pregnant American women (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). The MSPSS is a widely used instrument and was translated to Icelandic by ISPMH-group. In the translated version Cronbach's alpha for the "Significant other subscale" was α = 0.95; for the "Family subscale" it was 0.92 and for the "friends' subscale" 0.94.

Scoring of the MSPSS is done by evaluating each subscale separately. The scoring is done on a Likert scale, from 1 – 7 for each item. The lowest score on each scale is four and the highest 28, with 4 as a median score. Higher score indicates stronger support, either from family, friends or significant other (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). A decision was made during the conception and design of this thesis to dichotomize the MSPSS subscales. Each of them was dichotomized into: ≤ 16 indicating "weak support" and ≥ 17 indicating "strong support" from either family, friends or significant other. The main argument for doing this was for clarification on the concept "support" and to simplify results from the scale for possible use in antenatal care practice. The argument to pick 16 as a cut –off for weak or strong support was that if a woman had chosen 4 (median) or lower for each question on each subscale the scoring would be maximum 16 and therefore the woman would be assessing her support as not being strong.

## AEI

*Adverse experiences Interview (AEI)* is a questionnaire regarding adverse life experiences was developed by members of the ISMPH group, as no suitable scale was available that met one of the aims of the ISPMH project. The questionnaire is in the form of a semi-structured interview and is divided into two parts. The interviewer first asked the person to think about childhood up to 18 years of age and after that the second part is dedicated to adulthood after 18 years of age. The childhood part consists of 11 dichotomized questions concerning adverse experiences and the adulthood part consists of 13 questions. The adverse experience covers a variety of incidences like death of loved once, accidents, severe illness and violence experience (Lydsdottir et al., 2018). In this thesis, we analyzed responses to two questions from the AEI, both relating to experiencing mental, physical, and/or sexual violence from an intimate

partner during adulthood. The choice of these questions was based on results from a study showing association between experience of violence and distress during pregnancy (Finnbogadóttir, Dykes, & Wann-Hansson, 2014).

## Background variables

Sociodemographic background data included: maternal age, marital status, size of family, para, number of children in the family, own – and stepchildren, educational level, employment status, percentage of weekly employment, satisfaction with division of household tasks and child-rearing, financial situation, use of tobacco, alcohol and drug use, and current or earlier treatment for mental health problems.

# Data collection and Analysis

## Study I

### Data collection

Data in this study is solely based on data from the ISPMH. Data were gathered by screening the women at three T-time points during pregnancy and from data collected during the semi-structured interview.

### Data analysis

Statistical analyses used to explore differences between the PDG and the NDG included: Independent samples $t$-test and Pearson´s Chi–square test. A multiple logistic regression was conducted for all significant variables. The level of significance for all tests was pre-set at $p < 0.05$, and the confidence interval (CI) was set at 95%.

## Study II

### Data collection

Data from the ISPMH were used in this study along with data from pregnancy records. The data from the pregnancy records were documented directly into a computer excel sheet, developed by the doctoral candidate (See Figure 5. Appendix A). The data collection was structured from existing scientific literature regarding perinatal distress, outcome of pregnancy and the International Classification of Primary care (ICPC-2-R), (WONCA International Classification Committee, 2005). Each complaint (variable) might involve many documented items and for some complications there might be more than one incidence when a woman reports similar problems, such as contractions without cervical change. We documented up to three incidences

for each of these problems. On the other hand, variables indicating complaints regarding physical/psychosocial health of the women were counted only once, if documented. These variables were then dichotomized. For example, in a medical record where sleep disturbance is documented once or more often, a "yes" is documented in the datasheet. Data on the participants' sick leave certificates were received in an excel sheet after an employee at TM Software® obtained the data from the electronic medical record. TM Software (currently named Origo®) is a software developing company which, through a contract with the Directorate of Health in Iceland, is responsible for the development, quality and security of electronic medical records in Iceland.

### Data Analysis

Statistical analyses included descriptive analyses and Pearson's Chi-square, Fisher's exact tests, Independent samples *t*-test, Mann-Whitney *U*-test, and Backward logistic regression. A backward logistic regression was applied and presented in three modules in order to identify the association between perinatal distress, background variables, social support, and satisfaction in terms of partner relationships and pregnancy complications. The level of significance for all tests was pre-set at $p < 0.05$, and the confidence interval (CI) was set at 95%. For analyses of partner relationship, women without a partner were excluded from analysis when appropriate. The two questions regarding violence were merged into one variable. Separate analyses were done with two subgroups of the sample. *Subgroup 1* PDG divided after satisfaction or dissatisfaction in their partner relationship. *Subgroup 2* PDG divided after weak or strong family support.


## Study III

### Data collection

From the participants' electronic medical records, data were obtained on sick leave certificates issued by physicians during the index pregnancy (see Study II). The data included total number of sick leaves issued during the pregnancy, the period from the date of issue until the childbirth. Data was also gathered regarding whether the sick leave was a partial or full-time permission for absence due to sickness. The data was then analyzed along with data from the ISPMH. The variables used to identify health care problems /diagnoses documented alongside the sick leaves came from two systems used simultaneously among physicians practicing in Iceland: the World Health Organization's, ICD-10 (International classification of diseases and other health problems) (WHO, 2010) and the International Classification of Primary Care, ICPC (WONCA International Classification Committee, 2005).

### Data analysis

Statistical analyses used to explore differences between the PDG and the NDG were: Independent samples *t*-test, Mann-Whitney *U*-test, Pearson's Chi-square and Fisher's exact tests and descriptive analyses. The level of significance was pre-set at p<0.05 and the confidence interval (CI) at 95%.

## Study IV

### Data collection

Along with data from the ISPMH, data from childbirth records were gathered for this study (see Figure 6, Appendix B). The procedure was similar to data collection in Study II and was performed simultaneously. Data were extracted from the women´s childbirth records including pain relief methods, medical interventions, mode of childbirth, and total duration of childbirth. Data on the fetus/new-born included fetal distress, gestational age at birth, birthweight, and admission to the Neonatal intensive care unit (NICU).

### Data analysis

Statistical analyses used to explore differences between the groups included: An Independent sample t-test, Pearson's Chi-square, Fisher's exact tests, Mann-Whitney *U*-test, and Two proportional tests, Spearman's rho correlation and descriptive analyses. A backward logistic regression analysis was conducted for all significant variables. The level of significance was pre-set at p <0.05 and the confidence interval (CI) at 95%. Due to strong correlation between the family- and friends support variables (rho = .474, n= 436; p < .001) no further analysis was conducted with the friends support variable.

## Additional data collection and analysis

After the initial documentation from pregnancy and childbirth records, a second "round" was conducted to further assess the midwives' documentation on: 1) Experience of being a victim of violence during adulthood or if violence was documented in the medical records, and 2) "Do you have a history of perinatal distress" which midwives are required to ask at the booking visit. Information were also gathered regarding number of women who gave birth at the low risk unit versus the high-risk unit at Hospital 1. It was the only hospital in the country, where women had a choice regarding if they gave birth in the high-tech unit (labor ward) versus low tech unit (called "The Nest"). A descriptive analysis and a Pearson´s Chi-square test were conducted.

# Ethical consideration

The thesis was designed in accordance to the Declaration of Helsinki (World Medical Association., 2008) and the Icelandic Law on Bioethical research (Althingi, 2014). Study I was ethically approved as part of The ISPMH by the Icelandic National Bioethical Committee (ref. no. 05-107-SI) and the Data Protection Authority (ref. no. S2589). Studies II, III and IV were also approved by the Icelandic National Bioethical Committee (VSN-15-135). Permission was given by the director of nursing and midwifery as well as the medical director at the Primary Health Care Center of the capital area, Reykjavik, Iceland as well as the medical director of the Health Care Institution of North Iceland (HSN), as the Primary Health Care Center in Akureyri is part of HSN. Permission was also granted by the medical director of the National Hospital of Iceland (identified as Hospital 1), the medical director of Akureyri Hospital, Iceland (Hospital 2), the medical director of the Health Care Institution of West Iceland, Akranes, Iceland (Hospital 3).

Midwives introduced the study by oral and written information to pregnant women during the booking visit, around the 12th gestational week. Women who agreed to participate signed an informed consent before participation. The women deposited, the informed consent in a sealed envelope, into a locked mailbox at the Health Care Center´s service desk. None of the four interviewers who conducted the semi-structured interviews participate in the women's antenatal or childbirth care. The interviewers were all blind to the screening outcomes of the participants.

Health care professionals not involved in conducting the research were available for women who were in need of psychiatric treatment or felt they needed support after participating, since questions asked in the interview could have disturbed women's feelings and thoughts. The midwives who collected data for Study II and III did not work currently at any of the hospitals involved. They signed a confidentiality agreement at the hospitals where they participated in the data collection

# RESULTS

In this section, the results from the four studies in this thesis will be described briefly. It starts with the results from study I since it serves as the basis for the women´s circumstances in the thesis. Results from studies II, III, and IV will be described in chronological order, first with description of the effect of perinatal distress on pregnancy (II) 'pregnancy study' followed by the need of sick leave among pregnant distressed women (III) 'sick leave study.' The final study is on the association between perinatal distress and childbirth (IV) 'childbirth study.' Results from each paper starts, if appropriate, by discussing the whole sample and then the difference between the Perinatal Distress Group (PDG) and the (Non-Distressed Group (NDG). For a more complete description of results, see the respective individual papers. Extra data were gathered from the participants' medical records after the studies were completed. These results are presented separately at the end of this section.

## Study I, Perinatal distress, dissatisfaction in partner relationship and weak social support

Of the 560 women in the sample, there was no significant difference between multipara 335 (59.2%) or primipara 225 (40.8%) women. The mean number of individuals in the women's household was 2.89 (range 1 -8). Women´s reported doing on the average 60.6% of the division of the household and child-rearing. Ninety-six (18.7%) of the participants were dissatisfied in their relationship with their partner. Weak social support from family was reported by 57 women (10.3%) and weak social support from friends by 53 (9.4%) but almost all the women, or 95.9%, received strong support from a significant other.

Three hundred-sixty (64.1%) of the participants were assigned to the PDG and 202 (35.9%) to the NDG group. See figure 4 (page 37), for a description of

the total study sample and dropout. The women in the PDG had a mean score of 14.9 (range 12 – 26) on the EPDS. Their mean score on the DASS Depression subscales was 16.5, (range 8 – 40). The mean score for the DASS Anxiety subscale was 13.2 with range (10 – 42) and for the DASS Stress subscale the mean score was 22.1 (range 15 – 41).

There was no significant difference in age between the PDG, with an average of 28.4 years (range 17-43 years), and the NDG, with an average of 29.9 years (range 17 – 47 years). An association was also found between women in the PDG and elementary or lower educational level, unemployment or student status, smoking during the pregnancy, financial difficulties, and/or currently receiving mental health therapy or having a history of mental health therapy. When satisfaction in the relationship with their partner was analyzed between the PDG and the NDG, results indicated a significant difference (p<0.001), as 83 of the women (86.5%) belonged to the PDG and 13 (13.54%) to the NDG. A significant association (p=0.002) was found between receiving weak social support from family and belonging to the PDG (n=47, 82.5%) rather than the NDG (n=10, 17.54%). A similar association was noted for women receiving weak support from friends, as 45 of them (82.5%) belonged to the PDG and 8 (15.9%) to the NDG.

Results from multivariate analyses showed that women in the PDG were more likely (AOR 4.59) to be dissatisfied in the relationship with their partner than women in the NDG, have lower educational level (AOR 2.29), and to be students (AOR 2.84) or unemployed (AOR 1.85). They were also more likely to be dissatisfied with the division of household tasks and child-rearing (AOR 1.99). The PDG was also more likely than the NDG to continue to smoke (AOR 3.83).

## Study II, Pregnancy complications among distressed women

In study II, 503 women from the ISPMH met the inclusion criteria, 318 (63.9%) in the PDG and 185 (36.1%) in the NDG. Results from this study differs from study I, as there was an association between belonging to the PDG and being younger (p=.001). These results also add to results from study I, as we found an association between being in the PDG and not living with the father of the child (p=.014), having experienced violence during adulthood (p=0.003) and using psychiatric medication (p=0.22), although only 33 (5.9%) women reported having taken prescriptive psychiatric medication. There was no difference between the PDG and NDG regarding primipara and multipara, and the average number of earlier childbirths was 1.4 per multipara woman.

The women in the PDG were significantly more likely than women in the NDG to complain about being fatigued (OR 2.67), experiencing vomiting (OR,

2.17) having pelvic girdle pain (OR 1.57) and sleeping difficulties (OR 1.66). Women in the PDG were more likely to experience vaginal bleeding than the NDG (OR 4.09), but only three women were in the NDG. Results from *Subgroup 1* (PDG and satisfaction/dissatisfaction in partner relationship) indicated 69 women (22.3%) in the PDG were dissatisfied in their partner relationship. They did not experience pregnancy complications more frequently than the 209 (77.7%) women in the PDG who were satisfied in their partner relationship. Women in *Subgroup 2* (PDG and weak/strong family support) who reported weak family support (n=42, 13.5%) were significantly more likely than women in the PDG with strong family support (n=270, 86.5%) to experience fatigue (p=0.03), nausea (p=0.02) and/or heartburn (p=0.007).

A backward stepwise logistic regression was performed to assess if perinatal distress predicts complications during pregnancy. This was done using three step modeling and eight variables contributed significantly to the final model. Women in the PDG were significantly more likely than women in the NDG to experience pregnancy complications ($\chi^2$ [12 n= 399] = 94.49, $p <$ 0.001; Nagelkerke $R^2$ = 0.287). Women in the PDG were also significantly more likely than women in the NDG to continue to smoke during pregnancy (AOR 5.23), be dissatisfied in the relationship with their partner (AOR 3.22), and to be dissatisfied with division of household tasks and child-rearing (AOR 2.14). They were also significantly more likely to have a history of mental health therapy (AOR 1.79) and experience fatigue (AOR 3.59), vomiting (AOR 2.50) or pelvic girdle pain (AOR 1.76). We also observed that women who were unemployed or students were more often found in the PDG, but this was not statistically significant.

Results from a comparison between the PDG and the NDG on the need for service showed that women in the PDG needed a significantly increased amount of perinatal care service than the NDG, both from midwives (*p*=0.010) and obstetricians (*p*=0.011), resulting in more total antenatal visits for women in the PDG (*p*=0.027). Women in the PDG who experienced weak family support also needed significantly more antenatal visits (*p*=0.017), than PDG with strong family support, although there was no difference between service from midwives, obstetricians or GPs. Dissatisfaction in the relationship with the partner did not indicate a significant difference in need for service.

# Study II and III, sick leave certificates and pregnancy

Of the total number of participants (n=560), 303 (54.1%) received at least one sick leave certificate issued by a physician during the pregnancy (III). The mean number of sick leaves issued to the group was 1.9 (range 1 – 6) (II). Of the total number of women receiving sick leave, the ones who were dissatisfied with the division of household tasks and child-rearing (n=121, 22.2%) were found by a Mann Whitney test to do less of the household and child-rearing (M = 58.34, SD = 23.197) than those who were satisfied with their share of household tasks and child-rearing (M = 63.50, SD = 25.82; p = 0.015) (III)

No significant difference (p = 0.124) was found between issuing of sick leave certificates to women in the PDG 185 (51.7%) or the NDG 118 (58.4%) (III). However, the second sick leave was issued on the average 30 days earlier to women in the PDG than to those in the NDG, which was a significant difference (p=0.004) (II). Women in the NDG, on the other hand, received significantly (p=0.027) more frequently full-time sick leave when the second one was issued (III). Women in *subgroup 1*, PDG who were dissatisfied in their partner relationship and received at least three sick leaves, were allocated theirs up to 42 days earlier than PDG who were satisfied in their relationship (II). Women in *subgroup 2*, PDG who reported weak family support on the average received their first certificate up to 39 days earlier than PDG who reported strong family support (II).

It is also noteworthy that the PDG with weak family support (subgroup 2) received their first sick leave earliest in the pregnancy compared to other participants, or up to 145 days before the childbirth (II). These women received either a part time or full-time sick leave. One hundred forty-four (47.5%) received full time sick leave as the first allocation. When the second was issued, 126 (41.6%) of the women received a full-time certificate (III).

Results from study III indicated an association between receiving sick leave certificates among women in the PDG who were ≥ 25 years old (p=0.048), had elementary or less education (p=0.016), were employed (p=0.013), were dissatisfied in division of household tasks and child-rearing (p=0.008) and were dissatisfied in their partner relationship (p=0.0001). There was also an association between receiving sick leaves, being in the PDG and having no previous history of mental health therapy (p<0.001). Interestingly, there was an association found between smoking during pregnancy and not receiving a sick leave (p=0.002).

The most common reason for sick leave certificates was pelvic girdle pain. "Other pregnancy problems" was the second most common group of diagnoses. These included, for example, reasons such as high or low blood pressure, vaginal bleeding, vomiting, premature contractions, Braxton hick's

contractions, hemorrhoids, physical pain and gestational diabetes. Only 13 women (4.3%) were allocated sick leave due to distress.

# Study IV, Childbirth experiences among perinatally distressed women

Women who screened with distress at T1 used epidural significantly more often (p=0.001) as a single pain management during childbirth than women in the PDG who screened positive at T2 or T3. Overall the PDG were more likely than the NDG to use epidural anesthesia as the single pain management after adjusting for background variables (AOR 2.86). There was also a correlation found between use of epidural analgesia in combination with other pain management and the PDG (p=0.020) although this difference was not significant after adjusting for background variables. The situation did however not differ between the women who used epidural or other participants regarding cervical dilation, the strength of the contractions, or the intensity of pain documented by the attending midwives. Women in the NDG were significantly more likely than women in the PDG to go through the childbirth without use of pain management (AOR 0.43, 95% CI 0.23 – 0.80).

There was no difference between women in the PDG and the NDG regarding mode of childbirth, intervention other than pain management use, duration of the childbirth or the newborn's outcome. Women who were dissatisfied in the relationship with their partner were however more likely to need an induction (OR 1.88), an episiotomy (OR 2.17) and deliver with a vacuum extraction (OR 3.58). After adjusting for background variables these differences were not significant, although a trend was observed between episiotomy and dissatisfaction in the relationship with their partner.

# Additional data results

We were able to assess 514 medical records. The missing 46 belonged to women who gave birth at the Health Care Institution of West Iceland (Hospital 3). In 43 (8.4%) pregnancy records, there was a documentation confirming that the midwives had asked the women if they had experienced violence during adulthood. There was no significant difference between the PDG and NDG. Fifteen (34.9%) of the women who were asked confirmed violence experience, but 27 (62.8%) denied violence experience. An answer from one woman was not documented. No other documentation of violence was found in the pregnancy records. During the semi-structured research interviews, however, 110 (19,6%) answered yes to the question if they had been a victim of violence

during adulthood (II). These findings indicate that at least 95 (16,9%) women went through the current pregnancy and childbirth without their violence history having been assessed. There was a significant association between history of being a victim of violence during adulthood and belong to the PDG (p= 0.003) (II).

The data showed that midwives asked 85.4% of the participants regarding perinatal distress. As seen in Table 6 there was a significant association between women in the PDG and answering 'yes' to the midwife´s question (p <0.001). However, 48.0% of women categorized in the PDG denied distress when asked.

Table 6.  *Response to the midwife´s question in antenatal care, regarding perinatal distress. N = 514*

|  | Total N (%) | PDG n (%) | NDG n (%) | p |
|---|---|---|---|---|
| **No** | 248 (100) | 119 (48.0) | 129 (52.0) | <0.001 |
| **Yes** | 191 (100) | 162 (84.8) | 29 (15.8) | |
| **Not asked** | 75 (100) | 49 (65.3) | 26 (37.4) | |

Significance was set at p< 0.05

In total, 445 (79.5%) of the women gave birth at the National Hospital of Iceland, Reykjavik. Of those, 288 (64.7%) belonged to the PDG which was 80% of the total PDG. One hundred fifty-seven (35.2%) belonged to the NDG, which was 77.7% of the total NDG. This hospital is the only one in Iceland where women could choose a high-tech versus low tech unit when giving birth. The low-tech unit was managed by midwives with a focus on natural birth without medical interventions but was closed down in 2013. The high-tech unit is managed by midwives and obstetricians and offers all up-to-date medical interventions for childbirth. There was a significant association found between belonging to the PDG and giving birth at the high-tech unit. (Table 7).

Table 7. *Choosing of unit for giving birth at hospital 1 between PDG and NDG.*

| Unit | PDG | NDG | p |
|---|---|---|---|
| **Labor ward** | 231 (67.7) | 110 (32.3) | 0.016 |
| **The Nest** | 57 (54.8) | 47 (45.2) | |

Significance was set at p< 0.05

# DISCUSSION

## Discussion of findings

The overall aim of this thesis was to achieve a deeper understanding of the situation among women who experience perinatal distress during pregnancy and childbirth and the effects that dissatisfaction in partner relationship and weak social support from family and friends have on pregnancy and childbirth. Our results indicate that perinatal distress, dissatisfaction in partner relationship and weak social support all affect women's pregnancy and childbirth. Dissatisfaction with division of household tasks and child-rearing was also a significant variable affecting pregnancy.

The thesis results will be discussed in the following sections: First, I will discuss the association between perinatal distress and pregnancy complications, including the need for sick leave and professional service during pregnancy. Next, I will discuss the effect of perinatal distress on childbirth. Subsequently, I will discuss the effect of dissatisfaction with partner relationship on pregnancy and childbirth. I will then discuss the effect of weak social support and, finally, the effect of dissatisfaction with division of household tasks and child-rearing on pregnancy and childbirth. In the discussion section I have chosen to identify the women as perinatal distressed and non-distressed, instead of discussing them as the PDG or the NDG. The purpose of this is to discuss the findings in a broader context, rather than only in reference to the study groups.

### Women who experience perinatal distress are prone to pregnancy complications

After adjusting for background variables, the results support an association between distress and several complications. A complaint of fatigue should be taken as a warning sign for perinatal distress (II). In earlier studies on pregnancy complications, fatigue and tiredness have been assessed as one and the same

complication (Dørheim, Bjorvatn, & Eberhard-Gran, 2013; Perlen, Woolhouse, Gartland, & Brown, 2013; Yuksel, Akin, & Durna, 2014). Based on our results it is important to distinguish between these two variables (II). The argument is that a tired person may regain energy after a rest and can continue to perform everyday tasks, while a person who is feeling fatigue might lose the ability to perform these tasks (Olson, 2007). This might also be the situation for pregnant women who experiences fatigue, increasing their distress and the feeling that they are bad at ''doing pregnancy'' (Neiterman, 2012), thereby jeopardizing the frequent enhancement in well-being resulting from a successful transitional process (Meleis, 2010).

Pelvic girdle pain was the most common pregnancy problem among the distressed group (II). Our results confirmed results of other studies (Bakker, van Nimwegen-Matzinger, Ekkel-van der Voorden, Nijkamp, & Völlink, 2013; Perlen et al., 2013). It was also the most frequent indication for sick leave certificates (III), similar to findings of previous studies (Gutke et al., 2014; Malmqvist et al., 2015; Truong, Lupattelli, Kristensen, & Nordeng, 2017). Although pelvic girdle pain is experienced by up to two-thirds of pregnant women, it only becomes a severe problem for some (Pierce, Homer, Dahlen, & King, 2012). A Danish study indicated that distressed pregnant women had a lower pain threshold on manual clinical tests than pregnant women who were not distressed (Palsson, Beales, Slater, O'Sullivan, & Graven-Nielsen, 2015).

The distressed women were also likely to experience vomiting; however, nausea was as common among them as the non-distressed women (II). Based on our results, a distinction between nausea and vomiting should be emphasised when assessing women´s distress status, a distinction not made in previous studies (Andersson, et al., 2004; Tan et al., 2010). Since Budtz-Lylly et al. (2015) did not include pregnant women in their research project on the ''bodily distressed symptom,'' we can only speculate that pelvic girdle pain, fatigue or nausea during pregnancy among distressed women might be an expression of bodily distress symptoms.

A possible link was identified between the finding that only a small portion of the women classified as distressed were allocated sick leave due to distress itself (III) and that almost half of the distressed women denied distress when asked during antenatal care (additional data). Fear of stigma could explain this finding as results from several studies have suggested that women may not reveal their distress due to fear of being stigmatized (Bennett, et al., 2007; Goffman, 1963; NICE, 2014; Staneva, et al., 2017) and even afraid of being graded for not ''doing the pregnancy right'' (Neiterman, 2012).

Important results from our study specified that distressed women were allocated part-time sick leave on the average a month earlier than the non-distressed women (II). This indicates that the distressed women either were advised by midwives and physicians to see if their problem would be alleviated with decreased work hours, or that the women themselves suggested to start

decreasing their work hours. These results add important knowledge about the experiences of distressed women, as no previous research is available on the issuing of sick leave certificates for distressed women. They suggest a possible association between part-time or longer periods of sick leave and perinatal distress.

Why a reason for sick leave was missing in one third of the certificates (III) is unclear, but could be due to difficulties among physicians determining the reason (Larsson, Sydsjö, Alexanderson, & Sydsjö, 2006; Marcum, 2005). Results from our study indicate that distressed pregnant women experience symptoms which coincide with those identified by Budtz-Lilly et al. (2015) as bodily distressed syndrome. Physicians have reported difficulty in identifying a reason for these symptoms among the general population, as physical disease cannot be identified (Creed et al., 2011), raising speculation about the existence of bodily distressed symptoms during pregnancy.

Women should be screened with self-reported psychological scales for distress during pregnancy, as 48% of the distressed women denied distress when asked by midwives during antenatal care (Additional data). The most important time to screen for distress is in the beginning of pregnancy since an association was found between screening at the 16th week and epidural analgesia use for pain management during childbirth (IV). Evaluation of stress should be included in the screening (1). There are two main arguments for this. Although stress symptoms were identified during secondary analysis within our study, the highest distress frequency was in relation to depressive and anxiety symptoms (I). The second argument is the growing body of evidence about the effects of stress on the growing fetus in utero and the child after birth through the mother's HPA axis, with increased production of stress hormones, which can interfere with the fetus HPA axis as well (Glover, et al., 2010; Glover, 2015; Nagle et al., 2017). This situation could also lead to changes in the child´s epigenome (Cao-Lei et al., 2016). Results from the A meta – synthesis from eight qualitative studies confirms these results (Staneva, Bogossian, & Wittkowski, 2015).

The finding that distressed women come more often for antenatal care (II) needs to be recognized and acknowledged by midwives, physicians and health care administrators as well.  These results should be used as an opportunity to offer consultation and assistance with relieving distress, strengthen the expectant parents' relationship, but also to offer encouragement, caring support and information to the pregnant women and their partners/families (Bäckström et al., 2016; Berg, 2005). This should be approached with the idea that the body and the mind are connected as two elements (Westphal, 2016) and that suffering physiologically brings on physical problems, and the other way around. As Bäckström et al. pointed out in their study, women felt that professional care and support was important to enhance mental preparedness for childbirth. A woman feels the distress as part of the lived experience in her connection to the world and other people around her (Dahlberg, et al., 2008; Heidegger,

1927/2010; Svenaeus, 2000). If she feels that she cannot trust people in her lived world, she might distance herself from the embodied experience (Dahlberg, 2019) resulting in problems with the transitional process (Meleis et al., 2010).

## Effect of distress on childbirth

Our findings link perinatal distress significantly with the choice of epidural as a single pain management method during childbirth (IV). Since our results indicated that between the distressed and non-distressed women there was no difference during childbirth in documented level of pain or strength of contractions before epidural administration nor any difference in pain relief post-administration (IV), they suggest the choice was largely related to distress. This finding is contrary to that of Saunders et al (2006) who found no relationship between epidural use and distress. These results shed light on the experience of distressed women during childbirth which is important for health care professionals to acknowledge.

Midwifery-managed care throughout pregnancy and childbirth has been found to increase women´s trust and confidence in themselves. This care model is, however, not generally offered in Iceland, though it is recommended by systematic review (Renfrew et al., 2014; Sandall, Soltani, Gates, Shennan, & Devane, 2016). Women giving birth at the three participating hospitals usually meet the childbirth unit's midwives and obstetricians for the first time when entering the unit, leading to a challenging situation for the women, whereby the women might feel overwhelmed and incapable of managing the experience of childbirth (Dahlberg, 2019; Dixon, Skinner, & Foureur, 2014). The situation might increase the women´s distress and lead to a use of an epidural (Edwards, 2009), resulting in the women´s better management of their reactions to childbirth pain (Hunter & Deery, 2009). Another explanation, according to Neiterman (2012), would be that the distressed women request an epidural to be better at behaving appropriately at "doing childbirth." Side-effects of epidural analgesia are well known; a Cochrane systematic review identifies increased instrumental use for the childbirth, drop in blood pressure, urinary retention, fever and post-dural puncture headache (Jones et al., 2012). Approximately 1% of women using epidural during childbirth experience this severe headache (Sachs & Smiley, 2014). The financial cost of epidural is substantial in relation to other pain management methods used during childbirth but, as mentioned in Jones et al (2012), has not been investigated. Continuous professional support during childbirth has been found to reduce pain, fear, anxiety and interventions (Bonapace et al., 2018) and increase trust (Berg, 2005), raising the question of whether distressed women would benefit more from money spent on continuous support both during pregnancy and childbirth, rather than on epidurals.

We found no significant correlation between distress and interventions used, mode of childbirth, duration of the childbirth or outcome of the newborn (IV).

These results are supported by findings from an Australian study (Staneva, et al., 2017) but contradict findings from other studies (Andersson, et al., 2004; Ding et al., 2014; Staneva, Morawska, Bogossian, & Wittkowski, 2015). I would like to suggest that differences in health care structure and quality could explain this contradiction. Icelandic health care services have been found to be of high quality (Murray, 2017) and only extremely rarely does a woman not undertake antenatal care. This high quality may also be reflected by a relatively low Cesarean Section rate (around 16%) in Iceland, which is among the lowest in the developed world (Pyykönen et al., 2017).

## Dissatisfaction with partner relationship and effect on perinatal distress, pregnancy problems and outcome of childbirth.

According to the study results, dissatisfaction in partner relationship was a strong predictor of perinatal distress (I), complications during pregnancy (II), increased need of sick leave during pregnancy (III), and the total number of days on sick leave (II). These results add valuable knowledge regarding partner factors during pregnancy, consistent with a recent study showing that partners were less involved during pregnancy among women with perinatal distress (Boekhorst et al., 2019). The lived experience of the woman might be interacting with how she senses the situation in her relationship with the partner (Dahlberg, 2019; Dahlberg, et al., 2008; Heidegger, 1927/2010) and if she is dissatisfied, it results in increased physical symptoms and distress.

When it came to childbirth, women who were dissatisfied in their partner relationship were more likely to need induction of labor, have an episiotomy, and give birth with a vacuum extraction (IV). After adjusting for background variables this difference was not significant, although a tendency was found between episiotomy and dissatisfaction in the relationship with their partner (IV). The association between dissatisfaction in partner relationship and these three interventions has not been reported in a study before. According to Dahlberg (2019) a woman who does not have trust in her partner, might be afraid of the future. She might not be able to follow her body and let go of control during childbirth, which might result in a more complicated childbirth, as the results of the study indicate. These results confirm the importance of assessing satisfaction in the relationship with partner, also emphasized by Figueiredo, B. et al., (2018). According to Stapleton et al (2012), dissatisfaction in partner relationship is likely to affect the newborn and the maturing and growing child, and it may also interfere with the expected well-adjusted transition process to parenthood (Meleis et al., 2010).

## Weak social support and pregnancy problems

The association between weak social support and nausea, heartburn and fatigue (II) among distressed women needs to be acknowledged. If these symptoms are looked at through the mind-body lens they would be identified as "minor"

problems accompanying hormonal changes in pregnancy, and clinically hardly taken seriously (Marcum, 2005; O'Hara et al., 2014). If we look beyond the mind-body ideology, we see that nausea and heartburn along with fatigue, actually do fit with the bodily distress syndrome (Budtz-Lilly, Vestergaard, Fink, Carlsen, & Rosendal, 2015). From an existential phenomenologically point of view, however, the woman is rather experiencing the effects of weak social support as her embodied experience of the pregnant body (Dahlberg, 2019; Dahlberg, et al., 2008; Merleau-Ponty, 1945/2012).

Attention needs to be brought to the situation of distressed women with weak social support since they required additional care and services from midwives and obstetricians (II). They were also allocated the longest sick leave periods of all the participants (II) and the reason for their sick leaves was most commonly pelvic girdle pain (III). A pregnant woman who experiences weak social support would be expected to be missing important emotional, instrumental and appraisal support (Bäckström et al., 2017). A supportive midwife will however be able to increase the woman´s control over the situation by being present with her, offering nearness and availability (Berg, 2005). Midwives and other health care providers also need to take into account that distress might decrease a person's sense of control (Dahlberg, 2019; Mirowsky & Ross, 2012; Rosand et al., 2011; Staneva, et al., 2015) and could hinder women from noticing or accepting support offered by families and friends. It is important for midwives to enquire about social support and offer ways to strengthen support when needed (Bäckström et al., 2016).

## Dissatisfaction with household tasks and child-rearing

The results from the thesis indicate a strong correlation between distress and dissatisfaction with the division of household tasks and child-rearing (I) and pregnancy complications (II). This finding was despite no difference being found between the distressed or non-distressed women regarding job percentage (III) and division on household tasks and child-rearing (I). Distressed women who received sick leave certificates on average did less of the household tasks and child-rearing (III). It appears that their partners had taken over more of it, probably since distressed women on sick leave might not have the physical or mental strength to participate as much in the household tasks and child-rearing. Another explanation might be that the dissatisfied women are doing less due to their dissatisfaction with the division.

These results contribute important knowledge regarding the association of dissatisfaction with division of household tasks and child-rearing and pregnancy complications. A systematic review and a meta-analysis of 120 publications confirm that research has been missing regarding division of household tasks and child-rearing in the family when women are experiencing perinatal distress, and further studies are needed (Pilkington et al., 2015).

# Methodological considerations

### Selection bias.

### Recruitment.

According to the ISPMH protocol, midwives in participating health care centers were instructed to introduce the research project and offer participation to all pregnant women during the recruitment period, when they came for the booking visit for antenatal care. We do not have any information regarding the number of women who refused participation as the midwives were not asked to document this information. The data collection did take considerably longer than anticipated in the beginning of the project, allowing for a speculation that the midwives did not invite all women to participate. Women who were dealing with substance abuse during pregnancy were also missing from the sample. The data showed that more than half of all of the participants had received mental health treatment previously. It raises a question regarding the possibility that these women were more willing to participate in the study than women who had no experience of perinatal distress. Although we do not have any concrete data from Iceland to support this, from the doctoral candidate´s experience as a clinical midwife in antenatal care, this is an extraordinarily high percentage. As only a small percentage of participating women took medication for anxiety and/or depressive symptoms, there is a strong likelihood that women with severe distress refused participation. We also had fewer women than the national average participating who had given birth to a preterm infant, had an elective C/S or history of obstetrical problems, indicating women with these issues had chosen not to participate.

### Drop-out.

Considerable drop-out is a weakness of this thesis and adds to the possibility of selection bias. The first occurred between the screening T1 and T2 (T-time points) and the second dropout was between T2 and T3. The third dropout occurred after women who had participated in the screening declined an offer to come for the semi-structured interview. We have no information regarding why these women chose to drop out after accepting participation.

### Managing of missing data

Missing data were handled by the rule introduced by Cohen & Cohen (1985) with the aim to make as many numbers of responses from the participants usable as possible in the analytical process. According to Streiner and Norman (2008) the 10% rule of missing data was still generally used when the ISPMH

protocol was developed. If ≤ 10% of items are missing on a psychometric scale from a participant, the mean value of that person's score for that scale is added to make up for the missing item(s) (Cohen & Cohen, 1985). The DAS scale consists of 32 items and the 10% rule was applied to 49 (9.8%) cases where one item was missing and to one case with three missing items. The ≤ 10% rule was also applied to eight (1.5%) cases in the MSPSS scale, where one item out of 12 was missing. It can be argued that since the proportion of missing cases is relatively low for the MSPSS but higher for the DAS scale this method might produce an estimate bias.

## Measurement bias

As has been mentioned in this thesis before, the most common way to screen pregnant women for depression is by using the EPDS. A cut-off scores appropriate for use during pregnancy, however, is still being debated. A cut–off between 11/12 was recommended among postpartum women by the tool's developers (Cox et al., 1987), but cut-off scores of 10/11 (Bergink et al., 2011; O'Hara et al., 2014) or ≥ 13 have also been recommended (Matthey, 2010). According to Matthey, however, this cut-off is recommended only if no other psychological risks are present. This leads to the question, what if the health care professional is not aware or uninformed of any psychological risks? Different cut off scores have also been used for women in different trimesters of pregnancy. A cut-off ≥10 was used for women in the 1st trimester, but 11 for women in the 2nd and 3rd trimesters (Fontein-Kuipers et al., 2015). In the ISPMH a decision was made to use ≥12 as recommended by the developers. When assessing women´s distress during pregnancy, the overall aim must be to identify the women regardless of what self-reported psychological scale is used, as long as the psychological scales have validated psychometric properties. Although EPDS can be used for identifying anxiety symptoms (Matthey, 2008) it does not identify stress symptoms. For this reason, in this thesis results from both the EPDS and DASS were used to identify women of distress.

In answering the MSPSS questionnaire (Zimet et al., 1988), a majority of the women felt they received strong support from their ''significant other''. While these results should be interpreted in a positive way for the expectant mother, the women were not asked to report who they identified as their significant other, limiting flexibility for further explanation and analyses. A weakness is also that the women were not asked about the length of the partner relationship.

## Analytical considerations.

One of the independent variables in the study was satisfaction in partner relationship, and another was perceived social support. The effect of these variables on pregnancy and childbirth was analyzed. In study II a decision was

made to analyze these variables as a special subgroup of distress. This decision was constructed based on results from study I, since social support did not make a significant contribution toward the likelihood of perinatal distress. Due to the strong association found (I) between distress and dissatisfaction in partner relationship, analysis of that subgroup was also determined to be of significance.

A decision was made to dichotomize the MSPSS into weak and strong social support although the list is developed as a continuous scale indicating that social support grows stronger with higher scores (Zimet et al., 1990). On page 41 the decision for dichotomizing is clarified but, in short, the aim was to simplify the use of the scale to make it more straightforward for use in antenatal care. A set cut-off score distinguishing between weak and strong social support offers a clear guideline in antenatal care as to when there is a reason for intervening and offering support.

## Conceptual clarity

The concept used in the study was "perinatal distress" which combines symptoms of psychological distress, assessed by anxiety, depression and stress symptoms on self-reported psychological scales. The fact that women were not originally selected in the ISPMH project by their scoring on the stress scale weakens the results. Twenty-one woman entered the project as members of the NDG but were relocated into to the PDG as a secondary analysis. It might be argued that they should have been left out of the whole sample, but a decision was made to include them, since stress was also the most common symptom in combination with either anxiety or depression. A strong argument supporting inclusion of stress when screening for distress in recent research has shown that stress during pregnancy has negative consequences on fetal/child development (Glover, 2015; O'Donnell, Glover, Barker, & O'Connor, 2014).

## Quantitative studies

The power of results from quantitative studies becomes stronger as the number of participants increases for each variable. Although the sample as a whole is large on an Icelandic scale, it is small in relation to other larger nationalities, and for several of the variables, few women were represented. Because of this, for example, no concrete conclusions may be drawn from our finding of a connection between distress and vaginal bleeding during pregnancy. As few women were represented in some of the variables in the regression models, we are aware of the increased risk of bias in interpreting the results as Steyerberg, Eijkemann and Haddema (1999) pointed out.

## Confounders

It could be argued that a weakness in this thesis is the fact that we did not assess fear of childbirth, as it has been linked with distress in earlier studies (Andersson, et al., 2003) and could be a confounder. Results from a recent study from Italy showed that primiparous women with depressive or anxiety symptoms as well as dissatisfaction with their partner relationships are more likely to experience fear of childbirth (Molgora et al., 2018). Primiparous women with fear of childbirth have also been found to need longer sick leave during pregnancy (Nieminen et al., 2017). However, in a recent population – based study from Norway the researcher found that symptoms of distress rather than fear of childbirth were linked with experienced labor pain (Junge et al., 2018). Similar results came from a recent study conducted in Hungary (MoghaddamHosseini et al., 2019). These results support the design and the results from this thesis and indicate that more research on fear of childbirth is needed in relation to distress.

Experience of violence could also be expected to be a confounder of distress. No validated questionnaire was used to determine the women´s experience of violence. The questions used to assess the women´s experience of violence during adulthood came from the Adverse Experience Interview (AEI) developed by the ISPMH team (Lydsdottir et al., 2018) and required that a woman herself needed to define what she considered to be violence.

Data regarding head circumference of the newborns was not collected, although the newborn's head size might be a confounder regarding medical interventions such as episiotomy and vacuum use during the childbirth (Elvander, Högberg, & Ekeus, 2012).

## Ethical considerations

As no data were collected regarding a woman's need for psychiatric treatment or feeling she needed support after participating in the semi-structed interview, we do not know if participation in the thesis caused any harm to the participants. The doctoral candidate interviewed one woman who had occasional suicidal thoughts. Right after the interview the doctoral candidate contacted the woman´s GP and informed the woman that she could be seen by a physician. The woman then responded that she was feeling emotional relief just after participating in the interview with the doctoral candidate.

# Conclusion

Distress among pregnant women affects the pregnancy and the childbirth. A link exists between the experience of distress and dissatisfaction in the relationship with women´s partners which also affects pregnancy and childbirth. The same is the case if a woman who reports distress is dissatisfied with household tasks and child-rearing. Strong social support from families and friends is the general norm in Icelandic society, but when it is missing it affects women´s well-being during pregnancy. The most common problems during pregnancy among distressed women are experience of fatigue, vomiting, and pelvic girdle pain. Distressed women who, in addition, perceive receiving weak social support may also experience nausea and heartburn.

Midwives and physicians should suspect distress during pregnancy if women complain of these problems and have elementary or lower education, are unemployed or students, have a history of mental-health treatment, or continue to smoke during pregnancy. An organized screening for distress with reliable self-reporting psychological scales is important during antenatal care and should be done at least once early in the 2$^{nd}$ trimester of the pregnancy. The assessment should include symptoms of stress, depression and anxiety. Use of a reliable scale is important since we found that almost half of the distressed expectant mothers denied distress when midwives enquired about it during antenatal care. In addition to distress, it is important to evaluate social support, satisfaction in partner relationship, and satisfaction with household tasks and child-rearing. Pregnant women identified as distressed, along with their families, should be offered consultation, treatment for distress and solution options for difficult social circumstances. This is important since despite distressed women being in need of increased antenatal care service, there is a link between distress and the issuing of part-time sick leaves during pregnancy as well as a prolonged period until they get a full-time sick leave. If the distressed women are also experiencing weak social support, they are in need of increased antenatal service as well as receiving sick leave for even longer periods, emphasizing the need of intervention for women in this situation.

When the distressed women enter childbirth, they are likely to use an epidural as the single pain management method. A link exists between the use of an epidural and being identified with distress early in the second trimester. Women who are dissatisfied in their relationship with their partner might need to undergo induction of childbirth, episiotomy, and/or vacuum extraction. These results highlight even more the need to identify distress in women during pregnancy.

62

# Clinical implications

The findings of the thesis point toward several possible clinical development issues. The main finding suggests that pregnant women should be screened for perinatal distress during antenatal care. Based on our results, screening as early as 16 weeks is important since distressed women might have already made the decision by then that they would need epidural analgesia during the childbirth. Another argument towards early screening is that midwives and other health professionals have time to give support and counseling. The satisfaction of the relationship between the expectant parents should also be assessed as well as enquiring about the woman´s social support. There are two relatively simple questions that a midwife could ask as a foundation to assess the pregnant woman's satisfaction in the relationship with her partner:

- How do you generally feel about the sharing of household tasks and child-rearing between you and your partner?
- How satisfied do you generally feel about the relationship with your partner?

Based on answers from these questions as well as the results of the screening for distress, interventions should be offered with the aim to alleviate distress and to reduce the risk for pregnancy complications and negative outcomes of the childbirth. The emphasis should be on individualized interventions for each woman and her family. The first step is to build a caring and trustful therapeutic relationship between them and the midwife/health care provider. Once trust is established, counseling begins with empowering the woman, so she will trust her body and gain control over the situation. Family-centered intervention might be offered to support the women in finding ways to strengthen her social support and her partner relationship.

# Future directions

The results and methodological limitations offer several suggestions for future research.

- Why women feel distressed during pregnancy needs to be explored in depth, including an exploration of women's attitudes toward routine screening for perinatal distress. Possible benefits of using the DASS scale solely for distress screening during pregnancy should also be studied. A larger sample than ours is needed to assess if there is an association between distress and bleeding during pregnancy. The possible association between perinatal distress, fatigue and the ability to perform daily tasks should also be further studied. An intervention study is needed to assess what kind of caring professional model the

distressed women would benefit most from, during pregnancy and childbirth.

- The link between perinatal distress and the need for sick leave during pregnancy should also be further assessed. An important question to ask is why distressed pregnant women receive part-time sick leave more frequently and for longer periods than women who do not report distress. It is also important to explore the experiences of distressed women related to interaction with healthcare professionals during pregnancy, as well as why distressed women make the decision early during pregnancy to receive epidural analgesia during childbirth. The professional's interaction with pregnant women and their families is also a future research topic.

- The connection between dissatisfaction in the relationship with the partner among perinatally distressed women and the consequences this has for pregnancy and labor needs to be investigated further and with larger sample than ours.

# GRANTS

# ACKNOWLEDGEMENT

Decades ago I made myself a promise to go on the PhD journey. First it was a dream but developed into the process itself. I like to use a metaphor and visualize the PhD education, as a mountain, like mount Everest. Much planning and preparation is needed so the trekking becomes a unique positive experience. You must invite experienced people that are willing to supervise you and guide you on the way, support you, teach you and actually participate in the journey with you. Good health and stamina are important qualities and one must be mentally and physically fit enough to be able to keep trekking. There are endless things to plan and the hikers must gather supplies, get maps, a compass, make sure all calculations are correct for the track, check all equipment, arrange it and make sure finances are clear, get a lifeline and even have a safety net. Backup plans are needed for things that might go wrong.

*When I now sit down [on a rock] to write this little diary, I actually see the PhD summit ahead. I have been very lucky since I was able to get the possible best guides.*

I want sincerely to thank my main supervisor and my co-supervisors:
- Professor Katarina Swahnberg
- Professor emerita Marga Thome and
- Professor Þóra Steingrímsdóttir.

I asked them to become my supervisors and guides because of their expertise. I have never regretted that decision. With their endless support, they have guided me up the mountain, supported me onto the right track when I was wandering off-track, fixed my lifeline and have the safety net ready.

On the trip with me, were also my four co-authors who gave good comments and made this trip much more meaningful. These are Halldóra Ólafsdóttir, a

psychiatrist who was the founder of the ISPMH project, professor Jón Friðrik Sigurðsson, Dr. Linda Bára Lýðsdóttir and Guðmundur Kristján Óskarsson. His support never ended, always ready to give me advice on how to correct the compass and the track calculation, throughout. Most of the hiking, Linda Bára and I were fellow hikers, sharing the experience, encouraging each other and giving support.

A hike up the PhD mountain must be financed. I am very thankful for the financial support I received by salary, grants and a sabbatical from the University of Akureyri (UNAK). My sincere thanks got to the former dean of the School of Health Science, Dr. Árún K. Sigurðardóttir and the current dean, Dr. Eydís Sveinbjarnardóttir and to the University rector, Dr. Eyjólfur Guðmundsson. From the Hospital in Akureyri who supported me on this hike as well, my sincerely thanks go to the CEO, Bjarni Jónasson.

I would like to thank all the people who sent my supplies. Among many I surely want to thank the librarians, Ragnheiður Kjærnested and Kristín Konráðsdóttir. The ones who fixed my equipment over and over again; the librarians, Pía Sigurlína Viinikka and Sigríður Ásta Björnsdóttir and the computer staff at UNAK and at the IT-unit in Kalmar. Special thanks go to the doctoral secretary at LNU, Catarina Gaunitz, who always kept me informed and kept track of how my hike was progressing. My midwifery colleagues, Guðrún Eggertsdóttir and Hildur Kristjánsdóttir get a special thanks for joining me and collecting data with me from pregnancy and childbirth records and giving me collegial support.

Along the way I have had the support from my dear husband and friend, Birgir Karl Knútsson, who encouraged me to take on this trip and always has been ready with the safety net and caught me when I stumbled. I also got unconditional support from my mother, Vilborg Guðjónsdóttir while she was alive.

My sincere thanks go to Dr. David Ekström, a very special friend and extended family member who took on the role of English editor for the Kappa, always ready to read and give suggestion for better wording.

On a trip like this good health is important. A sincerely thanks go to Guðrún Freysteinsdóttir a dear friend, who became my personal trainer and keeping me just fit enough.

Along the path, several friends gave support, encouragement and reinforced the safety net. Thank you, you know what you did for me: Auðna Ágústsdóttir and Kjartan Gíslason; Elín Kristjánsdóttir; Jónína Sigurgeirsdóttir and Ólafur Thoroddsen; Ragnhildur Vigfúsdóttir and Hafliði Helgason; Sigfríður Inga

# REFERENCES

Alexander, G. R., & Kotelchuck, M. (2001). Assessing the role and effectiveness of prenatal care: History, challenges, and directions for future research. *Public Health Reports (Washington, D.C.: 1974), 116*(4), 306-316.

Althingi. (2008). Act on health insurance, no. 112/2008. Retrieved from https://eng.velferdarraduneyti.is/media/acrobat-enskar_sidur/Act-on-Health-Insurance-No-112-2008-16.pdf

Althingi. (2014). Law of bioethical research no. 44/2014. Retrieved from https://www.althingi.is/lagas/nuna/2014044.html

Andersson, L., Sundström-Poromaa., I., Bixo, M., Wulff, M., Bondestam, K., & Åström, M. (2003). Point prevalence of psychiatric disorders during the second trimester of pregnancy: A population-based study. *American Journal of Obstetrics and Gynecology, 189*(1), 148-154. doi:10.1067/mob.2003.336

Andersson, L., Sundstrom-Poromaa, I., Wulff, M., Astrom, M., & Bixo, M. (2004). Implications of antenatal depression and anxiety for obstetric outcome. *Obstetrics and Gynecology, 104*(3), 467-476. doi:10.1097/01.AOG.0000135277.04565.e9

Asgeirsdottir, T. L. (2009). The Icelandic health care system. In J. Magnussen, K. Vrangbaek & R. Saltman (Eds.), *Nordic health care systems: Recent reforms and current policy challenges* (pp. 316-330). Maidenhead, Berkshire, England: McGraw-Hill Education.

Austin, M. (2004). Antenatal screening and early intervention for "perinatal" distress, depression and anxiety: Where to from here? *Archives of Women's Mental Health, 7*(1), 1-6. doi:10.1007/s00737-003-0034-4

Bäckström, C., Kåreholt, I., Thorstensson, S., Golsäter, M., & Mårtensson, L. B. (2018). Quality of couple relationship among first-time mothers and partners during pregnancy and the first six months of parenthood. *Sexual & Reproductive Healthcare, 17*, 56-64. doi:10.1016/j.srhc.2018.07.001

Bäckström, C., Larsson, T., Wahlgren, E., Golsäter, M., Mårtensson, L. B., & Thorstensson, S. (2017). 'It makes you feel like you are not alone': Expectant first-time mothers' experiences of social support within the social network, when

preparing for childbirth and parenting. *Sexual & Reproductive Healthcare, 12*, 51-57. doi:10.1016/j.srhc.2017.02.007

Bäckström, C., Mårtensson, L. B., Golsäter, M. H., & Thorstensson, S. A. (2016). "It's like a puzzle": Pregnant women's perceptions of professional support in midwifery care. *Women and Birth, 29*(6), e110-e118. doi:10.1016/j.wombi.2016.04.011

Bakker, E. C., van Nimwegen-Matzinger, C. W., Ekkel-van der Voorden, W., Nijkamp, M. D., & Völlink, T. (2013). Psychological determinants of pregnancy-related lumbopelvic pain: A prospective cohort study. *Acta Obstetricia Et Gynecologica Scandinavica, 92*(7), 797-803. doi:10.1111/aogs.12131

Bansil, P., Kuklina, E. V., Meikle, S. F., Posner, S. F., Kourtis, A. P., Ellington, S. R., & Jamieson, D. J. (2010). Maternal and fetal outcomes among women with depression. *Journal of Women's Health, 19*(2), 329-334. doi:10.1089/jwh.2009.1387

Bennett, H. A., Einarson, A., Taddio, A., Koren, G., & Einarson, T. R. (2004). Prevalence of depression during pregnancy: Systematic review. *Obstetrics & Gynecology, 103*(4), 698-709. doi:10.1097/01.AOG.0000116689.75396.5f

Bennett, H. A., Boon, H. S., Romans, S. E., & Grootendorst, P. (2007). Becoming the best mom that I can: Women's experiences of managing depression during pregnancy - A qualitative study. *BMC Women's Health, 7* doi:10.1186/1472-6874-7-13

Benton, T., & Craib, I. (2011). *Philosophy of the social science.* Houndmills: Palgrave Macmillan.

Berg, M. (2005). A midwifery model of care for childbearing women at high risk: Genuine caring in caring for the genuine. *The Journal of Perinatal Education, 14*(1), 9-21. doi:10.1624/105812405X23577

Bergink, V., Kooistra, L., Lambregtse-van den Berg, M. P., Wijnen, H., Bunevicius, R., van Baar, A., & Pop, V. (2011). Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research, 70*(4), 385-389. doi:10.1016/j.jpsychores.2010.07.008

Blackmore, J. T. (1972). *Ernst mach: His work, life, and influence.* Berkeley, LA.: Univ of California Press.

Boekhorst, M. G. B. M., Beerthuizen, A., Endendijk, J. J., van Broekhoven, K. E. M., van Baar, A., Bergink, V., & Pop, V. J. M. (2019). Different trajectories of depressive symptoms during pregnancy. *Journal of Affective Disorders, 248*, 139-146. doi:10.1016/j.jad.2019.01.021

Bonapace, J., Gagné, G. P., Chaillet, N., Gagnon, R., Hébert, E., & Buckley, S. (2018). No. 355-physiologic basis of pain in labour and delivery: An evidence-based approach to its management. *Journal of Obstetrics and Gynaecology Canada, 40*(2), 227-245. doi:10.1016/j.jogc.2017.08.003

Budtz-Lilly, A., Fink, P., Ørnbøl, E., Vestergaard, M., Moth, G., Christensen, K. S., & Rosendal, M. (2015). A new questionnaire to identify bodily distress in primary care: The 'BDS checklist'. *Journal of Psychosomatic Research, 78*(6), 536-545. doi:10.1016/j.jpsychores.2015.03.006

Budtz-Lilly, A., Vestergaard, M., Fink, P., Carlsen, A. H., & Rosendal, M. (2015). Patient characteristics and frequency of bodily distress syndrome in primary care: A cross-sectional study. *The British Journal of General Practice : The Journal of the Royal College of General Practitioners, 65*(638), e617-23. doi:10.3399/bjgp15X686545 [doi]

Burckhardt, C. S., & Anderson, K. L. (2003). The quality of life scale (QOLS): Reliability, validity, and utilization. *Health and Quality of Life Outcomes, 1*(1), 60. doi:10.1186/1477-7525-1-60

Cao-Lei, L., de Rooij, S. R., King, S., Matthews, S. G., Metz, G. A. S., Roseboom, T. J., & Szyf, M. (2016). Prenatal stress and epigenetics. *Neuroscience and Biobehavioral Reviews, 16* doi:10.1016/j.neubiorev.2017.05.016

Carroll, M., Downes, C., Gill, A., Monahan, M., Nagle, U., Madden, D., & Higgins, A. (2018). Knowledge, confidence, skills and practices among midwives in the republic of Ireland in relation to perinatal mental health care: The mind mothers study. *Midwifery, 64*, 29-37. doi:10.1016/j.midw.2018.05.006

Clara, I. P., Cox, B. J., & Enns, M. W. (2001). Confirmatory factor analysis of the Depression-Anxiety-Stress Scales in depressed and anxious patients. *Journal of Psychopathology and Behavioral Assessment, 23*(1), 61-67. doi:10.1023/A:1011095624717

Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine, 38*(5), 300-314.

Cohen, J., & Cohen, P. (1985). *Applied multiple regression and correlation analysis for the behavioral sciences* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist, 59*(7), 614-625. doi:10.1037/0003-066X.59.7.614

Cox, J. L., & Holden, J. (2003). *Perinatal mental health: A guide to the Edinburgh Postnatal Depression Scale (EPDS)*. London: RCPsych Publications.

Cox, J. L., Holden, J., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry, 150*(6), 782-786. doi:10.1192/bjp.150.6.782

Creed, F., van der Feltz-Cornelis, C., Guthrie, E., Henningsen, P., Rief, W., Schröder, A., . . . Fink, P. (2011). Identification, assessment and treatment of individual patients. In F. Creed, P. Henningsen & P. Fink (Eds.), *Medically unexplained symptoms, somatisation and bodily distress* (pp. 175-216). New York: Cambridge University Press.

Dahlberg, H. (2019). Beyond the absent body—A phenomenological contribution to the understanding of body awareness in health and illness. *Nursing Philosophy, 20*(2), e12235. doi:10.1111/nup.12235

Dahlberg, K., Dahlberg, H., & Nyström, M. (2008). *Reflective lifeworld research* (2nd. ed.). Lund: Studentlitteratur.

De Wilde, K. S., Tency, I., Boudrez, H., Temmerman, M., Maes, L., & Clays, E. (2016). The modified reasons for smoking scale: Factorial structure, validity and reliability in pregnant smokers. *Journal of Evaluation in Clinical Practice, 22*(3), 403-410. doi:10.1111/jep.12500

Ding, X., Wu, Y., Xu, S., Zhu, R., Jia, X., Zhang, S., . . . Tao, F. (2014). Maternal anxiety during pregnancy and adverse birth outcomes: A systematic review and meta-analysis of prospective cohort studies. *Journal of Affective Disorders, 159*, 103-110. doi:10.1016/j.jad.2014.02.027

Dixon, L., Skinner, J., & Foureur, M. (2014). The emotional journey of labour—Women's perspectives of the experience of labour moving towards birth. *Midwifery, 30*(3), 371-377. doi:10.1016/j.midw.2013.03.009

Dørheim, S. K., Bjorvatn, B., & Eberhard-Gran, M. (2013). Sick leave during pregnancy: A longitudinal study of rates and risk factors in a Norwegian population.

*BJOG: An International Journal of Obstetrics and Gynaecology, 120*(5), 521-530. doi:10.1111/1471-0528.12035

Dunkel Schetter, C., Niles, A. N., Guardino, C. M., Khaled, M., & Kramer, M. S. (2016). Demographic, medical, and psychosocial predictors of pregnancy anxiety. *Paediatric and Perinatal Epidemiology, 30*(5), 421-429. doi:10.1111/ppe.12300

Dunkel Schetter, C., & Tanner, L. (2012). Anxiety, depression and stress in pregnancy: Implications for mothers, children, research, and practice. *Current Opinion in Psychiatry, 25*(2), 141-148. doi:10.1097/YCO.0b013e3283503680 [doi]

Edwards, N. P. (2009). Women′s emotion work in the context of current maternity services. In B. Hunter, & R. Deery (Eds.), *Emotions in midwifery and reproduction* (pp. 36-55). Basingstoke, Hampshire, UK: Palgrave MacMillan.

Einarsdóttir, Þ. (2013). Women in Iceland: Strong women: Myths and contradictions. In J. Billson Mancini, & C. Fluehr-Lobban (Eds.), *Female well-being: Toward a global theory of scoial change.* (e-book ed., pp. 181-206). book.goggle.com: Zed Books London.

Elvander, C., Högberg, U., & Ekeus, C. (2012). The influence of fetal head circumference on labor outcome: A population-based register study. *Acta Obstetricia Et Gynecologica Scandinavica, 91*(4), 470-475. doi:10.1111/j.1600-0412.2012.01358.x

Emmanuel, E., & St. John, W. (2010). Maternal distress: A concept analysis. *Journal of Advanced Nursing, 66*(9), 2104-2115. doi:10.1111/j.1365-2648.2010.05371.x

Emmanuel, E., St. John, W., & Sun, J. (2012). Relationship between social support and quality of life in childbearing women during the perinatal period. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 41*(6), E62-E70. doi:10.1111/j.1552-6909.2012.01400.x

Figueiredo, B., Field, T., Diego, M., Hernandez-Reif, M., Deeds, O., & Ascencio, A. (2008). Partner relationships during the transition to parenthood. *Journal of Reproductive and Infant Psychology, 26*(2), 99-107. doi:10.1080/02646830701873057

Figueiredo, B., Canário, C., Tendais, I., Pinto, T. M., Kenny, D. A., & Field, T. (2018). Couples' relationship affects mothers' and fathers' anxiety and depression trajectories over the transition to parenthood. *Journal of Affective Disorders, 238*, 204-212. doi:10.1016/j.jad.2018.05.064

Finnbogadóttir, H., Dykes, A., & Wann-Hansson, C. (2014). Prevalence of domestic violence during pregnancy and related risk factors: A cross-sectional study in southern Sweden. *BMC Women's Health, 14*, 63. doi:10.1186/1472-6874-14-63

Fontein-Kuipers, Y., Ausems, M., Budé, L., Van Limbeek, E., De Vries, R., & Nieuwenhuijze, M. (2015). Factors influencing maternal distress among dutch women with a healthy pregnancy. *Women and Birth, 28*(3), e36-e43. doi:10.1016/j.wombi.2015.02.002

Fontein-Kuipers, Y., Budé, L., Ausems, M., de Vries, R., & Nieuwenhuijze, M. J. (2014). Dutch midwives' behavioural intentions of antenatal management of maternal distress and factors influencing these intentions: An exploratory survey. *Midwifery, 30*(2), 234-241. doi:10.1016/j.midw.2013.06.010

Ford, E., Shakespeare, J., Elias, F., & Ayers, S. (2016). Recognition and management of perinatal depression and anxiety by general practitioners: A systematic review. *Family Practice, 34*(1), 11-19. doi:10.1093/fampra/cmw101

Franks, W. L. M., Crozier, K. E., & Penhale, B. L. M. (2016). Women's mental health during pregnancy: A participatory qualitative study. *Women and Birth, 30*(1) doi:10.1016/j.wombi.2016.11.007

Gisladottir, E., Gunnarsdottir, G., Þorgeirsdottir, H., Jónsson, R. M., Jensson, V. & Danielsdottir, S. (2016). Talnabrunnur, February, 2016. Retrieved from https://www.landlaeknir.is/utgefid-efni/skjal/item29044/

Glover, V. (2014). Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. *Best Practice & Research Clinical Obstetrics & Gynaecology, 28*(1), 25-35. doi:10.1016/j.bpobgyn.2013.08.017

Glover, V., O'Connor, T. G., & O'Donnell, K. (2010). Prenatal stress and the programming of the HPA axis. *Neuroscience & Biobehavioral Reviews, 35*(1), 17-22. doi:10.1016/j.neubiorev.2009.11.008

Glover, V. (2015). Prenatal stress and its effects on the fetus and the child: Possible underlying biological mechanisms. Advances in neurobiology. In M. Antonelli (Ed.), *Perinatal programming of neurodevelopment: Advances in neurobiology* (10th ed., pp. 269-283). New York: Springer. doi:10.1007/978-1-4939-1372-5_13

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. Englewood, NJ, USA: Prentice-Hall.

Gutke, A., Olsson, C. B., Völlestad, N., Öberg, B., Wikmar, L. N., & Robinson, H. S. (2014). Association between lumbopelvic pain, disability and sick leave during pregnancy - A comparison of three scandinavian cohorts. *Journal of Rehabilitation Medicine, 46*(5), 468-474. doi:10.2340/16501977-1801

Guxens, M., Sonnenschein-Van Der Voort, A. M. M., Tiemeier, H., Hofman, A., Sunyer, J., De Jongste, J. C., . . . Duijts, L. (2014). Parental psychological distress during pregnancy and wheezing in preschool children: The generation R study. *Journal of Allergy and Clinical Immunology, 133*(1), 59-67.e12. doi:10.1016/j.jaci.2013.04.044

Hansson, M., & Ahlborg, T. (2016). Factors contributing to separation/divorce in parents of small children in Sweden. *Nordic Psychology, 68*(1), 40-57. doi:10.1080/19012276.2015.1071201

Hauge, L. J., Torgersen, L., & Vollrath, M. (2012). Associations between maternal stress and smoking: Findings from a population-based prospective cohort study. *Addiction, 107*(6), 1168-1173. doi:10.1111/j.1360-0443.2011.03775.x

Heidegger, M. (1927/2010). *Being and time. A translation of sein und zeit* (J. Stambaugh Trans.). Albany, NY: State University of New York Press.

Henrichs, J., Schenk, J. J., Roza, S. J., Van den Berg, M. P., Schmidt, H. G., Steegers, E. A. P., . . . Tiemeier, H. (2010). Maternal psychological distress and fetal growth trajectories: The generation R study. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 40*(4), 633-643. doi:10.1017/S0033291709990894

Howard, L. M., Piot, P., & Stein, A. (2014). No health without perinatal mental health. *The Lancet, 384*(9956), 1723-1724. doi:10.1016/S0140-6736(14)62040-7

Hunter, B., & Deery, R. (2009). Emotions in midwifery and reproduction. In B. Hunter, & R. Deery (Eds.), *Emotions in midwifery and reproduction* (pp. 1-13). Basingstoke, UK: Palgrave Macmillan.

Jeong, H. G., Lim, J. S., Lee, M. S., Kim, S. H., Jung, I. K., & Joe, S. H. (2013). The association of psychosocial factors and obstetric history with depression in pregnant

women: Focus on the role of emotional support. *General Hospital Psychiatry, 35*(4), 354-358. doi:10.1016/j.genhosppsych.2013.02.009

Jones, L., Othman, M., Dowswell, T., Alfirevic, Z., Gates, S., Newburn, M., . . . Neilson, J. P. (2012). Pain management for women in labour: An overview of systematic reviews. *Cochrane Database of Systematic Reviews (Online), 3* doi:10.1002/14651858.CD009234.pub2

Junge, C., von Soest, T., Weidner, K., Seidler, A., Eberhard-Gran, M., & Garthus-Niegel, S. (2018). Labor pain in women with and without severe fear of childbirth: A population-based, longitudinal study. *Birth, 45*(4), 1-9. doi:10.1111/birt.12349

Kjeldgaard, H. K., Eberhard-Gran, M., Benth, J. Š., & Vikanes, Å V. (2017). Hyperemesis gravidarum and the risk of emotional distress during and after pregnancy. *Archives of Women's Mental Health, 20*(6), 747-756. doi:10.1007/s00737-017-0770-5

Kurki, T., Hiilesmaa, V., Raitasalo, R., Mattila, H., & Ylikorkala, O. (2000). Depression and anxiety in early pregnancy and risk for preeclampsia. *Obstetrics & Gynecology, 95*(4), 487-490. doi:10.1016/S0029-7844(99)00602-X

Langford, C. P. H., Bowsher, J., Maloney, J. P., & Lillis, P. P. (1997). Social support: A conceptual analysis. *Journal of Advanced Nursing, 25*(1), 95-100. doi:10.1046/j.1365-2648.1997.1997025095.x

Laplante, D. P., Brunet, A., & King, S. (2016). The effects of maternal stress and illness during pregnancy on infant temperament: Project Ice Storm. *Pediatric Research, 79*(1), 107-113. doi:10.1038/pr.2015.177

Larsson, C., Sydsjö, A., Alexanderson, K., & Sydsjö, G. (2006). Obstetricians' attitudes and opinions on sickness absence and benefits during pregnancy. *Acta Obstetricia Et Gynecologica Scandinavica, 85*(2), 165-170. doi:10.1080/00016340500430345

Leach, L. S., Poyser, C., & Fairweather-Schmidt, K. (2017). Maternal perinatal anxiety: A review of prevalence and correlates. *Clinical Psychologist, 21*(1), 4-19. doi:10.1111/cp.12058

Liou, S. R., Wang, P., & Cheng, C. Y. (2014). Longitudinal study of perinatal maternal stress, depressive symptoms and anxiety. *Midwifery, 30*(6), 795-801. doi:10.1016/j.midw.2013.11.007

Lovibond, S., & Lovibond, P. (1995). *Manual for the depression Anxiety Stress Scales* (2nd ed.). Sydney, Australia: Psycology Foundation Monograph.

Lydsdottir, L. B., Howard, L. M., Olafsdottir, H., Einarsson, H., Steingrimsdottir, T., & Sigurdsson, J. F. (2018). Adverse life experiences and common mental health problems in pregnancy: A causal pathway analysis. *Archives of Women's Mental Health, 22*(1), 75-83. doi:10.1007/s00737-018-0881-7

Lydsdottir, L. B., Howard, L. M., Olafsdottir, H., Thome, M., Tyrfingsson, P., & Sigurdsson, J. F. (2014). The mental health characteristics of pregnant women with depressive symptoms identified by the Edinburgh Postnatal Depression Scale. *The Journal of Clinical Psychiatry, 75*(4), 393-398. doi:10.4088/JCP.13m08646

Lydsdottir, L. B., Howard, L. M., Olafsdottir, H., Thome, M., Tyrfingsson, P., & Sigurdsson, J. F. (2019). The psychometric properties of the Icelandic version of the Edinburgh Postnatal Depression Scale (EPDS) when used prenatal. *Midwifery, 69*, 45-51. doi:10.1016/j.midw.2018.10.009

Lynn, F. A., Alderdice, F. A., Crealey, G. E., & McElnay, J. C. (2011). Associations between maternal characteristics and pregnancy-related stress among low-risk

mothers: An observational cross-sectional study. *International Journal of Nursing Studies, 48*(5), 620-627. doi:10.1016/j.ijnurstu.2010.10.002

Malmqvist, S., Kjaermann, I., Andersen, K., Økland, I., Larsen, J. P., & Brønnick, K. (2015). The association between pelvic girdle pain and sick leave during pregnancy; a retrospective study of a Norwegian population. *BMC Pregnancy and Childbirth, 15*(1) doi:10.1186/s12884-015-0667-0

Marcum, J. A. (2005). Biomechanical and phenomenological models of the body, the meaning of illness and quality of care. *Medicine, Health Care and Philosophy, 7*(3), 311-320. doi:DOI:10.1007/s11019-004-9033-0

Matthey, S. (2008). Using the Edinburgh Postnatal Depression Scale to screen for anxiety disorders. *Depression and Anxiety, 25*(11), 926-931. doi:10.1002/da.20415

Matthey, S. (2010). Are we overpathologising motherhood? *Journal of Affective Disorders, 120*(1), 263-266. doi:10.1016/j.jad.2009.05.004

Mehta, N. (2011). Mind-body dualism: A critique from a health perspective. *Mens Sana Monographs, 9*(1), 202-209. doi:10.4103/0973-1229.77436 [doi]

Meijer, J. L., Bockting, C. L. H., Stolk, R. P., Kotov, R., Ormel, J., & Burger, H. (2014). Associations of life events during pregnancy with longitudinal change in symptoms of antenatal anxiety and depression. *Midwifery, 30*(5), 526-531. doi:10.1016/j.midw.2013.06.008

Meleis, A. I. (2010). Theoretical development of transitions. In A. I. Meleis (Ed.), *Transitions theory. Middle-range and situation-specific theories in nursing research and practice.* (pp. 13-24). New York: Springer Publishing Company.

Meleis, A. I., Sawyer, L. M., Im, E. O., Hilfinger Messias, D. A. K., & Schumacher, K. (2010). Experiencing transitions: An emerging middle range theory. In A. I. Meleis (Ed.), *Transitions theory. middle-range and situation-specific theories in nursing research and practice.* (pp. 52-65). New York: Springer Publishing Company.

Mercer, R. T. (1990). *Parents at risk.* New York: Springer Publishing Company.

Merleau-Ponty, M. (1945/2012). *Phenomenology of perception* (Donald A. Landes Trans.). Abingdon: Routledge.

Mirowsky, J., & Ross, C. E. (2012). *Social causes of psychological distress* (2nd ed.). London: Aldin Transaction Publishers.

MoghaddamHosseini, V., Makai, A., Varga, K., Ács, P., Prémusz, V., & Várnagy, Á. (2019). Assessing fear of childbirth and its predictors among Hungarian pregnant women using Wijma Delivery Expectancy/Experience Questionnaire subscales. *Psychology, Health & Medicine,* , 1-11. doi:10.1080/13548506.2019.1572904

Molgora, S., Fenaroli, V., Prino, L. E., Rollè, L., Sechi, C., Trovato, A., . . . Lucarelli, L. (2018). Fear of childbirth in primiparous Italian pregnant women: The role of anxiety, depression, and couple adjustment. *Women and Birth, 31*(2), 117-123. doi:10.1016/j.wombi.2017.06.022

Moran, P., Leese, M., Lee, T., Walters, P., Thornicroft, G., & Mann, A. (2003). Standardised assessment of Personality–Abbreviated scale (SAPAS): Preliminary validation of a brief screen for personality disorder. *The British Journal of Psychiatry, 183*(3), 228-232. doi:10.1192/bjp.183.3.228

Murray, C. J. L. (2017). Healthcare access and quality index based on mortality from causes amenable to personal health care in 195 countries and territories, 1990–2015: A novel analysis from the global burden of disease study 2015. *Lancet, 390*(10091), 231-266. doi:org/10.1016/ S0140-6736(17)30818-8

Nagle, K., Green, J., & Walker, K. (2017). The link between brain development, neonatal outcomes and maternal stress states. *Journal of Neonatal Nursing, 23*(6), 282-285. doi:10.1016/j.jnn.2017.05.005

National Human Genome Research Institute. (2016). Epigenomics, fact sheet. Retrieved from https://www.genome.gov/27532724/epigenomics-fact-sheet/

Neiterman, E. (2012). Doing pregnancy: Pregnant embodiment as performance. *Women's Studies International Forum, 35*(5), 372-383. doi:10.1016/j.wsif.2012.07.004

NICE. (2011). Common mental health disorders. Identification and pathways to care. Clinical Guidelines [CG 123], National Institute for Health and Clinical Excellence. Retrieved from http://publications.nice.org.uk/common-mental-health-disorders-cg123

NICE. (2014). Antenatal and postnatal mental health. Clinical management and service guidance. Clinical Guideline [CG192]. National Institute of Clinical Excellence. Retrieved from https://www.nice.org.uk/guidance/cg192

NICE. (2017). Antenatal care for uncomplicated pregnancies. Clinical Guideline [CG62]. published 2008. National Institute for Clinical Excellence. Retrieved from https://www.nice.org.uk/guidance/cg62

Nieminen, K., Wijma., K., Johansson, S., Kinberger, E. K., Ryding, E. L., Andersson, G., . . . Wijma, B. (2017). Severe fear of childbirth indicates high perinatal costs for Swedish women giving birth to their first child. *Acta Obstetricia Et Gynecologica Scandinavica, 96*(4), 438-446. doi:10.1111/aogs.13091

Nylen, K. J., O'Hara, M. W., & Engeldinger, J. (2013). Perceived social support interacts with prenatal depression to predict birth outcomes. *Journal of Behavioral Medicine, 36*(4), 427-440. doi:10.1007/s10865-012-9436-y

O'Donnell, K. J., Glover, V., Barker, E. D., & O'Connor, T. G. (2014). The persisting effect of maternal mood in pregnancy on childhood psychopathology. *Development and Psychopathology, 26*(02), 393-403. doi:10.1017/S0954579414000029

O'Hara, M. W., Wisner, K. L., & Asher, H. (2014). Perinatal mental illness: Definition, description and aetiology. *Best Practice & Research Clinical Obstetrics & Gynaecology, 28*(1), 3-12. doi:10.1016/j.bpobgyn.2013.09.002

Olson, K. (2007). A new way of thinking about fatigue: A reconceptualization. Paper presented at the *Oncology Nursing Forum, , 34*(1) 93-99. doi:10.1188/07.ONF.93-99

Palsson, T. S., Beales, D., Slater, H., O'Sullivan, P., & Graven-Nielsen, T. (2015). Pregnancy is characterized by widespread deep-tissue hypersensitivity independent of lumbopelvic pain intensity, a facilitated response to manual orthopedic tests, and poorer self-reported health. *The Journal of Pain, 16*(3), 270-282. doi:10.1016/j.jpain.2014.12.002

Perlen, S., Woolhouse, H., Gartland, D., & Brown, S. J. (2013). Maternal depression and physical health problems in early pregnancy: Findings of an Australian nulliparous pregnancy cohort study. *Midwifery, 29*(3), 233-239. doi:10.1016/j.midw.2012.01.005

Pierce, H., Homer, C. S., Dahlen, H. G., & King, J. (2012). Pregnancy-related lumbopelvic pain: Listening to Australian women. *Nursing Research and Practice, 2012*, Article ID 387428. doi:10.1155/2012/387428

Pilkington, P. D., Milne, L. C., Cairns, K. E., Lewis, J., & Whelan, T. A. (2015). Modifiable partner factors associated with perinatal depression and anxiety: A systematic review and meta-analysis. *Journal of Affective Disorders, 178*, 165-180. doi:10.1016/j.jad.2015.02.023

Polit, D.,F., & Beck, C.,T. (2018). *Essentials of nursing research: Appraising evidence for nursing practice* (9th ed.). Philadelphia, PA, USA: Wolters Kluwer.

Pyykönen, A., Gissler, M., Løkkegaard, E., Bergholt, T., Rasmussen, S. C., Smárason, A., . . . Klungsoyr, K. (2017). Cesarean section trends in the Nordic Countries–a comparative analysis with the Robson classification. *Acta Obstetricia Et Gynecologica Scandinavica, 96*(5), 607-616. doi:10.1111/aogs.13108

Rallis, S., Skouteris, H., McCabe, M., & Milgrom, J. (2014). The transition to motherhood: Towards a broader understanding of perinatal distress. *Women and Birth, 27*(1), 68-71. doi:10.1016/j.wombi.2013.12.004

Renfrew, M. J., McFadden, A., Bastos, M. H., Campbell, J., Channon, A. A., Cheung, N. F., . . . Malata, A. (2014). Midwifery and quality care: Findings from a new evidence-informed framework for maternal and newborn care. *The Lancet, 384*(9948), 1129-1145. doi:10.1016/S0140-6736(14)60789-3

Ridner, S. H. (2004). Psychological distress: Concept analysis. *Journal of Advanced Nursing, 45*(5), 536-545. doi:10.1046/j.1365-2648.2003.02938.x

Rini, C., Schetter, C. D., Hobel, C. J., Glynn, L. M., & Sandman, C. A. (2006). Effective social support: Antecedents and consequences of partner support during pregnancy. *Personal Relationships, 13*(2), 207-229. doi:10.1111/j.1475-6811.2006.00114.x

Rosand, G. M., Slinning, K., Eberhard-Gran, M., Roysamb, E., & Tambs, K. (2011). Partner relationship satisfaction and maternal emotional distress in early pregnancy. *BMC Public Health, 11*, 161-2458-11-161. doi:10.1186/1471-2458-11-161

Rubertsson, C., Hellström, J., Cross, M., & Sydsjö, G. (2014). Anxiety in early pregnancy: Prevalence and contributing factors. *Archives of Women's Mental Health, 17*(3), 221-228. doi:10.1007/s00737-013-0409-0

Rubertsson, C., Waldenström, U., & Wickberg, B. (2003). Depressive mood in early pregnancy: Prevalence and women at risk in a national swedish sample. *Journal of Reproductive and Infant Psychology, 21*(2), 113-123. doi:10.1080/0264683031000124073

Ryan, J., Mansell, T., Fransquet, P., & Saffery, R. (2017). Does maternal mental well-being in pregnancy impact the early human epigenome? *Epigenomics, 9*(3), 313-322. doi:10.2217/epi-2016-0118

Sachs, A., & Smiley, R. (2014). Post-dural puncture headache: The worst common complication in obstetric anesthesia. *Seminars in Perinatology, 38*(6), 386-394. doi:10.1053/j.semperi.2014.07.007

Sandall, J., Soltani, H., Gates, S., Shennan, A., & Devane, D. (2016). Midwife-led continuity models versus other models of care for childbearing women. *Cochrane Database of Systematic Reviews, 2016*(4) doi:10.1002/14651858.CD004667.pub5

Sartorius, N. (2002). Iatrogenic stigma of mental illness. *BMJ (Clinical Research Ed.), 324*(7352), 1470-1471. doi:10.1136/bmj.324.7352.1

Saunders, T. A., Lobel, M., Veloso, C., & Meyer, B. A. (2006). Prenatal maternal stress is associated with delivery analgesia and unplanned cesareans. *Journal of Psychosomatic Obstetrics & Gynecology, 27*(3), 141-146. doi:10.1080/01674820500420637

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., . . . Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*, 22-33.

Shumaker, S. A., & Brownell, A. (1984). Toward a theory of social support: Closing conceptual gaps. *Journal of Social Issues, 40*(4), 11-36. doi:10.1111/j.1540-4560.1984.tb01105.x

Spanier, G. B. (1989). *Dyadic Adjustment Scale (DAS). user´s manual*. Toronto, Canada: Mulity-Health Systems Inc.

Staneva, A., Bogossian, F., Pritchard, M., & Wittkowski, A. (2015). The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: A systematic review. *Women and Birth, 28*(3), 179-193. doi:10.1016/j.wombi.2015.02.003

Staneva, A., Bogossian, F., & Wittkowski, A. (2015). The experience of psychological distress, depression, and anxiety during pregnancy: A meta-synthesis of qualitative research. *Midwifery, 31*(6), 563-573. doi:10.1016/j.midw.2015.03.015

Staneva, A., Bogossian, F., Morawska, A., & Wittkowski, A. (2017). "I just feel like I am broken. I am the worst pregnant woman ever": A qualitative exploration of the "at odds" experience of women's antenatal distress. *Health Care for Women International, 38*(6), 658-686. doi:10.1080/07399332.2017.1297448

Staneva, A., Morawska, A., Bogossian, F., & Wittkowski, A. (2015). Pregnancy-specific distress: The role of maternal sense of coherence and antenatal mothering orientations. *Journal of Mental Health, 25*(5), 387-394. doi:10.3109/09638237.2015.1101425

Staneva, A., Morawska, A., Bogossian, F., & Wittkowski, A. (2017). Maternal psychological distress during pregnancy does not increase the risk for adverse birth outcomes. *Women & Health, 58*(1), 92-111. doi:10.1080/03630242.2017.1282395

Stapleton, L. R. T., Schetter, C. D., Westling, E., Rini, C., Glynn, L. M., Hobel, C. J., & Sandman, C. A. (2012). Perceived partner support in pregnancy predicts lower maternal and infant distress. *Journal of Family Psychology, 26*(3), 453-463. doi:10.1037/a0028332

Statistics Iceland. (2016). Women's income from work was less than 30% of men's 2015. Retrieved from http://www.statice.is/publications/news-archive/wages-and-income/unadjusted-gpg-2015/

Statistics Iceland. (2017a). Births per year. Retrieved from http://px.hagstofa.is/pxen/pxweb/en/Ibuar/Ibuar__Faeddirdanir__faeddir__faedingar/MAN05100.px/?rxid=7f64fd7d-f954-474e-b3fb-00f528007c94

Statistics Iceland. (2017b). Infant mortality rate in Iceland. Retrieved from https://statice.is/publications/news-archive/population/life-expectancy-and-mortality-rates-2016/

Statistics Iceland. (2017c). Total fertility rate in Iceland never lower. Retrieved from http://www.statice.is/publications/news-archive/population/births-2016/

Statistics Iceland. (2017d). Women´s mean age at childbirth. Retrieved from http://px.hagstofa.is/pxen/pxweb/en/Ibuar/Ibuar__Faeddirdanir__faeddir__faedingar/MAN05103.px

Stein, A., Pearson, R. M., Goodman, S. H., Rapa, E., Rahman, A., McCallum, M., . . . Pariante, C. M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet, 384*(9956), 1800-1819. doi:10.1016/S0140-6736(14)61277-0

Steyerberg, E. W., Eijkemans, M. J. C., & Habbema, J. D. F. (1999). Stepwise selection in small data sets: A simulation study of bias in logistic regression analysis. *Journal of Clinical Epidemiology, 52*(10), 935-942. doi:10.1016/S0895-4356(99)00103-1

Streiner, D. L., & Norman, G. R. (2008). *Health measurement scales: A practical guide to their development and use* Oxford university press.

Svenaeus, F. (2000). *The hermeneutics of medicine and phenomenology of health: Steps towards a philosophy of medical practice.* Dordrecht, The Netherlands: Kluwer Academic Publisher.

Szyf, M., Tang, Y., Hill, K. G., & Musci, R. (2016). The dynamic epigenome and its implications for behavioral interventions: A role for epigenetics to inform disorder prevention and health promotion. *Translational Behavioral Medicine, 6*(1), 55-62. doi:10.1007/s13142-016-0387-7

Talge, N. M., Neal, C., & Glover, V. (2007). Antenatal maternal stress and long-term effects on child neurodevelopment: How and why? *Journal of Child Psychology and Psychiatry, 48*(3-4), 245-261. doi:10.1111/j.1469-7610.2006.01714.x

Tan, P. C., Vani, S., Lim, B. K., & Omar, S. Z. (2010). Anxiety and depression in hyperemesis gravidarum: Prevalence, risk factors and correlation with clinical severity. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 149*(2), 153-158. doi:10.1016/j.ejogrb.2009.12.031

Thome, M. (2000). Predictors of postpartum depressive symptoms in Icelandic women. *Archives of Women's Mental Health, 3*(1), 7-14.

Thome, M., & Alder, B. (1999). A telephone intervention to reduce fatigue and symptom distress in mothers with difficult infants in the community. *Journal of Advanced Nursing, 29*(1), 128-137. doi:10.1046/j.1365-2648.1999.00872.x

Thome, M., & Arnardottir, S. B. (2012). Evaluation of a family nursing intervention for distressed pregnant women and their partners: A single group before and after study. *Journal of Advanced Nursing, 69*(4), 805-816. doi:10.1111/j.1365-2648.2012.06063.x

Truong, B. T., Lupattelli, A., Kristensen, P., & Nordeng, H. (2017). Sick leave and medication use in pregnancy: A European web-based study. *BMJ Open, 7*(8) doi:10.1136/bmjopen-2016-014934

Van den Bergh, B. R. H., van den Heuvel, M. I., Lahti, M., Braeken, M., de Rooij, S. R., Entringer, S., . . . Schwab, M. (2017). Prenatal developmental origins of behavior and mental health: The influence of maternal stress in pregnancy. *Neuroscience and Biobehavioral Reviews,* doi:10.1016/j.neubiorev.2017.07.003

Van Gennep, A. (2013/1960). *The rites of passage*. New York: Routledge.

Westphal, J. (2016). *The mind-body problem*. Massachusetts, USA: The MIT Press.

Whitworth, M., & Dowswell, T. (2009). Routine pre-pregnancy health promotion for improving pregnancy outcomes. *The Cochrane Database of Systematic Reviews, (4):CD007536. doi*(4), CD007536. doi:10.1002/14651858.CD007536.pub2

WHO. (2010). International statistical classification of diseases and related health problems, 10th revision (ICD-10). Retrieved from http://apps.who.int/classifications/icd10/browse/2010/en

WONCA International Classification Committee (WICC). (2005). *International classification of primary care (ICPC-2-R)* (revised 2nd ed.). Oxford: Oxford University Press.

Woods, S. M., Melville, J. L., Guo, Y., Fan, M. -., & Gavin, A. (2010). Psychosocial stress during pregnancy. *American Journal of Obstetrics and Gynecology, 202*(1), 61.e1-61.e7. doi:10.1016/j.ajog.2009.07.041

World Economic Forum. (2013). The global gender gap report 2013. Retrieved from http://www.weforum.org/reports/global-gender-gap-report-2013

World Economic Forum. (2016). The global gender gap report. Retrieved from http://reports.weforum.org/global-gender-gap-report-2016/economies/#economy=ISL

World Medical Association. (2008). Helsinki Declaration. Retrieved from http://www.wma.net/en/30publications/10policies/b3/index.html

Yuksel, F., Akin, S., & Durna, Z. (2014). Prenatal distress in Turkish pregnant women and factors associated with maternal prenatal distress. *Journal of Clinical Nursing, 23*(1-2), 54-64. doi:10.1111/j.1365-2702.2012.04283.

Zhang, S., Ding, Z., Liu, H., Chen, Z., Wu, J., Zhang, Y., & Yu, Y. (2013). Association between mental stress and gestational hypertension/ preeclampsia: A meta-analysis. *Obstetrical and Gynecological Survey, 68*(12), 825-834. doi:10.1097/OGX.0000000000000009

Zijlmans, M. A. C., Beijers, R., Riksen-Walraven, M. J., & de Weerth, C. (2017). Maternal late pregnancy anxiety and stress is associated with children's health: A longitudinal study. *Stress, 20*(5), 495-504. doi:10.1080/10253890.2017.1348497

Zimet, G. D., Powell, S. S., Farley, G. K., Werkman, S., & Berkoff, K. A. (1990). Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 55*(3-4), 610-617.

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52*(1), 30-41.

# APPENDIX A

1. Total number of antenatal visits
2. Number of visits were the woman met with:
    a. Midwife
    b. Family doctor
    c. Obstetrician
    d. Any of them simultaneously
3. The woman height
4. Weight at:
    a. Booking visit
    b. The most weight during pregnancy
    c. Missing documentation regarding weight
5. Number of sick days due to nausea and vomiting
6. Documentation of pelvic discomfort / pain
    a. Done by midwife
    a. Done by physician
    b. Referral to physiotherapist reading pelvic problems.
    c. Number of sick days due to pelvic problems
7. Documentation of each sonogram;
    a. Reasons for individual sonogram
    b. Outcome of each
8. Vaginal bleeding during pregnancy;
    a. How many incidences (documented for each)
    b. In what week of pregnancy,
    c. cause,
    d. Result at each occurrence
    e. Tests and treatment at each occurrence
9. Contractions without cervical change
    a. How many incidences (documented for each)
    b. In what week of pregnancy,
    c. Nr of weeks where the woman does report contractions
    d. Number of sick days due to contractions
10. Documented mother´s worries regarding decreased fetal movement $\geq$ 28 weeks
    a. Each incident
    b. Gestational week at each incident
    c. Tests done
    d. Outcome of the tests
    e. Diagnoses of a problem by the fetus
11. Documenting of physical / psychosocial health of the women:
    a. Sleeping problems
    b. Tiredness
    c. Feeling weak
    d. Digestive problem,
    e. Lost appetite
    f. Feeling of dizziness

g. Pain – other than contractions. Headache (without symptoms of pre-eclampsia);

    back pain; abdominal pain; musculoskeletal pain (documented for each)
    a. What kind of pain,
    b. evaluation of intensity
    c. treatment

12. Documentation of heart palpitation, a) tests done, b) treatment, c) referral to medical specialists
13. Worries regarding a) the fetus, b) one-self, c) other family members
14. ICD -10 diagnoses of diseases

*Figure 5 Data collected from pregnancy records*

# APPENDIX B

**Variables from the mother´s record**
15. Interventions
        a. Induction
        b. Stimulations
        c. Episiotomy
16. Documented pain management methods
        a. Epidural analgesia
        b. Nitrous oxide
        c. Massage
        d. Hydrotherapy (bath)
        e. Acupuncture
        f. Opioids
        g. Other pharmacological pain medication
        h. Cervical dilation at time of pain management administered.
        i. Documentation of strength of contractions
        j. Documentation on the pain management effect.

17. Mode of childbirth

18. Reasons for C/S

19. Time length of the childbirth:
        a. From the time that the woman states that the birth has started until the child is born.
        b. Total time of „latent" phase (0 > 3 cm)
        c. Total time of "active" phase (4 > 10 cm)
        d. Total time of 2. stage of childbirth.
20. Medical diagnosed (ICD-10) documented in relation to the childbirth.

**Variables related to the fetus /newborn**
21. Meconium stained amniotic fluid documented at birth.
22. Documentation of fetal distress,
        a. Late decelerations
        b. Treatment for fetal distress
        c. Outcome of mother and child
23. Birthweight
24. Child´s gender

25.  Apgar at 1 minute / 5 minutes
26.  Gestational age at birth, assess by pediatrician.
27.  Admission to the NICU

*Figure 6.   Data collected from childbirth records*

**I**

Original Research - Quantitative

# Partner relationship, social support and perinatal distress among pregnant Icelandic women

CrossMark

Sigridur Sia Jonsdottir[a,b,*], Marga Thome[c], Thora Steingrimsdottir[d,e], Linda Bara Lydsdottir[e], Jon Fridrik Sigurdsson[e,f,g], Halldora Olafsdottir[f], Katarina Swahnberg[a]

[a] Department of Health and Caring Sciences, Linnaeus University, Kalmar/Växjö, Sweden
[b] School of Health Sciences, University of Akureyri, Iceland
[c] School of Health Science, Faculty of Nursing, University of Iceland, Reykjavik, Iceland
[d] Women's Clinic, Landspitali University Hospital, Reykjavik, Iceland
[e] School of Health Science, Faculty of Medicine, University of Iceland, Reykjavik, Iceland
[f] Division of Mental Health, Landspitali University Hospital, Reykjavik, Iceland
[g] School of Business, Department of Psychology, Reykjavik University, Reykjavik, Iceland

## ARTICLE INFO

## ABSTRACT

*Background:* It is inferred that perinatal distress has adverse effects on the prospective mother and the health of the foetus/infant. More knowledge is needed to identify which symptoms of perinatal distress should be assessed during pregnancy and to shed light on the impact of women's satisfaction with their partner relationship on perinatal distress.
*Aim:* The current study aimed to generate knowledge about the association of the partner relationship and social support when women are dealing with perinatal distress expressed by symptoms of depression, anxiety and stress.
*Methods:* A structured interview was conducted with 562 Icelandic women who were screened three times during pregnancy with the Edinburgh Depression Scale and the Depression, Anxiety, Stress Scale. Of these, 360 had symptoms of distress and 202 belonged to a non-distress group. The women answered the Multidimensional Scale of Perceived Social Support and the Dyadic Adjustment Scale. The study had a multicentre prospective design allowing for exploration of association with perinatal distress.
*Findings:* Women who were dissatisfied in their partner relationship were four times more likely to experience perinatal distress. Women with perinatal distress scored highest on the DASS Stress Subscale and the second highest scores were found on the Anxiety Subscale.
*Conclusion:* Satisfaction in partner relationship is related to perinatal distress and needs to be assessed when health care professionals take care of distressed pregnant women, her partner and her family. Assessment of stress and anxiety should be included in the evaluation of perinatal distress, along with symptoms of depression.

© 2016 Australian College of Midwives. Published by Elsevier Ltd. All rights reserved.

Summary of relevance:

### Problem or issue

Increased knowledge is needed on the possible association between perinatal distress and satisfaction in partner relationship and perceived social support.

### What is already known

It is inferred that perinatal distress has adverse effects on the expectant mother's health and affects the foetus'/infants' well-being.

### What this paper adds

(1) During pregnancy it is important to assess satisfaction in the partner relationship and division of household tasks and to offer advice if dissatisfaction is identified. (2) Evaluation of the pregnant woman's stress level is suggested along with anxiety and depression symptoms, when perinatal distress is assessed.

* Corresponding author at: Department of Health and Caring Sciences, Linnaeus University, Stagneliusgatan 14b, 392 34 Kalmar, Sweden.
E-mail addresses: sia.jonsdottir@lnu.se, siaj@unak.is (S.S. Jonsdottir).

## 1. Introduction

The journey to becoming a mother constitutes a transitional process which starts during pregnancy[1] and brings along changes in the relationships with partner, friends, family and the social environment.[1,2] As a part of the normal transition the prospective mother may also experience mild stress such as insecurity about the pregnancy or her ability to become a mother. This mild stress may enhance her need to seek information regardless of whether this is her first or a latter pregnancy.[1,3,4] During the pregnancy it is important however, for the mother, her support system and health care professionals to identify whether the stress becomes more severe or pervasive and escalates to distress.

Perinatal distress refers to distress that is experienced during pregnancy but can also emerge at any time up to a year after birth. Perinatal distress can be expressed as stress,[5] anxiety and/or depressive symptoms[2,5–7] and can be detected as a screen positive level of self-reporting scales or by assessment of experienced clinicians. Perinatal distress is common among pregnant women in relation to other pregnancy problems and has been found to be 12–15% on self-report scales.[6] In an Icelandic study 9.7% of women were reported to experience distress at the 16th week of pregnancy.[7] A woman who does report depressive symptoms may also experience anxiety[8,9] and/or stress symptoms[5] which should be included in evaluation of perinatal distress.

Early detection of perinatal distress is important as it affects the woman's and her family's adjustment during the transition of pregnancy as well as her own health and that of her foetus in a negative way[1,10] and have shown to increases family stress in general.[11] It has also been found to affect the woman's mental bonding with the foetus and the new-born.[12] Distress does also affect the foetus'/infant's development in a detrimental way.[11,13,14] An association between perinatal distress and spontaneous preterm labour was found in a systematic review[5] and a meta-analyses showed an association between anxiety and premature birth and low birth weight.[15] There is evidence that it affects emotional, behavioural, motor and cognitive development among children as they grow and increases the risk of developing psychiatric disorders in adolescence and adulthood.[16]

When assessing for perinatal distress it is important to consider those factors that are related to the occurrence of perinatal distress. Known factors include low socioeconomic status, unemployment, low education level, financial difficulties, being single, a history or episodes of earlier distress, and on-going conflict between the partners.[10] Association was found between perinatal distress and decrease sense of control over one's body and intensified feelings of responsibility over the developing foetus.[17] Smoking and drinking alcohol during pregnancy have been found to be covariates of perinatal distress as women reporting perinatal distress have been found to have more difficulties in stopping smoking and drinking alcohol during pregnancy than non-distressed women.[11,18] A meta-synthesis showed that perinatal distressed women experience feelings of unmet expectation about the pregnancy and stigma from the environment regarding their distressed feelings.[19]

When a pregnant woman is in transition to motherhood, she leans on her social support[1] and strong social support has been found to buffer distress.[2,10,20,21] Perceived social support might be a more reliable and valid measure of social support than available support[3] and weak perceived partner support was found to be associated with antenatal anxiety and depressive symptoms.[20] Conceptualizations of the social support network might be difficult to assess, however, as it can be either defined too broadly or too narrowly or just as one type of support, and the family or partner may not even be included.[21] When assessing association with perinatal distress, social support from partner and satisfaction in partner relationship have commonly been evaluated as one and the same variable. Therefore, partner support and partner relationship have been entangled with each other in studies' outcomes.[18,22] Poor quality of partner relationship was found to be the strongest predictor of perinatal distress in an epidemiological cross-sectional study from Norway.[18] A systematic review by Pilkington et al.[8] showed that more research is needed to evaluate dissatisfaction about division of household tasks and child care which could indicate on-going conflict between the partners.

Midwives and other healthcare professionals need to be alert to symptoms of distress among partners and offer advice and guidance on ways to enhance factors which are likely to decrease the distress,[8,10] and encourage communication regarding feelings since distressed women have been found to experiences difficulties expressing their feelings and needs.[19] Perinatal distress in the partner relationship might be alleviated with a brief family-oriented intervention, as shown in a study, who found that perinatal distress decreased, both amongst expectant fathers and mothers.[23] By guiding the mother, her partner and the family to strengthen positive and protective factors which could prevent the escalation of pervasive/severe distress, the health of both mother and the foetus can be improved.[10]

From a review of the literature it is concluded that perinatal distress has adverse effects on prospective mothers' health and affects the foetus'/infant's well-being and even the whole family in a negative way. More knowledge is needed regarding the association of anxiety symptoms and satisfaction in the partner relationship on perinatal distress. Based on increased knowledge healthcare professionals could advise ways and methods to strengthen protective factors during the pregnancy.

The aim of the current study was to generate knowledge about the possible association with satisfaction in the partner relationships and social support among Icelandic women who are dealing with perinatal distress.

The following research questions were asked:

- Is perinatal distress during pregnancy associated with dissatisfaction in the partner relationship among Icelandic women?
- Is perinatal distress during pregnancy associated with perception of social support among Icelandic women?

## 2. Method

### 2.1. Design

The study was part of a larger population-based research project named: the Icelandic study of perinatal mental health (ISPMH). The women who participated (n = 2523) were followed from the 16th week of pregnancy until the infant reached one year of age. The ISPMH had a multicentre prospective design allowing for exploration of correlations of perinatal distress with a variety of variables. In the current study data from the pregnancy part (n = 562) of the ISPMH were used to explore the possible association between satisfaction with the partner relationship, social support and perinatal distress among pregnant Icelandic women. Where an association existed, evaluation was conducted with perinatal distress as the dependent variable (see Table 1).

### 2.2. Participants

The participants were women receiving their antenatal care from eleven Primary Health Care Centres in Iceland, 10 in Reykjavik, the capital city, and one in Akureyri, Iceland's second largest urban area. Antenatal care in Iceland is free of charge, provided by midwives at healthcare centres on a regular basis from

**Table 1**

Background variables for the perinatal distress group (PDG) and the non-distress group (NDG) ($n = 562$).

| Characteristic | PDG | | NDG | | $\chi^2$ (df) | M |
|---|---|---|---|---|---|---|
| | $n = 360$ | % | $n = 202$ | % | | |
| Marital status | | | | | 14.69 (1)[*] | 2 |
| Married | 88 | 53.01 | 78 | 46.99 | | |
| Cohabiting | 230 | 67.06 | 113 | 32.94 | | |
| Single | 40 | 78.43 | 11 | 21.57 | | |
| Education | | | | | 30.01 (3)[*] | 5 |
| Elementary or lower | 88 | 81.48 | 20 | 18.52 | | |
| Diploma or junior college | 104 | 66.24 | 53 | 33.76 | | |
| Special education | 27 | 77.14 | 8 | 22.86 | | |
| University degree | 137 | 53.31 | 120 | 47.69 | | |
| Employment | | | | | 21.3 (2)[*] | 3 |
| Employed | 206 | 57.7 | 151 | 42.3 | | |
| Student | 66 | 69.5 | 29 | 30.5 | | |
| Unemployed | 87 | 81.3 | 20 | 18.7 | | |
| Division of household tasks and child caring | | | | | 7.92 (1)[**] | 62 |
| Dissatisfied | 79 | 74.5 | 27 | 25.5 | | |
| Pleased | 235 | 59.6 | 158 | 40.4 | | |
| Financial situation | | | | | 7.88 (1)[**] | 2 |
| Easy | 305 | 61.99 | 187 | 38.01 | | |
| Difficult | 54 | 79.41 | 14 | 20.59 | | |
| Smoking | | | | | 28.95 (2)[*] | 1 |
| Yes | 48 | 90.57 | 5 | 9.43 | | |
| Quit when becoming pregnant | 63 | 77.78 | 18 | 22.22 | | |
| Never or quit before the pregnancy | 249 | 58.31 | 178 | 41.69 | | |
| Currently in mental health therapy | | | | | 26.95 (1)[**] | 12 |
| Yes | 97 | 84.35 | 18 | 15.65 | | |
| No | 253 | 58.16 | 182 | 41.84 | | |
| Mental health therapy before | | | | | 37.42 (1)[*] | 7 |
| Yes | 227 | 75.42 | 74 | 24.58 | | |
| No | 128 | 50.39 | 126 | 49.61 | | |

M = missing.
[*] $p < 0.001$.
[**] $p < 0.05$.

around the 12th week of pregnancy, and each pregnant woman has her dedicated midwife. Almost 100% of pregnant women come for prenatal care and midwives do refer women to a physician as needed. High risk women are in the care of a midwife and a physician/obstetrician. The criteria for inclusion in the study were: (a) being at least 16 years of age and receiving parents' permission to participate if younger than 18 years; (b) being able to read and speak Icelandic. Exclusion criteria for participation included a history of a diagnosed schizophrenia, acute psychotic symptoms or impaired cognitive functioning, assessed by the midwife.

### 2.3. Procedure

The study was introduced with written information during the initial booking visit by midwives who had before received verbal and written information from the ISPMH team. At the following visit, around the 16th week of pregnancy, women who had consented signed an informed consent and received from the midwives the first package of screening tools (self-report scales). Recruitment started during the last months of 2006 in Reykjavik, and from the middle of 2008 in Akureyri. Women were recruited until the middle of 2012, with data collection halted for 6 months during 2009. This recruitment period of 6 years, is explained first of all by the fact that the Icelandic population numbers around 330,000 citizens[24] with an annual birth rate of around 4500.[25] This situation explains the longer required recruitment time needed than in larger societies. During the middle of the data collection the

2008 financial crisis hit Iceland, which also resulted in a drop in the participation rate for an extensive period.

Screening for perinatal distress included symptoms of anxiety and depression and was conducted by two self-reported scales at three time points (T) during pregnancy: at 16 ($T1$), 25 ($T2$) and 36 ($T3$) weeks. The scales were the Edinburgh Depression Scale (EDS)[26] and the Depression, Anxiety, Stress Scale (DASS).[27] Women who screened positive on at least one occasion ($n = 397$) were contacted by a research assistant and asked to participate within two to four weeks in a semi-structured psychiatric diagnostic interview. These women belonged to the Perinatal Distress Group (PDG). Non-distressed women were randomly selected ($n = 324$) and asked to participate for a similar semi-structured interview and formed the Non-Distressed Group (NDG) (see Fig. 1). After agreeing to participate, an interviewer contacted the women and scheduled the interview, which was conducted by experienced female clinicians. During the interview either the woman's perinatal distress or non-distress status was confirmed by the interviewer. The interviewers had extensive clinical experience in distinguishing between symptoms of physical discomfort or mental health symptoms regarding pregnancy. Inter-rater reliability between the two main interviewers was high (Kappa = 0.86 [$p < 0.001$], 95% CI 0.75, 0.97). During the interview the women provided background information and answered several questionnaires, two of which were used in the current study. Women who were interviewed but did not return the EDS or DASS at any of the three
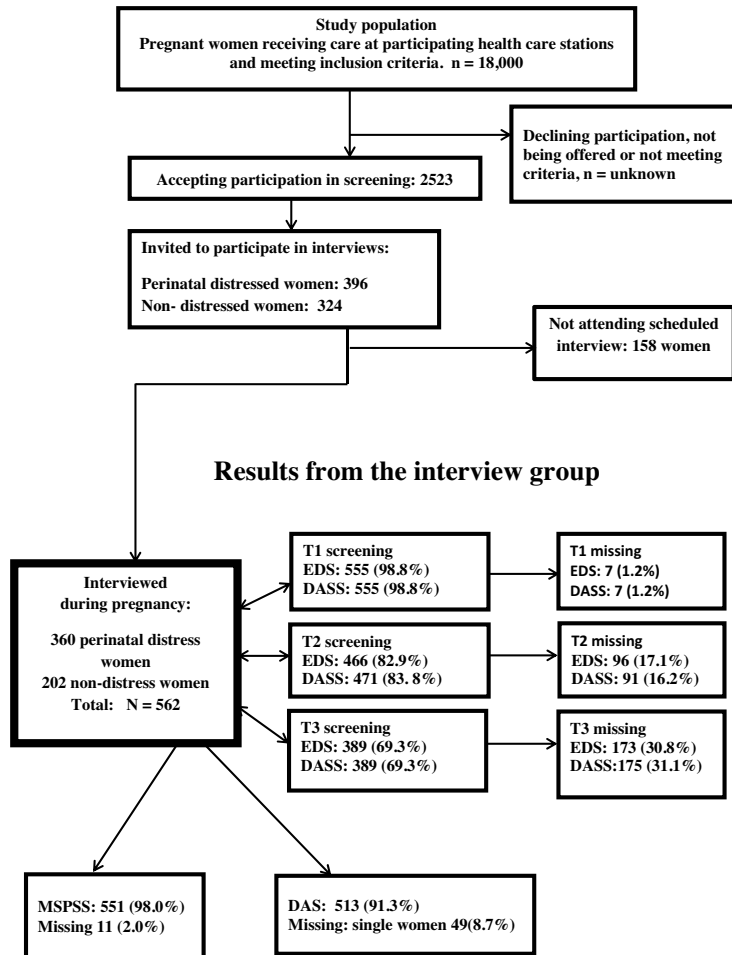
**Fig. 1.** Overview of study population and drop-outs.

T—points were counted as drop-outs for that time point only (see Fig. 1).

### 2.4. Instruments

The sociodemographic and background information gathered during the interview was: maternal age; para (primipara or multipara); marital status; educational level; employment status; financial situation; use of tobacco and or alcohol; and current or history of mental health therapy. As a part of the background information there were also questions aimed to evaluate issues that could suggest possible conflict between the partners. These were number of persons living in the household; percentages of the woman's part of household tasks and childcare; and how pleased she was with division of household tasks and child care as a possible evaluation of any on-going conflict with the husband.[10]

#### 2.4.1. Perinatal distress scales

The women's perinatal distress was assessed with two self-reported screening tools. They were screened with the Depression and Anxiety subscales of the Depression, Anxiety Stress Scale (DASS)[27] and with the Edinburgh Postpartum Depression Scale (EPDS).[26] The two scales were applied for comparison purposes of the two scales, in Iceland, but for this research the results of positive screening were used for both scales since the focus was on all distressed participants.

The Depression, Anxiety Stress Scale (DASS) consists of three subscales that measure negative emotional states of depression, anxiety and stress.[27] Each scale is measured by 14 items and individuals are asked to rate each item as experienced during the previous week. The DASS Anxiety Scale includes symptoms such as: "aware of action of heart"; "dryness of mouth"; "worried about situation"; or "scared for no good reason". The Depression Scale includes symptoms such as: "nothing future hopeful"; "feeling of

being worthless"; "lost interest in everything"; or "could not get enjoyment". The Stress Scale includes symptoms such as: "hard to calm down"; "upset easily"; "irritable"; or "impatient when delayed". DASS has been widely used in research and for clinical purposes. It has also been used in research on pregnant women.[12,28]

Scores for each item range from number 0 to 4 with the lowest score zero and the highest 42 for each subscale. Participants pick the number that best applies to them: (0) did not apply at all; (1) applied to some degree, or some of the time; (2) applied to a considerable degree, or a good part of time; (3) applied very much, or most of the time. Participants were found to be screen positive if they reached scores of ≥mild anxiety or depression. Symptoms of anxiety are divided by levels into: mild (8–9 scores); moderate (10–14 scores); severe (15–19 scores); and ≥20 scores indicate extreme severe anxiety. The subscale of depressive symptoms is divided into: mild (10–13); moderate (14–20); severe (21–27); and extreme severe depression ≥28. The subscale of stress is divided into mild (15–18); moderate (19–25); severe (26–33); and extreme severe stress ≥34.[27] The Icelandic version of DASS has been available for some time and used extensively in the country. Cronbach's alpha for this study is shown in Table 2.

The Edinburgh Postpartum Depression Scale (EPDS) is a 10-item self-reporting scale originally designed to screen for symptoms of postnatal depression[26] but has been used and tested during pregnancy and has satisfactory psychometric properties. When used during pregnancy it is commonly referred to as the Edinburgh Depression Scale (EDS).[29] Women are asked to reflect on the previous seven days and the scale covers symptoms of distress such as: self-blaming; feeling sad; ability to laugh; feeling unhappy; a feeling of panic; sleep disturbance; and crying due to unhappiness. Scoring is from 0 to 30, higher scores indicating more symptoms of depression.[26] A cut-off score of 10–13 is most commonly used to differentiate between screen positive and screen negative women[10] and scores of ≥12 were used in this study. The Icelandic version of EDS was available.[30] See Table 2 for Cronbach's alpha (α) in the study.

### 2.4.2. Satisfaction with partner relationship

The Dyadic Adjustment Scale (DAS) is a 32-item questionnaire which assesses several components related to quality of adjustment and satisfaction in a partner relationship.[31] The total score of the scale reflects satisfaction with the quality of the partner relationship. Fifteen of the items are developed as a Likert scale, reaching from always disagree (0) to always agree (6). These are such items as: "handling family finances", "major decisions", "philosophy of life", "ways of dealing with parents or in-laws" and "time spent together". There are also seven items on a Likert scale which ask questions such as how often: "do you discuss or have you considered divorce, separation or termination of your relationship?" and "do you confide in your partner". The remaining items are developed with different and individual answers. Some of them can be judged as intrusive personal questions, for example whether the partners disagree about sex and showing love. The lowest possible score on the DAS is 0 but satisfaction with the partner relationship increases with higher scores, the highest possible being 151.[31] Individuals scoring below 92–107 are more dissatisfied with their relationship than individuals with higher scores.[32] For this study, the results were calculated into a dichotomous variable of satisfaction with the partner relationship: (1) ≤107 dissatisfied; (2) ≥108 satisfied. DAS has been used widely and has been found to be reliable in a sample of American married and divorced people with Cronbach's alpha = 0.95–0.96.[31,33] The instrument was translated into Icelandic by the ISPMH team and back-translated by a professor of psychology. Cronbach's alpha for this study was α = 0.92.

### 2.4.3. Social support

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item questionnaire assessing social support and consists of three sub-scales: family, friends, and significant others, each with four questions.[34] Each of the MSPSS subscales consists of four items with answers based on a 7 point rating scale, from "very strongly disagree" (1) to "very strongly agree" (7). Four questions ask about "significant other" (SO): "there is a special person who is

**Table 2**
Screening results of Perinatal Distress Group (n = 360).

| Self-reported scales cut-off for positive screening | | T1 | T2 | T3 |
|---|---|---|---|---|
| EDS ≥ 12 | n (%) | 150 (42.5%) | 109 (41.3%) | 79 (42.9%) |
| | Mean–max score | 15.0–26 | 14.95–26 | 14.9–25 |
| | SD | 2.93 | 3.00 | 3.28 |
| | Drop-outs[a] | 7 (1.2%) | 96 (17.1%) | 173 (30.8%) |
| | α | 0.85 | 0.84 | 0.84 |
| | CI | (0.84–0.86) | (0.83–0.85) | (0.83–0.85) |
| DASS depression ≥ 10 | n (%) | 164 (45.5%) | 101 (37.5%) | 67 (36.0%) |
| | Mean–max score | 16.0–40 | 16.3–39 | 17.1–38 |
| | SD | 6.30 | 6.75 | 7.24 |
| | Drop-outs[a] | 7 (1.2%) | 91 (16.2%) | 174 (31.0%) |
| | α | 0.92 | 0.92 | 0.92 |
| | CI | (0.91–0.92) | (0.91–0.92) | (0.91–0.92) |
| DASS anxiety ≥ 8 | n (%) | 168 (47.4%) | 139 (51.7%) | 89 (50.9) |
| | Mean–max score | 12.9–34 | 12.7–34 | 14.3–42 |
| | SD | 5.18 | 5.51 | 6.27 |
| | Drop-outs[a] | 6 (1.1%) | 91 (16.2%) | 175 (31.1%) |
| | α | 0.85 | 0.86 | 0.87 |
| | CI | (0.84–0.86) | (0.85–0.87) | (0.86–0.88) |
| DASS stress ≥ 15 | n (%) | 183 (51.8%) | 146 (54.1%) | 95 (50.1%) |
| | Mean–max score | 22.1–41 | 21.4–40 | 23.0–41 |
| | SD | 6.50 | 5.61 | 6.42 |
| | Drop-outs[a] | 7 (1.2%) | 89 (15.8%) | 174 (31.0%) |
| | α | 0.92 | 0.93 | 0.93 |
| | CI | (0.92–0.93) | (0.92–0.93) | (0.93–0.94) |

α = Cronbach's alpha; CI = 95% confidence interval.
[a] Drop-outs calculated from total number of participants (n = 562).

around when I am in need": "I have a special person who is a real source of comfort to me"; "there is a special person with whom I can share my joys and sorrows"; and "I have a special person in my life who cares about my feelings". The definition of "Significant Other" was discussed with the MSPSS constructor, Professor Zimet, who confirmed that it was chosen not to define SO, but rather which would allow respondents to decide for themselves who was their significant other. For some it will refer to a spouse or romantic partner, for others it could be a close friend, a therapist or some other specific individual who might provide support.

The lowest score possible for each sub-scale is 4 and the highest is 28 indicating "the ultimate" perceived support". For this study calculation of "weak support" was set at ≤16 and "strong support" at ≥17. The argument is twofold; first the method of dividing the scale into two parts was intended to differentiate between weak and strong support. Secondly, by rating each item as 4, (the median number) on the subscale, the scoring would be 16 and therefore the woman would be assessing her support as not being strong. The MSPSS is a widely used instrument and was tested on 265 pregnant US women during their 3rd trimester and proved reliable with Cronbach's alpha = 0.92.[35] The Icelandic translation was available before the ISPMH and Cronbach's alpha in the study, for the "Significant other subscale" was $\alpha$ = 0.95, for the "Family subscale" 0.92, and for the "friends subscale" 0.94.

### 2.5. Ethics

The study was approved by the Icelandic National Bioethical Committee (ref. no. 05-107-SI) and the Data Protection Authority (ref. no. S2589). Permission was given by directors of nursing and midwifery and medical directors at the participating Health Care Centres. None of the clinicians who conducted the interviews participated in the women's antenatal care and they were blind to the participants' EDS and DASS scores before the interview. Healthcare professionals not involved in the research were available for women who were in need of psychiatric treatment or felt they needed support after participation.

### 2.6. Statistics/statistical analysis

Analyses were conducted with the SPSS statistical package, 22nd version (SPSS for Windows, Rel. 22nd, SPSS Inc., Chicago IL, USA). Missing data in the DAS and the MSPSS instrument were handled by the 10% rule. If ≤10% of items have not been answered, the mean value of the person's total score for that scale are added to make up for the missing item(s). This is one of the most common ways of dealing with missing answers on a scale [36]. The level of significance was pre-set at $p < 0.05$ for comparison of the two groups. The displayed and discussed results are those that proved statistically significant. Preliminary analysis included a descriptive statistic and the $t$-test for independent samples and chi-square test ($\chi^2$) for independence.

Multiple logistic regressions were used to identify association between the dependent variable, perinatal distress and the independent variables, social support and satisfaction in partner relationship. They were coded to fit into a regression model along with the significant background variable and added one by one to a Hierarchical multiple logistic regression model: (1) DAS, dissatisfaction in relationship ($n$ = 96), where satisfaction in relationship ($n$ = 417) was used as a reference); (2) weak social support (MSPSS) from family ($n$ = 57), and friends ($n$ = 53). Strong social support from family ($n$ = 494) and friends ($n$ = 498) were used as reference. (3) Marital status was coded into indicator variables and formed into three categories for the model: (a) married ($n$ = 166) (used as a reference); (b) cohabiting ($n$ = 343); (c) and the third category, ($n$ = 51) with single ($n$ = 48) and divorced women ($n$ = 3). Education

level was coded into indicator variables and divided into three categories: (a) elementary or lower ($n$ = 108); (b) secondary or post-secondary ($n$ = 192); (c) university ($n$ = 257) (used as a reference). (5) Employment was coded into indicator variables and divided into: employed ($n$ = 357) (used as a reference) (a) students ($n$ = 95); and (b) unemployed ($n$ = 107). (6) Smoking was divided into: (a) never smoked or stopped before pregnancy ($n$ = 426) (used as reference); (b) stopped smoking after becoming pregnant ($n$ = 81); (c) continue to smoke ($n$ = 53). (7) Financial situation (ability to make ends meet) was divide into (a) easy ($n$ = 492), with combining easy ($n$ = 204) and manageable ($n$ = 288) (used as a reference); (b) difficult ($n$ = 68), combining two answers, bad ($n$ = 57) and really bad ($n$ = 11). (8) Division of household tasks and child care was divided into: (a) dissatisfied (very much, somewhat and no opinion) ($n$ = 123); (b) satisfied (somewhat satisfied and very satisfied) ($n$ = 425). The statistically significant variable "currently in mental therapy" and "in mental therapy before" was left out since they are obvious cofounders to perinatal distress. The variables, "financial situation", "education", "employment" and "smoking" are also known confounders to perinatal distress, but they were kept in the regression analyses since this study was the first on perinatal distress among Icelandic pregnant women.

## 3. Findings

### 3.1. Descriptive background analyses

Comparison of background variables of the PDG (360) and the NDG (202) revealed no significant difference for age between the groups. The mean age of the PDG was 28.4 years (range 17–43 years) and of the NDG 29.9 years (range 17–47 years). Sixteen participants were ≤19 years old, of whom two belonged to the NDG. A total of 225 of the women (40.8%) were carrying their first child and accounted for 40.5% of the PDG and 41.2% of the NDG. The question whether "employed at the moment" offered two options: 63.8% were employed against 36.2% not employed. They consisted of students 16.9%; women with a disability 1.8%; housewives 2.1%; unemployed 5.5%; and long-term sick leave 9.6%. The mean number of people in a household was 2.89 (median 3; range 1–8). There was no significant difference between the PDG and NDG in terms of number of people in the household, 15 women lived alone, and in six homes there were six to eight people in the household. There was no significant difference between the groups in their share of household tasks and child care. The women's mean share of household tasks and child care was 60.6% (median of 60%, range 0–100%). When the women were asked about how happy they were with the division of household tasks and child care, the PND group was significantly more likely to be dissatisfied with the division.

Of the women who continued to smoke during pregnancy, fourteen of them reported smoking 1–5 cigarettes daily, seventeen women smoked up to 10 cigarettes daily, and 8 women smoked up to twenty or more cigarettes. All eight women who smoked the most belonged to the PDG. Five women who continued to smoke did not answer how many cigarettes they smoked daily. Seven women continued to drink alcohol during pregnancy, four in the PDG and three in the NPD. Significant differences between the PDG and the NDG groups were found in eight background variables (see Table 1).

### 3.2. Prevalence of perinatal distress

Results from the EDS scales showed that from 41.3% to 42.9% of the PDG screened positive on any of the T-points, with a mean score of 14.9 compared to the maximum score of 26 (see Table 2). On the DASS Depression subscales, 36.0%–45.5% of the women did

**Table 3**

Satisfaction in partner relationship and perceived social support among Perinatal Distress group (PDG) and Non-distress group (NDG) ($n = 562$).

| Scale | Outcome | PDG | | NDG | | $X^2$ (df) | $p$ |
|---|---|---|---|---|---|---|---|
| | | $n$ | % | $n$ | % | | |
| **Relationship*** | **Dissatisfied** | 83 | 86.5 | 13 | 13.54 | **28.36 (1)** | 0.001 |
| | Satisfied | 239 | 57.3 | 178 | 42.69 | | |
| Social support** | | | | | | | |
| **Family** | **Weak** | 47 | 82.5 | 10 | 17.54 | **9.505 (1)** | 0.002 |
| | Strong | 305 | 61.7 | 189 | 38.26 | | |
| **Friends** | **Weak** | 45 | 84.9 | 8 | 15.09 | **11.23 (1)** | 0.001 |
| | Strong | 307 | 61.7 | 191 | 38.35 | | |
| Significant other | Weak | 8 | 66.7 | 4 | 33.3 | 0.041 (1) | 0.839 |
| | Strong | 344 | 63.8 | 195 | 36.18 | | |

DAS* $n = 513$; MSPSS** $n = 551$; Bold = significant results.

screen positive. Mean scores were 16.5, and maximum scores were 42. Of the participants, 47.4%–51.9% scored above the cut-off point on the DASS Anxiety subscale. The mean score was 13.2 (SD 5.18–6.31) and the maximum 42. During the analyses of the two DASS subscales it was decided to run a secondary analysis on the DASS Stress scale. Results from the DASS Stress subscale showed that 50.1%–54.1% of the participants screened positive with a mean score of 22.1 (SD 5.61–6.50) compared to the maximum of 41 (see Table 2). Although results for the mean scores of all three subscales of the DASS indicated moderate perinatal distress for the groups, there were individuals at all T-points who reported signs of extreme perinatal distress.

### 3.3. Satisfaction in the partner relationship and social support

Analysis of the DAS scores (Table 3) was based on answers from 91.3% ($n = 513$) women of whom 96 (18.7%) scored ≤107 (median score = 120; SD 14.49; range from 60 to 146). The 10% rule[36] was applied on 49 (9.8%) questionnaires that were missing one item of the 32 items in the questionnaire and also on one questionnaire with three missing items. The PDG experienced significantly more dissatisfaction in the partner relationship compared to the NDG ($p < 0.001$). Results from perceived social support from family and friends were based on data from 98% ($n = 551$) women. A total of 10.3% ($n = 57$) rated perceived "support from family" as weak. The mean score was 23.1 (median 25; SD 4.87). Perceived "support from friends" was rated weak by 9.4% ($n = 53$) and the mean score

for friends' support was 22.79 (median 24 and SD 4.77). The majority of the women or 95.9% ($n = 539$) felt that were receiving strong support from SO and the mean score was 26.1 (median 28; SD 3.56). The 10% rule[36] was used on eight (1.5%) questionnaires where one item of 12 was missing.

### 3.4. Factors associated with perinatal distress

Logistic regression was performed to assess the likelihood for perinatal distress associated with significant variables. The model contained eight independent variables (see Table 4) which were all significant in univariate analyses. They were: smoking during pregnancy (OR 6.86), mental therapy before (OR 4.60), elementary or lower education (OR 3.72), friends support (OR 3.50), unemployment (OR 2.50), financial situation (OR 2.36), dissatisfaction with division of household tasks and child care (OR 2.10), and marital status (OR 1.8). Six variables made a statistically significant contribution to the full model. They were: dissatisfaction in partner relationship; smoking during pregnancy; unemployment; being a student; elementary or lower education only; and division of household tasks and child care. The strongest association for the whole model was found with "dissatisfaction in partner relationship". The full model with all eight variables was statistically significant, $X^2$ (5 n = 496) = 92.97, $p < 0.001$. The model as a whole explained between 17.7% (Cox and Snell $R^2$) and 23.3% (Nagelkerke $R^2$) of the likelihood of being screened positive for perinatal distress during pregnancy.

**Table 4**

Adjusted odds ratio (OR) for association of perinatal distress ($n = 562$).

| Variables | | PDG $n$ 360 (%) | NDG $n$ 202 (%) | Adj OR | 95% CI | | M |
|---|---|---|---|---|---|---|---|
| Relationship | Dissatisfaction | 83 (86.5) | 13 (13.5) | **4.59** | 2.22 | 9.45 | 49 |
| Social support | Weak family support | 47 (82.5) | 10 (17.5) | 1.56 | 0.66 | 3.72 | 11 |
| | Weak friends support | 45 (84.9) | 8 (15.1) | 2.16 | 0.84 | 5.58 | |
| Marital status | Cohabiting | 230 (67.1) | 113 (32.9) | 1.45 | 0.93 | 2.26 | 2 |
| | Single | 40 (78.4) | 11 (21.6) | 0.60 | 0.15 | 2.49 | |
| Division of household tasks and child care | Dissatisfaction with division | 94 (76.4) | 29 (23.6) | **1.99** | 1.17 | 3.39 | 14 |
| Education | Elementary or lower | 88 (81.5) | 20 (18.5) | **2.29** | 1.10 | 4.75 | 3 |
| | Secondary or post-secondary | 135 (68.2) | 62 (33) | 1.29 | 0.82 | 2.04 | 1 |
| Employment | Unemployed | 156 (76.9) | 47 (23.2) | **1.85** | 1.08 | 3.19 | |
| | Students | 66 (69.5) | 29 (30.5) | **2.84** | 1.49 | 5.42 | |
| Smoking | Continued | 48 (90.6) | 5 (9.4) | **3.83** | 1.25 | 11.86 | 1 |
| | Stopped | 63 (77.9) | 18 (22.2) | 1.34 | 0.69 | 2.58 | |
| Financial situation | Difficult | 54 (79.49) | 14 (20.6) | 0.89 | 0.40 | 2.02 | 2 |

Bold = significant in full model.

## 4. Discussion

The most important findings in this study were that women reporting perinatal distress were 4.59 times more likely to be dissatisfied in their partner relationship. They were also significantly more likely to be dissatisfied with the division of household tasks and child care. The women scored higher on the DASS anxiety subscale than the DASS depression scale or the EDS, which indicated that symptoms of anxiety should be included in assessment of perinatal distress. The highest scores were on the DASS Stress subscale.

Since an association was found between perinatal distress and dissatisfaction with partner relationship the first research question got a definite positive answer. A large Norwegian epidemiological study supports our results even though partner relationship was assessed by a different measure or a 10 item scale developed by the research team.[18] Our findings are also congruent with the statement of Mirowsky and Ross[37] that good quality of partner relationship is important to boost well-being amongst related individuals. It has not been part of routine perinatal care in Iceland to ask about the quality of the partner relationship but midwives in Iceland were able to identify perinatal distress amongst women without a routine screening.[23] Our study is the first in Iceland that has assessed satisfaction in partner relationship during pregnancy and the results confirm that questions assessing satisfaction in partner relationship should be asked during perinatal care.

The majority of the women in the study assessed their social support as relatively strong. The PDG was significantly more likely to report less perceived support from family and friends than those in the NDG but almost all women perceived strong support from their significant other. The latter research question was therefore partially answered positively and partially negatively. It needs to be taken into account that distress might decrease a person's sense of control[3,17,18,37] and could hinder women from noticing or accepting support offered by family and friends. The result that only around 10% of the women perceive weak support from family and friends does not come as a surprise since it reflects the situation in Icelandic society. Bonds with family and friends are strong and individuals can traditionally count on help from family and friends when needed. Our finding from significant other support is more difficult to assess, especially because very few women evaluated their significant other support as being weak. From our results it is also inferred that the variables of significant other support, support from partner and satisfaction in partner relationship do contradict each other and that they ought to be distinguished in future studies, as Rosand et al.[18] point out as well.

Women in the PDG were also two times more likely to be dissatisfied with the division of the household tasks and child care, which could indicate dissatisfaction in the partner relationships. We were unable to locate another study which assesses satisfaction with division of household tasks and child care during pregnancy and results from Pilkington et al.[8] meta-analysis confirm that research has been missing regarding division of household tasks and child care in the family and perinatal distress.

Our finding that the highest percentage of distressed women were found on the DASS Stress subscale supports the proposition that assessment of stress should be included as a dimension of distress together with anxiety and depression symptoms.[4,5] It needs to be taken into account, however, that these results are based on answers from women who were initially screened for symptoms of depression and anxiety but not for stress. An Australian study where emotional well-being was assessed amongst pregnant women by the EDS and DASS showed that the highest scores on the DASS were found on the Stress subscale, which supports our results.[28] However, their results have to be viewed in the light of the fact that participants did not reach the cut-off scores of screen positive, since the highest mean score on the DASS Stress subscale was 9.45 (SD 6.20) which does not reach a level of mild stress, whereas in our study the perinatal distressed group reached moderate stress level on the DASS Stress subscale (highest mean 23.0). Cronbach's alpha of all the scales at all T-points did show good internal consistency. To our knowledge, our study is the first with a quantitative design to take into account the stress symptoms in a group of pregnant women who were screened for anxiety and depression. Based on our results, evaluation of stress should be taken into account when women are assessed for perinatal distress. A meta-synthesis by Staneva et al.[19] from eight qualitative studies, confirms that stress should be included in the assessment of perinatal distress. We found, the second highest distress mean score (14.6) on the DASS Anxiety subscale. This confirms the result of the systematic review of Pilkington et al.[8] as they recommended that anxiety symptoms need to be assessed as part of perinatal distress.

Students in the study were 2.84 times more likely to experience perinatal distress than employed women. These results raise concern and are highlighted. For the most part these women would be university students and after the birth of the child it is likely that they aim to continue their studies along with child rearing, which might contribute to their distress. These results also confirm results from another Icelandic study assessing university female students' distress. Results from that study indicated that 22.5% of the participants had symptoms of depression and 21.2% symptoms of anxiety.[38] Results from a study by the Icelandic Directorate of Health among Icelanders ≥18 years old indicated that 31% of Icelandic women experience stress on a regular base in their daily lives.[39] We were unable to locate another study which assessed perinatal distress among students and this needs to be studied further.

The logistic regression analyses did not show an association between financial difficulties and perinatal distress though financial difficulties were found to be confounded with perinatal distress in other studies.[2,9,10] The explanation for this finding could lie in the different types of health care systems. In the Icelandic Welfare System health care is socialized and free of charge during pregnancy, labour and delivery and during pre-school years and provided in-well baby/child clinics. The women in our study who had only an elementary or lower level of education and were unemployed experienced significantly more perinatal distress. The factors that have been found to be associated with perinatal distress in studies form other societies[10] were confirmed by our results. Women in the PDG were significantly more likely to continue to smoke during pregnancy, which is confirmed by findings from other studies.[11,18,20] It is socially expected that pregnant women stop smoking and the majority of women manage to quit, so women who continue to smoke do need special individual care, support and attention from health care professionals, as well as women who continued to drink during the pregnancy.

In the univariate analyses cohabitation among the participants was found to be significantly associated with perinatal distress and in the multivariate regression model a trend was found that cohabiting status is more likely to be related to perinatal distress than single status. Although it was not statistically significant, cohabiting status contributed to distress in the final regression model and ought to be studied further as it is discussed as the same background variable in other published studies.[11,18,28,29] Mirowsky and Ross[37] emphasize that marriage can bring emotional well-being, a sense of belonging and a feeling of being cared for, all of which could be present to a lesser degree with cohabiting partners.

There are several limitations to this multicentre prospective study. According to the ISPMH protocol all women should have received information regarding the study when they came for

initial antenatal care/booking and a visit at a participating health care centre. However, there was no documentation on how well the process was followed up by midwives. Fewer women accepted the invitation to participate in the NDG than planned, which might have affected the final outcome of the regression model. Women 19 years old or younger were especially missing from the NDG, which might have affected the comparison of the two groups. Underrepresentation of younger perinatal distressed women was also found in another Icelandic national study during the postpartum period.[30] These might indicate a negative view amongst younger Icelandic women towards screening for perinatal distress or a preference among younger women for a more personal kind of assessment than offered by self-report scales. Another weakness regards non-assessment of the length of the partner relationship and not asking for identification of the special person (SO) when women answered the MSPSS. Moreover, the study did not include adverse events in the woman's life, such as intimate partner violence. It needs to be taken into account that the total attrition rate was 30.7% at $T3$ (Fig. 1). Nevertheless, our experience was similar to other longitudinal studies researching pregnant women.[28,40] The explanation for the drop-out rate could be that the women with perinatal distress might have felt a decreased sense of control and increased powerlessness[3,17,37] as the pregnancy progressed and therefore were not up to answering the questionnaires again. An alternative explanation is participant boredom in answering the same scales over and over again.

The strength of this prospective multicentre study is the repeated screening in each trimester during pregnancy. We were able to evaluate symptoms of stress along with anxiety and depressive symptoms. The comparison of distressed and non-distressed women with the same cultural background and situation strengthened the study. The criteria for inclusion did not limit participation to low or high risk pregnant women. The instruments used, DASS, EDS, DAS and MSPSS, have all shown satisfactory psychometric properties. Although the study sample size was large in relation to Icelandic society, with a yearly birth-rate of 4500[25] and our results are most likely reliable; they should be confirmed by a study with a national sample before generalization.

### 4.1. Recommendation for research

More studies are needed to assess the experience of pregnant women who screen positive on distress measures but do not reach the criteria to establish a diagnosis since distress by itself can be detrimental to mother, foetus and family in various ways. Studies are also needed to distinguish between stress that could be a normal part of transition to motherhood and distress that could present a predisposition to mental health problems. Studies are furthermore needed to evaluate if there might be an association between perinatal distress and any outcomes of pregnancy and childbirth. Dissatisfaction in partner relationship needs to be studied further in different societies and its possible association with perinatal distress besides its effect on pregnancy and childbirth. Support of significant others when defined as partner's support and the effect of perinatal distress needs to be researched, as well as the origin of interaction between partner support and satisfaction in partner relationship and effect of distress. Why financial difficulties did not show an effect on perinatal distress amongst the study groups needs to be explored further. More studies are also needed to explore the possible origin of stress and anxiety amongst perinatal distressed women, and especially amongst female students. Furthermore, studies are also needed to explore attitude among women and especially younger women, towards routine screening for perinatal distress during pregnancy.

### 4.2. Recommendation for practice

Midwives and other healthcare professionals who attend pregnant women experiencing perinatal distress are in a key position to assess factors related to perinatal distress and distinguishing between normal transitional or pervasive/severe distress. The strength of social support, quality of partner relationship, and division of household task should be evaluated. Special focus should be given to women whom: are students, regarding possible distress. Midwives should offer primary care intervention to women in need and they and their families should be offered extra support and guidance to decrease the perinatal distress and the possibility of strengthen social support and the quality of the partner relationship.

Based on the results of this study it is recommended that development of guidelines to identify perinatal distress should be continued and factors such as smoking, a history of mental therapy, employment status and educational level should be considered in future guidelines. The results of this study could also be used to promote and help develop improved education of midwives with regard to assessment and treatment of perinatal distress.

### 5. Conclusion

From the findings of this study it is concluded that perinatal distress is strongly associated with dissatisfaction in partner relationship amongst Icelandic women. There are commonly symptoms of stress during pregnancy, combined with symptoms of anxiety and depression. When the prospective mother's well-being is evaluated it is important to assess symptoms of anxiety, depression and stress.

### Funding

### Acknowledgements

### References

1. Meleis AI, Sawer LM, Im EO, Hilfinger Messias DAK, Schumacker K. *Transitions theory: middle range and situation specific theories in nursing research and practice*. 1st ed. New York, USA: Springer Publishing Company; 2010.
2. Emmanuel E, St. John W. Maternal distress: a concept analysis. *J Adv Nurs* 2010;**66**(9):2014–1510.1111/j.1365-2648.2010.05371.x.
3. Mercer RT, Ferketich SL. Stress and social support as predictors of anxiety and depression during pregnancy. *Adv Nurs Sci* 1988;**10**(2):26–39.
4. Rallis S, Skouteris H, McCabe M, Milgrom J. The transition to motherhood: towards a broader understanding of perinatal distress. *Women Birth* 2014;**27**(1):68–7110.1016/j.wombi.2013.12.004.

5. Staneva A, Bogossian F, Pritchard M, Wittkowski A. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: a systematic review. *Women Birth* 2015;**28**(3):179–9310.1016/j.wombi.2015.02.003.

6. Matthey S. Are we overpathologising motherhood? *J Affect Disord* 2010;**120**(1):263–610.1016/j.jad.2009.05.004.

7. Lydsdottir LB, Howard LM, Olafsdottir H, Thome M, Tyrfingsson P, Sigurdsson JF. The mental health characteristics of pregnant women with depressive symptoms identified by the Edinburgh postnatal depression scale. *J Clin Psychiatry* 201410.4088/jcp.13m08646.

8. Pilkington PD, Milne LC, Cairns KE, Lewis J, Whelan TA. Modifiable partner factors associated with perinatal depression and anxiety: a systematic review and meta-analysis. *J Affect Disord* 2015;**178**:165–8010.1016/j.jad.2015.02.023.

9. Vigod SN, Wilson CA, Howard LM. Depression in pregnancy. *BMJ* 2016;**352**:i154710.1136/bmj.i1547.

10. O'Hara MW, Wisner KL. Perinatal mental illness: definition, description and aetiology. *Best Pract Res Clin Obstet Gynaecol* 2014;**28**(1):3–1210.1016/j.bpobgyn.2013.09.002.

11. Henrichs J, Schenk JJ, Roza SJ, van den Berg MP, Schmidt HG, Steegers EAP, et al. Maternal psychological distress and fetal growth trajectories: the generation R study. *Psychol Med: J Res Psychiatry Allied Sci* 2010;**40**(4):633–43.

12. Rossen L, Hutchinson D, Wilson J, Burns L, Olsson CA, Allsop S, et al. Predictors of postnatal mother-infant bonding: the role of antenatal bonding, maternal substance use and mental health. *Arch Women's Mental Health* 2016;1–1410.1007/s00737-016-0602-z.

13. Emmanuel EN, Creedy DK, St. John W, Brown C. Maternal role development: the impact of maternal distress and social support following childbirth. *Midwifery* 2011;**27**(2):265–7210.1016/j.midw.2009.07.003.

14. Glover V. Annual research review: prenatal stress and the origins of psychopathology: an evolutionary perspective. *J Child Psychol Psychiatry* 2011;**52**(4):356–6710.1111/j.1469-7610.2011.02371.x.

15. Ding X, Wu Y, Xu S, Zhu R, Jia X, Zhang S, et al. Maternal anxiety during pregnancy and adverse birth outcomes: a systematic review and meta-analysis of prospective cohort studies. *J Affect Disord* 2014;**159**:103–1010.1016/j.jad.2014.02.027.

16. Glover V. Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. *Best Pract Res Clin Obstet Gynaecol* 2014;**28**(1):25–3510.1016/j.bpobgyn.2013.08.017.

17. Staneva A, Morawska A, Bogossian F, Wittkowski A. Pregnancy-specific distress: the role of maternal sense of coherence and antenatal mothering orientations. *J Ment Health* 2015;1–810.3109/09638237.2015.1101425.

18. Rosand GM, Slinning K, Eberhard-Gran M, Roysamb E, Tambs K. Partner relationship satisfaction and maternal emotional distress in early pregnancy. *BMC Public Health* 2011**11**:10.1186/1471-2458-11-161 161-2458-11-161.

19. Staneva AA, Bogossian F, Wittkowski A. The experience of psychological distress, depression, and anxiety during pregnancy: a meta-synthesis of qualitative research. *Midwifery* 2015;**31**(6):563–7310.1016/j.midw.2015.03.015.

20. Cheng ER, Rifas-Shiman SL, Perkins ME, Wilson Rich-Edwards J, Gillman MW, Wright R, et al. The influence of antenatal partner support on pregnancy outcomes. *J Women's Health* 2016;**25**(7):672–910.1089/jwh.2015.5462.

21. Nylen KJ, O'Hara MW, Engeldinger J. Perceived social support interacts with prenatal depression to predict birth outcomes. *J Behav Med* 2013;**36**(4):427–4010.1007/s10865-012-9436-y.

22. Kruse JA, Low LK, Seng JS. Validation of alternative indicators of social support in perinatal outcomes research using quality of the partner relationship. *J Adv Nurs* 2013;**69**(7):1562–7310.1111/jan.12015.

23. Thome M, Arnardottir SB. Evaluation of a family nursing intervention for distressed pregnant women and their partners: a single group before and after study. *J Adv Nurs* 2012;**69**(4):805–1610.1111/j.1365-2648.2012.06063.x.

24. Statistic Iceland. Icelandic population. http://px.hagstofa.is/pxen/pxweb/en/Ibuar/Ibuar__mannfjoldi__1_yfirlit__yfirlit/MAN00000. px/table/tableViewLayout1/?rxid=425b7211-8de0-43d0-bdad-57952d135a3a.

25. Statistic Iceland. Childbirths. http://px.hagstofa.is/pxis/pxweb/is/Ibuar/Ibuar__Faeddirdanir__Faeddir__faedingar/MAN05100. px/?rxid=327f8fe7-ffff-4bc7-9366-c421dddd89b9.

26. Cox JL, Holden J, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. *Br J Psychiatry* 1987;**150**(6):782–610.1192/bjp.150.6.782.

27. Lovibond S, Lovibond P. *Manual for the depression anxiety sress scales*. 2nd ed. Sydney, Australia: Psycology Foundation Monograph; 1995.

28. Rallis S, Skouteris H, McCabe M, Milgrom J. A prospective examination of depression, anxiety and stress throughout pregnancy. *Women Birth* 2014;**27**(4):e36–4210.1016/j.wombi.2014.08.002.

29. Bergink V, Kooistra L, Lambregtse-van den Berg Mijke P, Wijnen H, Bunevicius R, van Baar A, et al. Validation of the Edinburgh depression scale during pregnancy. *J Psychosom Res* 2011;**70**(4):385–910.1016/j.jpsychores.2010.07.008.

30. Thome M. Predictors of postpartum depressive symptoms in Icelandic women. *Arch Women's Ment Health* 2000;**3**(1):7–14.

31. Spanier GB. Measuring dyadic adjustment: new scales for assessing the quality of marriage and similar dyads. *J Marriage Fam* 1976;15–28.

32. Graham JM, Liu YJ, Jeziorski JL. The dyadic adjustment scale: a reliability generalization meta-analysis. *J Marriage Fam* 2006;**68**(3):701–1710.1111/j.1741-3737.2006.00284.x.

33. Carey MP, Spector IP, Lantinga LJ, Krauss DJ. Reliability of the dyadic adjustment scale. *Psychol Assess* 1993;**5**(2):238–4010.1037/1040-3590.5.2.238.

34. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess* 1988;**52**(1):30–41.

35. Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. *J Pers Assess* 1990;**55**(3–4):610–7.

36. Streiner DL, Norman GR. *Health measurement scales: a practical guide to their development and use*. Oxford, U.K: Oxford University Press; 2008.

37. Mirowsky J, Ross CE. *Social causes of psychological distress*. 2nd ed. London: Aldin Transaction Publishers; 2012.

38. Bernhardsdóttir J, Vilhjálmsson R. Psychological distress among university female students and their need for mental health services. *J Psychiatr Ment Health Nurs* 2013;**20**(8):672–810.1111/jpm.12002.

39. Sigbjornsdottir HB. HeilsuhegÐun íslendinga—vöktun áhættuþátta. *Dir Health Embætti Landlæknis Iceland* 2016;**10**(2):1–3.

40. Emmanuel E, St. John W, Sun J. Relationship between social support and quality of life in childbearing women during the perinatal period. *J Obstet Gynecol Neonatal Nurs* 2012;**41**(6):E62–7010.1111/j.1552-6909.2012.01400.x.

**II**

# Pregnancy complications, sick leave, and service needs of women who experience perinatal distress, weak social support, and dissatisfaction in their partner relationships

**Authors:**

**Jonsdottir, S.S., Swahnberg, K., Thome, M., Oskarsson, G.K., Lydsdottir, L.B., Olafsdottir, H., Sigurdsson, J.F., and Steingrimsdottir, T.**

# ABSTRACT

**Introduction:** Although perinatal distress is acknowledged as a burdening condition for pregnant women, its effects on pregnancy are not well known. This study was conducted to increase knowledge regarding the effects of distress on pregnancy-related problems. The study also assessed women's need for sick leave and increased prenatal care due to distress, and the effects of weak social support and dissatisfaction with their partner relationships.

**Methods:** In total, 2523 women were screened for perinatal distress three times during pregnancy in this quantitative cohort study. Structured psychiatric interviews were conducted following the screening, with 562 of the participants. Data from participants' pregnancy records were also analysed. The study was conducted in primary healthcare centres in Iceland after receiving approval from the Icelandic National Bioethical Committee. The main outcome measures were pregnancy problems, sick leave issued, and prenatal service needs.

**Results:** Data from 503 women were analysed. The perinatal distress group (PDG) was significantly more likely than was the non-distressed group (NDG) to experience fatigue, vomiting, and pelvic pain after controlling for background variables. Women who reported weak family support experienced symptoms of nausea and heartburn. The PDG needed more frequent prenatal care than did the NDG and was issued sick leave for up to 42 days longer. Dissatisfaction in the partner relationship and with the division of household tasks and childcare was strongly associated with distress, the development of complications, and the need for sick leave.

**Discussion:** Identification of perinatal distress by midwives and other healthcare professionals is important, since distress may be linked to women's complaints of fatigue, vomiting, pelvic pain, need for prolonged sick leave, and additional prenatal care services will be needed. Perceived dissatisfaction in the partner relationship and with the division of household tasks should also form part of clinical practice and assistance provided.

Key words: Pregnancy complications, perinatal distress, sick leave, service needs, social support, partner.

**INTRODUCTION**

Perinatal distress refers to a pregnant woman's experiences of anxiety, depression, or stress symptoms, either in isolation or in any combination. (1-3) The prevalence of such symptoms is increasing in modern societies. (4) There are also concerns that stress symptoms are becoming common among pregnant women (5); negative effects of distress on developing foetuses have been observed.(6) Despite this, literature on the influence of distress on pregnancy complications is limited. The few studies available indicate that pregnant women with distress are more likely to develop pre-eclampsia (7) and vaginal bleeding/spotting. (8,9) Perinatal distress has also been reported among women hospitalized due to hyperemesis (10) and those at risk of pregnancy complications. (9) More researchers have focused on pregnancy among women diagnosed with depression and/or anxiety. Their study results showed increased likelihood of nausea and vomiting (11-13) pre-eclampsia, (14) a need for more visits to obstetricians, and the need for additional sonograms (11). Pregnant women diagnosed with depression complained more frequently of pelvic girdle pain, severe headaches, and tiredness/fatigue as a combined complication, than women who without a diagnosis of depression. (13)

Importantly, complications during pregnancy can interfere with women's ability to work, with some pregnant women taking sick leave from employment. (11,15) There is little evidence of the association between perinatal distress and sick leave; however, a Norwegian study showed no association between depressive symptoms and self-reported reasons for absence from work/taking sick leave. (15)

When assessing perinatal distress, possible protective and impeding factors must be evaluated. For example, in some studies, perinatal distress correlated with weak social support (16,17) and dissatisfaction in the partner relationship. (17,18) Being married (19) is reportedly a

protective factor for perinatal distress. However, despite these few studies, possible associations between pregnancy complications, social support, and satisfaction/dissatisfaction with a partner are unclear.

Midwives consider lack of organizational support and knowledge as barriers for asking about distress. (20) A systematic review of 10 studies showed that primary care physicians do not recognize depression and anxiety among pregnant women, and that their patient management might not be systematic enough. (21) Notably, some pregnant women might be reluctant to reveal their distress to prenatal care professionals. (22) Therefore, it is important to understand pregnancy complications that likely indicate perinatal distress, and their association with weak social support or dissatisfaction with one's partner relationship.

Considering the results of the literature reviewed, this study aimed to: 1) determine the association between perinatal distress and pregnancy complications; 2) explore possible associations between pregnancy complications and satisfaction/dissatisfaction in the partner relationship and perceived support from family or friends among women with perinatal distress; and 3) investigate associations between the need for services, sick leave needs during pregnancy, perinatal distress, satisfaction/dissatisfaction with the partner relationship, and perceived support from family and friends.

**METHODS**

**Design**

This cohort study is based on a longitudinal research project, the Icelandic Study of Perinatal Mental Health (ISPMH), conducted between 2006 and 2012. The following five steps were taken in this study: 1) Screening participants for anxiety and depression thrice during pregnancy,

namely, at 16 weeks = T1, 25 weeks = T2, and 36 weeks = T3 (T-points). 2) Conducting a semi-structured interview with each participant during pregnancy (hereafter, "the interview"). 3) Assessing the stress response, as a secondary analysis. 4) Collecting data from handwritten pregnancy records in hospital archives. 5) Obtaining data regarding participants' sick leaves from electronic healthcare records.

**Participants**

Initially, 2523 women were recruited and screened for the ISPMH. Exclusion criteria included: difficulty reading and speaking Icelandic, diagnosis of schizophrenia, acute psychotic symptoms, and/or cognitive impairment. In total, 562 participants were interviewed; Figure 1 shows details of participation, missing data, and excluded participants. The final sample size was 503: of these, 318 (63.2%) participants screened positive for distress (the perinatal distress group or PDG) and 185 (36.7%), negative (the non-distressed comparison group or NDG).


Please insert Figure 1 around here

**Settings**

Prenatal care in Iceland is free and part of public healthcare (23); it is provided by midwives and at healthcare centres. Ten of 14 healthcare centres in the capital city participated in this study along with the only centre in the largest town outside the capital area. Primary care physicians provide prenatal care and assess the women's health at first visit at some participating healthcare centres. Obstetrician-gynaecologists see pregnant women upon request by midwives, primary care physicians, or the women themselves. Pregnant women have the right to receive paid leave of absence from work when presenting a medical certificate. Sick leave benefits are based on the length of employment, and Icelandic law generally bans employers from dismissing pregnant

women. (24) Typically, more than one sick leave certificate is issued during a pregnancy. The first one or two certificates might be to decrease a woman's total hours of daily work for a specified period; the second or subsequent certificates usually allow for total leave of absence.

**Measures**

During the 3 T-points, women completed the Depression, Anxiety, and Stress Scales (DASS) (25) and the Epidural Postpartum Depression Scale. (26) During the interview, participants completed measures assessing social support, satisfaction in their partner relationships, and questions regarding adverse life experiences. Further, data were collected on socio-demographic characteristics, including maternal age, partner relationship, educational level, employment status, division of household tasks and childcare, financial situation, number of previous childbirths, previous mental health therapy, smoking, and alcohol consumption during pregnancy. (See Jonsdottir et al., 2017 for detailed information regarding screening.)

*Perinatal Distress Assessment*

The women were screened using the Depression, Anxiety, Stress Scales (DASS) (25) and the Edinburgh Postpartum Depression Scale (EPDS)(26) at the 3 T-points. For this study, the Cronbach's alpha values (α) of the anxiety subscale were 0.86 (T1), 0.85 (T2), and 0.90 (T3); the depression subscale, 0.93 (T1), 0.93 (T2), and 0.94 (T3) and the stress subscale, 0.92 (T1), 0.94 (T2), and 0.95 (T3). Scores on screening measures used as positive indicators for perinatal distress were $\geq 8$ for anxiety; $\geq 10$ for depression, and $\geq 15$ for stress. The DASS stress subscale yielded results regarding stress, which was analysed after the participants agreed to be interviewed.

Depressive symptoms were also assessed using the EPDS. (26) The Icelandic translation of the EPDS has been found to be reliable.(27) The Cronbach's alpha for the current study was 0.87 at all 3 T-points. The positive cut-off score on this indicator for perinatal distress was set at $\geq 12$.

*Satisfaction with Partner Relationship*

During the interview, participants answered the Dyadic Adjustment Scale (DAS), a 32-item questionnaire assessing satisfaction in partner relationships. (28) Possible scores range from 0 to 151; individuals scoring less than 107 are considered dissatisfied. (29) The DAS has been found to be reliable (28,30); Cronbach's alpha for the current study was 0.92.

*Perceived Social Support*

Social support was assessed with the Multidimensional Scale of Perceived Social Support (MSPSS).(31) This 12-item questionnaire comprises three sub-scales: family, friends, and significant other. For each sub-scale the lowest score is 4 and the highest, 28, indicates adequate perceived support. A cut-off score was used to determine "weak" ($\leq 16$ scores) versus "strong" support ($\geq 17$ scores). (32) The rationale for this is to clearly distinguish between weak, inadequate support and strong, adequate support, to use in clinical practice during pregnancy. (17) Cronbach's alpha for the MSPSS has been reported as 0.92 for the whole scale, (32) but in this study, was 0.95 for the "significant other" subscale and 0.92 for the "friends" and "family" subscales.

*Adverse Experiences Interview*

An instrument was developed by members of the ISMPH group to gather information from participants regarding adverse life experiences. The instrument, called Adverse Experiences Interview (AEI) was developed as no existing suitable scale was identified. The AEI comprises several questions concerning adverse life experiences in childhood and adulthood. (33) We analysed responses to two AEI questions, both relating to experiencing mental, physical, and/or sexual abuse during adulthood, either from a partner or another person.

*Data from pregnancy and sick leave records*

The following pregnancy complications were obtained from medical records: tiredness, fatigue, nausea, vomiting, heartburn, digestive discomfort (encompassing diarrhoea and constipation), and itching. Weeks during which the following complications were first documented were also noted: pelvic girdle pain, decreased foetal movement, vaginal bleeding, premature contractions, false labour, abdominal pain, pregnancy-induced-hypertension (PIH), pre-eclampsia, gestational diabetes mellitus (GDM), and urinary tract infection (UTI). Arrhythmias, dizziness, and palpitations were also documented, but not used in the analyses, as few women complained of these. The same went for alcohol consumption during pregnancy. Data were collected regarding number of sonograms and prenatal visits. Information gathered regarding sick leaves included days before childbirth for which sick leave was issued. The software company, TM Software, extracted the sick leave data from electronic healthcare records.

**Procedure**

During the women's first prenatal visits, midwives introduced the study and disseminated information letters, then inquired regarding participation at subsequent visits. Those agreeing to participate signed an informed consent form. The women's pregnancy records were then identified with a sticker and midwives handed out packages with questionnaires for self-completion at each T-point. After completion, the women left the consent forms and questionnaires in a locked box on the healthcare centre's service desk, either at the current or next check-up. All women who screened positive for perinatal distress and every fourth woman who screened negative were invited to participate in an interview. Professionals conducting the interviews were blind to the women's screening results and were experienced clinicians. These interviewers were psychologists, a psychiatrist, and a midwife. The interviewers asked participants questions from the AEI, whereas the women self-completed the DASS and the MSPSS during the interview.

**Main Outcome Measures**

The frequency of pregnancy complications, assessment of service needs, number of sonograms, sick leaves issued, and days on sick leave before childbirth were the main outcome measures. These outcomes were measured for all participants in the PDG and NDG. Additionally, the PDG was divided into two subgroups based on satisfaction levels with their partner relationship (Subgroup 1) and perceived family support (Subgroup 2). (See Figure 2.)

The correlation coefficient between tiredness and fatigue was $r = .110$, $p = .014$, resulting in fatigue's inclusion in the analyses. The correlation between nausea and vomiting was: $r = .308$, $p < .001$, resulting in the inclusion of vomiting. When assessing service needs, women with

diabetes mellitus and PIH were excluded, as they presumably had more service needs. Days on

sick leave before childbirth were calculated as the number of sick days between childbirth and

the issuing of sick leave. Finally, the number of prenatal care visits were divided into three

categories, as identified by the National Institute of Clinical Excellence (34): 1) seldom = 7 or

fewer visits; 2) average = 8 to 12 visits, and 3) often = 13 visits or more.

With PDG Subgroup 1, associations between distress, dissatisfaction with the partner

relationship, service needs, and sick leave were explored. With PDG Subgroup 2, associations

between distress, weak social support, service needs, and sick leave were investigated. Before

analysing the PDG Subgroup 2, the possibility of a correlation between support from family and

friends was determined; results showed a significant correlation ($r= .357, p < .001$), resulting in

the omission of friends' support from the subsequent analysis. Support from significant others

was strong for most participants (N=485 [96.4%], missing = 9) and similar for the two groups, so

excluded from further analysis.

Please insert Figure 2 around here

**Data Analyses**

The data were analysed with SPSS version 22 (IBM Corp., 2013). Statistical analyses

included descriptive statistics, correlation, an independent-samples $t$-test, the Mann-Whitney $U$

test, and a chi-square test. Backward logistic regression was applied to identify the likelihood of

pregnancy complications associated with perinatal distress, social support, and satisfaction in the

partner relationship. Significance was pre-set at $p < .05$ for all associations.

Backward stepwise logistic regression was performed to determine if distress could be

predicted from the demographic variables (Model 1), support variables (Model 2), and pregnancy

complications showing significant differences between the PDG and NDG (Model 3). The aim

was to evaluate if distress predicts pregnancy complications, since pregnant women might be

more likely to draw midwives' attention to these complications, rather than to their distress.


**RESULTS**

There were 318 women (63.9% of total sample) in the PDG and 185 women (36.1%) in the

NDG. Participants' demographic characteristics are shown in Table 1. Women in the PDG were

significantly more likely than women in the NDG to be young, not living with the child´s father,

have less education, be unemployed or students, and have an adverse financial situation. PDG

members were also more likely to be dissatisfied in their partner relationship, dissatisfied with

division of household tasks and child care, to have experienced violence in adulthood, and to

have received prior mental health therapy. Screening results in Table 1 shows that stress and

depression scores were similar for PDG and NDG for all three T-points. Between T1 and T3 a

slightly higher mean scores were found among women who scored above cut-off at T3.


Please insert Table 1 around here

**Association between perinatal distress and pregnancy complications.**

Table 2 shows the frequency of pregnancy complications experienced by the PDG and the

NDG. Women with perinatal distress were 2.17 times more likely to experience vomiting,

although no difference was found between PDG and NDG in nausea. The PDG were 2.67 times

more likely to complain of fatigue than then NDG, yet there was no significant between-group

difference in feeling tired. The PDG was also 1.5 times more likely than the NDG to experience

pelvic gridle pain. The PDG were 4 times more likely to experience vaginal bleeding; few

women in the NDG experienced it.

We examined possible differences regarding gestational weeks when women started to

experience problems in pregnancy. Women in the PDG reported vaginal bleeding at a

significantly later stage (mean: 23.4 weeks; range: 8.0-37.4 weeks; SD: 8.4) than those in the

NDG (mean: 9.7 weeks; range: 9.0-11.0 weeks; SD: 1.1) ($t$[23] = -2.75; $p$= .011); however, only

one woman required hospital treatment due to vaginal bleeding. No significant difference was

found between groups (p= .827) regarding pelvic girdle pain which, on average, began at 26.8

weeks (SD: 6.7; range: 10.1-39.0 weeks). There was also no significant between-group

difference for premature contractions, which began on average at week 29.8 (SD: 5.0; range:

12.0-36.2; p= .474).

In total, 124 participants (24.7%) complained of pain other than contractions. The following

types of pain were reported: back pain (59 participants, 11.7%), headache (34, 6.8%), abdominal

pain (13, 2.6%), and other types of pain (17, 3.3%). No significant difference was found between

the two groups regarding pain type.

Please insert Table 2 around here

**Association between dissatisfaction in the partner relationship and pregnancy**

**complications.**

As shown in Figure 2, 69 of the women (22.3%) who were distressed were dissatisfied in

their relationship. They along with women who were distressed but satisfied in their relationship

formed Subgroup 1. There was no significant difference found among Subgroup 1, either when

frequency of pregnancy problems was analysed or in gestational weeks when the women started

to complain about vaginal bleeding, pelvic girdle pain, or premature contractions.

**Association between perceived social support from family and pregnancy complications.**

Figure 2 shows that 42 participants in the PDG (13.5%) reported weak family support. They along with women who were distressed but reported strong family support, formed Subgroup 2. A chi-square test was conducted to assess the association between women with distress who received weak or strong family support and pregnancy complications. Results showed a significant difference for three variables. Fatigue was reported by 25 of these PDG and was significantly more common ($\chi^2$=4.931, df=1, $p$= .026) among women who received weak family support (n=7, 16.7%) than those who received strong family support (n=18, 6.7%). In the PDG, 171 women experienced nausea and this was significantly more common ($\chi^2$ =5.413, df=1, $p$= .020) among those who received weak family support (n=30, 71.4%) than those reporting strong family support (n=56, 12.7%). Heartburn was also significantly more common ($\chi^2$ = 7.294, df=1, $p$= .007) among women who received weak family support (n=8, 19.0%) than among women (n=18, 6.7%) who reported strong family support. No significant differences were found in gestational age among Subgroup 2, regarding complaints of vaginal bleeding, pelvic girdle pain, or premature contractions and support.

**Factors associated with pregnancy complications**

Backward stepwise logistic regression was performed in three steps to assess likelihood of perinatal distress in relation to significant variables (see Table 3). Eight variables contributed significantly to the final model, namely, smoking during pregnancy, dissatisfaction with the partner relationship, dissatisfaction with the division of household tasks and childcare, prior mental health therapy, fatigue, vomiting, pelvic girdle pain/discomfort, and blood pressure

problems (PIH and pre-eclampsia). However, women experiencing distress were less likely to develop PIH. The final model shows the likelihood of women with perinatal distress experiencing pregnancy complications ($\chi^2$ [12 n= 399] = 94.49, $p < 0.001$; Nagelkerke $R^2 =$ 0.287).

Please insert Table 3 around here

**Need for service, sonograms and sick leaves during pregnancy.**

The mean number of prenatal visits was 9.92 (SD: 2.46; range: 2-25 visits) for the total group; 56 women (10.9%) came seldom and 66 (12.9%) came often, but 383 participants (74.8 %) had an average number of visits. The women reporting perinatal distress (n= 43, 67.2%) came more often than those who did not report perinatal distress (n= 21, 32.8%), who were significantly more likely to come seldom ($p= .024$). Almost all participants received prenatal care from midwives at all prenatal visits (mean: 9.5 visits; SD: 2.3, range: 0-25); 182 (36.2%) saw primary care physicians (mean: 1.87 visits, SD: 2.00, range: 1-13 times), and 245 (48.7%) consulted an obstetrician-gynaecologist (mean 1.94 consultations; SD: 1.60; range: 1-14 consultations). Table 4 shows the mean differences in visits between the PDG and NDG, Subgroups 1 and 2.

Please insert Table 4 around here

The mean number of sonograms during pregnancy was 2.7 per woman (range: 1-8; SD: 1.15, missing: 21 [4.2%]) The highest percentage of women (36.6%, n=184) had 2 sonograms and the second highest percentage had 3 sonograms. Independent t-test showed no difference in number

of sonograms between the PDG (mean: 2.66, SD 0.67; range: 1-8), and the NDG (mean: 2.7, SD: 0.85; range= 1-8) ($t$[483] = 0.523; $p$ = .602).

A majority of participating women (n=290, 57.7%) received sick leave certificates from physicians. As shown in Table 5, there was a significant difference between the PDG and the NDG regarding when the second sick leave was issued; women in the PDG received it, on average, 30 days before women in the NDG. The women who reported weak family support received their first sick leave at an average of 39 gestational days (145 days prior to giving birth); in contrast, women who reported strong family support received sick leave certificates 106 days before childbirth. When a third sick leave was issued, it was generally for a total leave of absence from employment. Women who were dissatisfied in their partner relationship received their third sick leave on average 42 days before women who were satisfied in their relationship, with certificates issued 118 and 76 days before childbirth, respectively.

Please insert Table 5 around here

**DISCUSSION**

In this study, we assessed the association between perinatal distress and pregnancy complications. Notably, more than half of participants complained of tiredness, but fatigue was significantly more common in the PDG. A fatigued person has reached a physical condition that is more severe than tiredness, which may result in decreased ability to perform daily tasks. (34) In earlier studies on pregnancy complications, fatigue and tiredness were combined, (13,15,35) which does not allow analysis of the single effect of fatigue during pregnancy. To our

knowledge, our study is the first to identify fatigue as a stand-alone complication affecting pregnancy.

Nausea and vomiting are on the same continuum, with vomiting being more severe. Women in the PDG were significantly more likely to experience vomiting than those in the NDG, despite group similarities in the frequency of nausea. Based on our results, distinctions between nausea and vomiting are important, although the two are combined into a single variable in other studies. (11,12) Further, no differences in morning sickness between women with and without depressive symptoms were previously found. (13) However, given that morning sickness was not further described, it is unclear if study participants experienced either nausea or vomiting, or a combination of the two.

Perinatal distress was found to be a significant predictor of pelvic girdle pain, consistent with other studies. (13,36). Twenty-seven of our participants (5.4%) developed PIH, which is less than the percentage (6.47%) reported in a large Icelandic population-based study. (37) Further, in our study, women in the PDG were less likely than those in the NDG to experience PIH. This result is not in accordance with that of a previous meta-analysis, (7) and could be due to our exclusion of women who had been diagnosed with hypertension before pregnancy. Regarding time of appearance, vaginal bleeding was the only pregnancy complication differing significantly between the groups. We could not identify the effect of time of appearance on distress, since too few women in the NDG experienced vaginal bleeding.

The results from the regression model reflect those in Table 2 and indicate a possible association between distress and vaginal bleeding or complaints of fatigue and vomiting. Dissatisfaction with the partner relationship and with the division of household tasks and childcare were strongly correlated with pregnancy complications and distress. This is, to our

knowledge, the first study to assess dissatisfaction with division of household tasks and childcare and its association with pregnancy complications; our results revealed a need for further studies and were confirmed by a meta-analysis. (38) The strong association between distress and smoking was expected, as there is evidence of a link between smoking and perinatal distress. (39)

More than 50% of participants in our study needed sick leave at some point. Of special interest are PDG members who were on sick leave for a month longer than NDG members, despite no differences in when problems were first documented. This indicates a possible association between sick leave and perinatal distress. Notably, women experiencing distress, with weak social support or unsatisfying partner relationships might also need longer sick leave.

The women who were distressed, including those who reported weak family support, required more care and services from midwives and obstetrician-gynaecologists. Our results are notably congruent with those of a Swedish study on women diagnosed with depression/anxiety. (11) Conversely, we found no connection between distress and the number of sonograms received, which differs from the results of the above-mentioned Swedish study.(11) This could be because developments in foetal ultrasound screening differed during the course of the two studies.

**Limitations and Strengths**

This study has several limitations. First, the sizes of the NDG and PDG were unequal. As screening for stress was performed as a secondary analysis, few women screened positive for stress only; therefore, the sample might under-represent women with stress. We did not screen for fear of childbirth wich is a limitation as research has found that prevalance of fear of childbirth has been found to be more common in women with distress (40). The total drop-out rate is a limitation. Total drop-out was 40.71%. Drop-out between T1 and T2 was 14.08% and

between T2 and T3, 30.25%. Missing information on the possible association between perinatal

distress and the time at which pregnancy complication developed is also a weakness. Moreover,

information in pregnancy records was based on healthcare professionals' documentation;

personal variations in documentation might have affected the results. Some complaints could

have been reported, but not documented, and some women may have experienced unpleasant

symptoms without reporting them to healthcare professionals. As prenatal care records were in

the possession of the individual women during pregnancy, they might also have requested that

some information not be documented. During the study period, documentation gradually shifted

from being handwritten to electronic. This might have resulted in less documentation of the

women's health in the handwritten pregnancy records. Further, no information was provided on

pregnancy planning or the length of the partner relationship and we did not collect reasons for

declining participation in the ISPMH. We were unable to compare our results to overall rates of

depression, anxiety, or stress symptoms among pregnant women in Iceland. In fact, there are no

national data available on the proportion of the population with a history of mental health

therapy; therefore, there is no confirmation as to whether the high number of participants in our

study who received mental health therapy reflects the national average of people with mental

illness and seek services.

Nonetheless, this study had several strengths. Gathering information concerning

complications and sick leave directly from healthcare records is more accurate than sole reliance

on individuals' memories of pregnancy. Moreover, we reported on data from 95.9% of the

participants and the sample size was proportionally large, as there are only about 4,500 children

born annually in Iceland. (41) Also, the prevalence of stress in this study matches that in a report

by the Icelandic Directory of Health, showing that 31% of women 18 years or older experienced

stress in everyday life. (42)

**Implications for Practice and Research**

Midwives and physicians should recognize the possible link between perinatal distress and

women's complaints of fatigue, beyond the expressions of "just tired" that are often associated

with pregnancy. These complaints should be further assessed so appropriate support and

guidance can be offered. The same should be considered for complaints of vomiting, pelvic

girdle pain, and reports of vaginal bleeding not requiring hospital admission in the second

trimester. In clinical practice, assessment might start with a question regarding the woman's

satisfaction with the division of household tasks and childcare. Dissatisfaction with partner

relationships should be evaluated by healthcare professionals, as our results demonstrated its

strong association with pregnancy problems. Weak or insufficient family support among women

experiencing distress should also be evaluated. It is important to gauge perinatal distress during

pregnancy, to determine the service, care, and support needed by women in distress, as they

might need more check-ups, resulting in caseload changes and higher antenatal care costs.

Future research should focus on the possible effects of women's perceived satisfaction with

partner relationships and level of social support on distress in pregnancy. There is a need for

systematic investigation of links between distress and the timing of pregnancy complications.

The possible effect of perinatal distress on the ability to perform daily tasks and the need for sick

leave during pregnancy should also be assessed further. The personal experiences of women in

distress when interacting with healthcare professionals during pregnancy is also important to

explore.

**CONCLUSION**

Our finding shows that women reporting distressed as well as distressed women with weak support from their families are more likely to develop pregnancy complications. Moreover, reported dissatisfaction with partner relationship and/or the division of household tasks and childcare, is a predictor for experiencing fatigue, vomiting, and pelvic girdle pain during pregnancy. This study shows the importance of identifying women who experience distress and weak support as they are more likely to need longer periods of sick leave and require more professional care than non-distressed women and women with strong support during pregnancy.
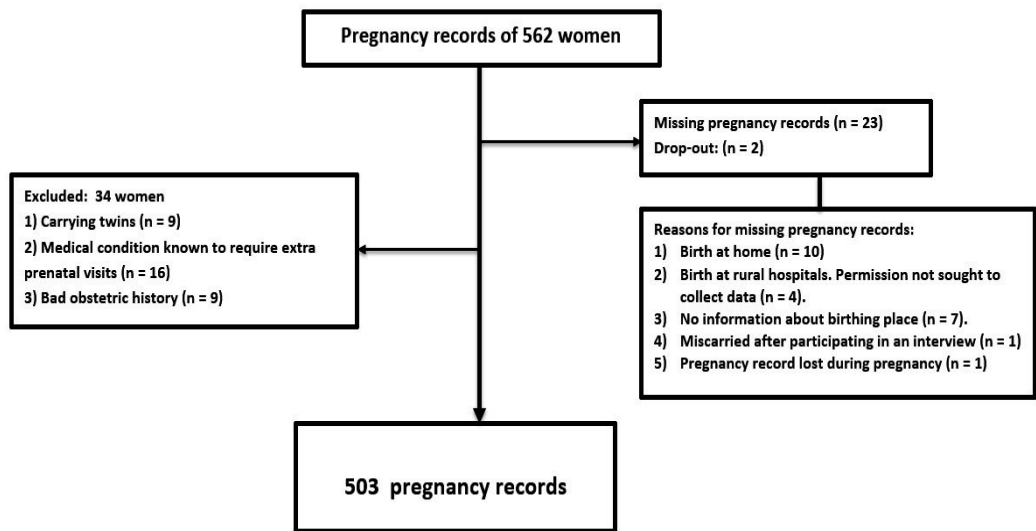
**Figure 1. Overview of participants' pregnancy records**
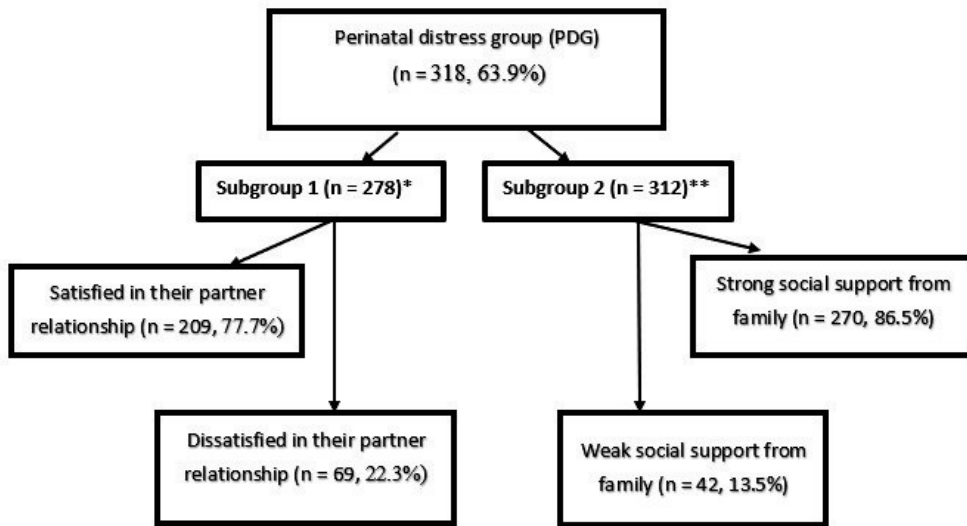
*In Subgroup 1, single women (n = 36) were omitted and 4 women were missing.
**In Subgroup 2, 6 women were missing.

**Figure 2. Graphical description of PDG and subgroup composition**

**Table 1. Overview of the demographic characteristics of women in the PDG and the NDG (N = 503)**

| | NDG | PDG | *P* | M |
|---|---|---|---|---|
| | N 185 (36.1%) | N 318 (63.9%) | | |
| **Age (mean, SD/range)** | 29.83 (4.90/17–43) | 28.30 (5.02/17–43) | **.001** | 0 |
| **Relationship with partner** | | | **.014** | 2 |
| Living with the child's father | 176 (95.1) | 280 (88.6) | | |
| Not living with the child's father | 9 (4.9) | 36 (11.4) | | |
| **Education** | | | **< .001** | 3 |
| ≤ 13 years of education | 74 (40.0) | 190 (60.3) | | |
| ≥ 14 years of education | 111 (60.0) | 125 (39.7) | | |
| **Employment status** | | | **< .001** | 2 |
| Employed | 138 (75.0) | 189 (59.6) | | |
| Unemployed or student | 46 (25.0) | 128 (40.4) | | |
| **Financial situation** | | | **.008** | 2 |
| Good | 171 (92.9) | 269 (84.9) | | |
| Bad | 13 (7.1) | 48 (15.1) | | |
| **Violence during adulthood** | | | **.003** | 14 |
| No | 152 (84.9) | 227 (73.2) | | |
| Yes | 27 (15.1) | 83 (26.8) | | |
| **Mental health therapy before** | | | **< .001** | 7 |
| No | 118 (64.5) | 116 (37.1) | | |
| Yes | 65 (35.5) | 197 (62.9) | | |
| **Satisfied with division of household tasks and child care*** | | | **.029** | 9 |
| Yes | 147 (85.0) | 211 (76.4) | | |
| No | 26 (15.0) | 65 (23.6) | | |
| **Satisfied in partner relationship*** | | | **< .001** | 8 |
| Yes | 160 (93.0) | 209 (77.7) | | |
| No | 12 (7.0) | 69 (22.3) | | |
| **Perceived support from significant other** | | | .633 | 9 |
| Strong | 178 (97.8) | 307 (98.4) | | |
| Weak | 4 (2.2) | 5 (1.6) | | |
| **Perceived support from family** | | | **.005** | 9 |
| Strong | 172 (94.5) | 270 (86.5) | | |

| | | | | |
|---|---|---|---|---|
| Weak | 10 (5.5) | 42 (13.5) | | |
| **Perceived support from friends** | | | **.007** | 9 |
| Strong | 174 (95.6) | 276 (88.5) | | |
| Weak | 8 (4.4) | 36 (11.5) | | |
| **Para** | | | .886 | 0 |
| Primipara | 85 (45.9) | 144 (45.3) | | |
| Multipara | 100 (54.1) | 174 (54.7) | | |
| **Number of earlier childbirths** | | | .099 | 0 |
| 1 childbirth | 58 (58.0) | 119 (67.2) | | |
| 2 childbirths | 38 (38.0) | 44 (24.7) | | |
| ≥ 3 childbirths | 4 (4.0) | 11 (6.3) | | |
| **History of problems in earlier births** | | | | 0 |
| Pre-term birth (n = 7) | 3 (1.6) | 4 (1.3) | .707 | |
| Pre-eclampsia (n = 19) | 7 (3.8) | 12 (3.8) | .995 | |
| Bleeding during pregnancy (n = 10) | 5 (2.7) | 5 (1.6) | .381 | |
| Cesarean section (n = 31) | 12 (6.5) | 19 (6.0) | .962 | |
| Bleeding during previous childbirth (n = 24) | 11 (5.9) | 13 (4.1) | .346 | |
| Small for gestational age (SGA) (n = 10) | 2 (1.1) | 8 (2.5) | .266 | |
| **Smoking during pregnancy** | | | **< .001** | 1 |
| No | 179 (97.3) | 276 (86.8) | | |
| Yes | 5 (2.7) | 42 (13.2) | | |
| **Anxiety or depression medication during pregnancy** | | | | |
| No | 179 (96.8) | 291 (91.5) | **.022** | 0 |
| Yes | 6 (3.2) | 27 (8.5) | | |
| **Screening results** | Mean (SD/n) | Mean (SD/n) | | |
| **DASS – Anxiety[a]** | | | | |
| 16 weeks | 2.66 (2.24/346) | 12.90 (5.20/151) | | 6 |
| 25 weeks | 2.96 (2.22/305) | 12.70 (6.47/120) | | 78 |
| 36 weeks | 2.59 (2.18/278) | 14.52 (6.47/81) | | 144 |
| **DASS – Stress[b]** | | | | |
| 16 weeks | 6.82 (4.17/333) | 22.23 (6.62/163) | | 7 |
| 25 weeks | 7.23 (4.09/301) | 21.34 (5.37/126) | | 76 |
| 36 weeks | 6.29 (4.20/276) | 22.98 (6.58/84) | | 143 |

| | | | | |
|---|---|---|---|---|
| **DASS – Depression[c]** | | | | |
| 16 weeks | 2.94 (2.78/350) | 16.29 (6.53/146) | | 7 |
| 25 weeks | 2.93 (2.59/336) | 16.08 (6.82/90) | | 77 |
| 36 weeks | 2.75 (2.50/302) | 17.16 (7.48/58) | | 143 |
| **EPDS[d]** | | | | |
| 16 weeks | 6.09 (2.85/368) | 15.08 (2.94/129) | | 6 |
| 25 weeks | 6.04 (3.17/335) | 14.77 (2.63/96) | | 72 |
| 36 weeks | 5.54 (2.95/289) | 14.92 (3.38/72) | | 142 |

Abbreviations: M, missing; NDG, non-distressed group; PDG, perinatal distress group.

* = 45 women not living with a partner excluded.

$P \leq .05$.

a = screen negative 0–7, screen positive 8–42.

b = screen negative 0–14, screen positive 15–42.

c = screen negative 0–9, screen positive 10–42.

d = screen negative 0–11, screen positive 12–30.

**Table 2. Frequency and odds ratio of complications among women in the PDG compared to women in the NDG (Using "No" as a reference group; N = 503)**

| Complications | | NDG | PDG | OR | 95% CI |
|---|---|---|---|---|---|
| | | N (%) | N (%) | | |
| | | 185 (36.2) | 327 (63.8) | | |
| Vomiting (m = 1) | | | | | |
| | No | 169 (91.4) | 263 (83.0) | | |
| | Yes | 16 (8.6) | 54 (17.0) | 2.17* | 1.20–3.91 |
| Sleeping difficulties (m = 1) | | | | | |
| | No | 142 (76.8) | 211 (66.6) | | |
| | Yes | 43 (23.2) | 106 (33.4) | 1.66* | 1.10–2.51 |
| Pelvic pain (m = 1) | | | | | |
| | No | 125 (67.6) | 181 (57.1) | | |
| | Yes | 60 (32.4) | 136 (42.9) | 1.57* | 1.07–2.29 |
| Fatigue (m = 1) | | | | | |
| | No | 179 (96.8) | 291 (91.7) | | |
| | Yes | 6 (3.2) | 26 (8.2) | 2.67* | 1.08–6.60 |
| Vagina bleeding (m = 1) | | | | | |
| | No | 182 (98.4) | 297 (93.7) | | |
| | Yes | 3 (1.6) | 20 (6.3) | 4.09*[a] | 1.20–13.94 |
| Pregnancy induced hypertension (PIH) | | | | | |
| (m = 1) | No | 170 (91.9) | 305 (96.2 | | |
| | Yes | 15 (8.1) | 12 (3.8) | 0.446*[b] | 0.20–0.98 |
| Tired (m = 1) | | | | | |
| | No | 82 (44.3) | 132 (41.6) | | |
| | Yes | 103 (55.7) | 185 (58.4) | 1.11 | 0.77–1.60 |
| Nausea (m = 1) | | | | | |
| | No | 98 (53.0) | 144 (45.4) | | |
| | Yes | 87(47.0) | 173(54.6) | 1.35 | 0.94–1.94 |
| Heartburn (m = 1) | | | | | |
| | No | 164 (88.6) | 291 (91.8) | | |
| | Yes | 21 (11.4) | 26 (8.2) | 0.70 | 0.38–1.28 |
| Digestive problems (m = 1) | | | | | |
| | No | 170 (91.9) | 282 (89.0) | | |
| | Yes | 15 (8.1) | 35 (11.0) | 1.40 | 0.74–2.65 |
| Itching (m = 1) | | | | | |
| | No | 172 (93.0) | 284 (89.6) | | |
| | Yes | 13 (7.0) | 33(10.4) | 1.53 | 0.79–3.00 |

| Braxton Hicks contractions | | | | | |
|---|---|---|---|---|---|
| (m = 2) | No | 139 (75.1) | 234 (73.8) | | |
| | Yes | 46 (24.9) | 82 (25.9) | 1.07 | 0.70–1.62 |
| Premature contractions | | | | | |
| (m = 1) | No | 152 (82.2) | 247 (77.9) | | |
| | Yes | 33 (17.8) | 70 (22.1) | 1.30 | .82–2.07 |
| Physical pain (m = 1) | | | | | |
| | No | 145 (78.4) | 233 (73.5) | | |
| | Yes | 40 (21.6) | 84 (26.5) | 1.30 | 0.85–2.00 |
| Decreased fetal movement | | | | | |
| (m = 1) | No | 168 (90.8) | 281 (88.6) | | |
| | yes | 17 (9.2) | 36 (11.4) | 1.27 | 0.69–2.32 |
| Gestational diabetes (m = 0) | | | | | |
| | No | 176 (95.1) | 306 (96.2) | | |
| | yes | 9 (4.9) | 12 (3.8) | 0.77 | |

Abbreviations: NDG, non-distressed group; PDG, perinatal distress group, M = missing
*P < .05.
a = Fisher's exact test.
b = distressed less likely to get PIH.

**Table 3. Backward stepwise logistic regression predicting likelihood of perinatal distress based on women's demographic characteristics, support, and pregnancy problems.**

| Variable | Model 1 | | | Model 2 | | | Model 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Exp(B) | P | CI* | Exp (B) | P | CI* | Exp (B) | P | CI* |
| Constant | 1.609 | .01 | | 0.751 | .22 | | 0.608 | .61 | |
| **Background** | | | | | | | | | |
| Education (14 years or more) | 0.614 | .026 | 0.4 0.942 | 0.683 | .099 | 0.434 1.074 | 0.665 | .088 | 0.41 1.06 |
| Employment status (Unemployed or student) | 1.693 | .025 | 1.069 2.68 | 1.893 | .01 | 1.168 3.068 | 1.627 | .055 | 0.98 2.701 |
| Smoking during pregnancy | 5.32 | .007 | 1.571 18.022 | 5.33 | .008 | 1.54 18.456 | 5.23 | .01 | 1.48 18.39 |
| **Support** | | | | | | | | | |
| Dissatisfied in partner relationship | | | | 2.86 | .004 | 1.393 5.873 | 3.22 | .003 | 1.5 6.9 |
| Dissatisfied with division of household tasks and childcare | | | | 2.18 | .01 | 1.209 3.931 | 2.14 | .014 | 1.17 3.93 |
| Mental health therapy before | | | | 2.181 | .001 | 1.392 3.419 | 1.79 | .016 | 1.12 2.86 |
| **Pregnancy problems** | | | | | | | | | |
| Fatigue | | | | | | | 3.59 | .041 | 1.06 12.18 |
| Vomiting | | | | | | | 2.5 | .019 | 1.16 5.37 |
| Vaginal bleeding | | | | | | | 3.34 | .126 | 0.71 15.73 |
| Blood pressure problems (PIH and pre-eclampsia) | | | | | | | 0.29 | .03 | 0.09 0.88 |
| Pelvic pain/discomfort | | | | | | | 1.76 | .018 | 1.1 2.82 |
| -2LL | 5E+05 | | | 5E+05 | | | 4E+05 | | |
| | Chi-square = 28.46 df = 3 P < .001 | | | Chi-square = 64, 86 df = 6 P < .001 | | | Chi-square = 88.259 df = 11 P < .001 | | |
| Nagelkerke R Square | 0.094 | | | 0.204 | | | 0.27 | | |
| Hosmer and Lemeshow Test | P = 0.792 | | | P = 0.990 | | | P = 0.645 | | |
| Classification accuracy | 63.4% | | | 65.9% | | | 71.9% | | |

*= 95% CI for EXP(B);

Variables not in model: age, relationship with partner, financial situation, violence in adulthood, perceived support from family, perceived support from friends, nausea, sleeping difficulties.

**Table 4. Evaluation of the effects of perinatal distress, satisfaction in the partner relationship, and family support on women's service needs**

| Prenatal care | Total visits M (SD/n) | P | Visits to midwife M (SD/n) | P | Visit to obstetrician-gynaecologist M (SD/n) | P | Visits to family physician M (SD/n) | P |
|---|---|---|---|---|---|---|---|---|
| **Non-distressed group (NDG)** | **9.6 (2.2/184)** | **.027** | **9.3 (2.2/181)** | **.010** | **1.6 (1.2/85)** | **.011** | 1.7 (1.7/66) | .294 |
| **Perinatal distress group (PDG)** | **11.1 (2.6/312)** | | **9.7 (2.5/307)** | | **2.1 (1.8/160)** | | 1.9 (2.2/116) | |
| Subgroup 1 | | | | | | | | |
| Satisfied in partner relationship | 10.1 (2.6/209) | .995 | 9.6 (2.6/205) | .660 | 2.1 (1.8/95) | .792 | 2.1 (2.5/75) | .746 |
| Dissatisfied in partner relationship | 10.2 (2.5/56) | | 9.7 (2.1/55) | | 2.0 (1.4/36) | | 2.0 (1.9/20) | |
| Subgroup 2 | | | | | | | | |
| Strong family support | **9.9 (2.4/265)** | **.017** | 9.5 (2.3/260) | .057 | 2.0 (1.8/133) | .925 | 2.1 (2.3/99) | .169 |
| Weak family support | **11.1 (3.2/42)** | | 10.5 (3.1/42) | | 1.9 (1.1/24) | | 1.3 (0.6/15) | |

M = mean visits.
BOLD = significant.
$P = .05$, Mann–Whitney $U$ test.

**Table 5. Evaluation of effects of perinatal distress, satisfaction in the partner relationship, and support from family on the issuing of sick leave before childbirth**

| | 1st sick leave Mean (SD/n) | P | 2nd sick leave Mean (SD/n) | P | 3rd sick leave Mean (SD/n) | P |
|---|---|---|---|---|---|---|
| **Non-distressed group (NDG)** | 94.4 (74.1/114) | .129 | **57.1 (48.5/58)** | **.004** | 58.9 (53.3/15) | .057 |
| **Perinatal distress group (PDG)** | 110.9 (82.1/178) | | **87.1 (65.2/100)** | | 87.0 (55.2/44) | |
| **Subgroup 1** | | | | | | |
| Satisfied in partner relationship | 110.9 (81.4/114) | .656 | 79.4 (58.5/66) | .465 | **76.1 (52.2/27)** | |
| Dissatisfied in partner relationship | 104.7 (78.61/39) | | 98.8 (75.7/24) | | **118 (53.0/11)** | **.017** |
| **Subgroup 2** | | | | | | |
| Strong family support | **106.6 (82.3/155)** | **.018** | 106.6 (82.3/155) | .064 | 82.3 (55.9/37) | .076 |
| Weak family support | **145.1 (77.5/18)** | | 124.2 (82.0/13) | | 117.8 (49.9/6) | |

Mean = mean days before childbirth.

$P$ = .05 Mann-Whitney $U$ test.

References

(1) Staneva A, Bogossian F, Pritchard M, Wittkowski A. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: a systematic review. Women and Birth 2015;28(3):179-193.

(2) Rallis S, Skouteris H, McCabe M, Milgrom J. The transition to motherhood: towards a broader understanding of perinatal distress. Women and Birth 2014;27(1):68-71.

(3) O'Hara MW, Wisner KL. Perinatal mental illness: Definition, description and aetiology. Best Practice & Research Clinical Obstetrics & Gynaecology 2014;28(1):3-12.

(4) Wiegner L, Hange D, Björkelund C, Ahlborg G, Jr. Prevalence of perceived stress and associations to symptoms of exhaustion, depression and anxiety in a working age population seeking primary care - An observational study. BMC Fam Pract 2015;16(1).

(5) Woods SM, Melville JL, Guo Y, Fan M-, Gavin A. Psychosocial stress during pregnancy. Am J Obstet Gynecol 2010;202(1):61.e1-61.e7.

(6) Van den Bergh BRH, van den Heuvel MI, Lahti M, Braeken M, de Rooij SR, Entringer S, et al. Prenatal developmental origins of behavior and mental health: The influence of maternal stress in pregnancy. Neurosci Biobehav Rev 2017.

(7) Zhang S, Ding Z, Liu H, Chen Z, Wu J, Zhang Y, et al. Association between mental stress and gestational hypertension/ preeclampsia: A meta-analysis. Obstet Gynecol Surv 2013;68(12):825-834.

(8) Sun L, Tao F, Hao J, Su P, Xu R, Liu F. Vaginal bleeding in early pregnancy and associations with physical, psychological and environmental factors among Chinese women: from the C-ABC cohort study. Gynecol Obstet Invest 2012;73(4):330-336.

(9) Dunkel S, Christine, Niles AN, Guardino CM, Khaled M, Kramer MS. Demographic, Medical, and Psychosocial Predictors of Pregnancy Anxiety. Paediatr Perinat Epidemiol 2016;30(5):421-429.

(10) Kjeldgaard HK, Eberhard-Gran M, Benth JŠ, Vikanes ÅV. Hyperemesis gravidarum and the risk of emotional distress during and after pregnancy. Arch Women's Ment Health 2017:1-10.

(11) Andersson L, Sundstrom-Poromaa I, Wulff M, Astrom M, Bixo M. Implications of antenatal depression and anxiety for obstetric outcome. Obstet Gynecol 2004 Sep;104(3):467-476.

(12) Tan PC, Vani S, Lim BK, Omar SZ. Anxiety and depression in hyperemesis gravidarum: prevalence, risk factors and correlation with clinical severity. European Journal of Obstetrics & Gynecology and Reproductive Biology 2010;149(2):153-158.

(13) Perlen S, Woolhouse H, Gartland D, Brown SJ. Maternal depression and physical health problems in early pregnancy: Findings of an Australian nulliparous pregnancy cohort study. Midwifery 2013;29(3):233-239.

(14) Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. Obstetrics & Gynecology 2000;95(4):487-490.

(15) Dørheim SK, Bjorvatn B, Eberhard-Gran M. Sick leave during pregnancy: A longitudinal study of rates and risk factors in a Norwegian population. BJOG Int J Obstet Gynaecol 2013;120(5):521-530.

(16) Cheng ER, Rifas-Shiman SL, Perkins ME, Rich-Edwards JW, Gillman MW, Wright R, et al. The influence of antenatal partner support on pregnancy outcomes. Journal of Women's Health 2016;25(7):672-679.

(17) Jonsdottir SS, Thome M, Steingrimsdottir T, Lydsdottir LB, Sigurdsson JF, Olafsdottir H, et al. Partner relationship, social support and perinatal distress among pregnant Icelandic women. Women and Birth 2017;30(1):e46-e55.

(18) Rosand GM, Slinning K, Eberhard-Gran M, Roysamb E, Tambs K. Partner relationship satisfaction and maternal emotional distress in early pregnancy. BMC Public Health 2011 Mar 14;11:161-2458-11-161.

(19) O'Hara MW, McCabe JE. Postpartum depression: current status and future directions. Annual review of clinical psychology 2013;9:379-407.

(20) Higgins A, Downes C, Monahan M, Gill A, Lamb SA, Carroll M. Barriers to midwives and nurses addressing mental health issues with women during the perinatal period: The Mind Mothers study. J Clin Nurs 2018;27(9-10):1872-1883.

(21) Ford E, Shakespeare J, Elias F, Ayers S. Recognition and management of perinatal depression and anxiety by general practitioners: a systematic review. Fam Pract 2016 Sep 22:11-19.

(22) NICE. Antenatal and postnatal mental health. Clinical management and service guidance. Clinical guideline [CG192]. National Institute of Clinical Excellence. 2014; Available at: https://www.nice.org.uk/guidance/cg192. Accessed January 13th., 2012.

(23) Asgeirsdottir TL. The Icelandic health care system. In: Magnussen J, Vrangbaek K, Saltman R, editors. Nordic Health Care Systems: Recent Reforms And Current Policy Challenges Maidenhead, Berkshire, England: McGraw-Hill Education; 2009. p. 316-330.

(24) Althingi. Act on Maternity/Paternity Leave and Parental Leave, No. 95/2000; Available at: https://www.government.is/Publications/Legislation/Lex/?newsid=8ef83983-fbd6-11e7-9423-005056bc4d74. Accessed August, 14th,W2017.

(25) Lovibond S, Lovibond P. Manual for the Depression Anxiety Stress Scales. 2nd ed. Sydney, Australia: Psychology Foundation Monograph; 1995.

(26) Cox JL, Holden J, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. The British Journal of Psychiatry 1987;150(6):782-786.

(27) Lydsdottir LB, Howard LM, Olafsdottir H, Thome M, Tyrfingsson P, Sigurdsson JF. The psychometric properties of the Icelandic version of the Edinburgh Postnatal Depression Scale (EPDS) when used prenatal. Midwifery 2019;69:45-51.

(28) Spanier GB. Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. Journal of Marriage and the Family 1976:15-28.

(29) Crane DR, Allgood SM, Larson JH, Griffin W. Assessing marital quality with distressed and nondistressed couples: A comparison and equivalency table for three frequently used measures. Journal of Marriage and the Family 1990:87-93.

(30) Carey MP, Spector IP, Lantinga LJ, Krauss DJ. Reliability of the Dyadic Adjustment Scale. Psychological Assessment 1993;5(2):238-240.

(31) Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. J Pers Assess 1988;52(1):30-41.

(32) Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. J Pers Assess 1990;55(3-4):610-617.

(33) Lydsdottir LB, Howard LM, Olafsdottir H, Einarsson H, Steingrimsdottir T, Sigurdsson JF. Adverse life experiences and common mental health problems in pregnancy: a causal pathway analysis. Archives of women's mental health 2018:1-9.

(34) Olson, K. (2007).A New Way of Thinking About Fatigue A Reconceptualization. Oncology nursing forum; 2007:93-99

(35) Yuksel F, Akin S, Durna Z. Prenatal distress in Turkish pregnant women and factors associated with maternal prenatal distress. J Clin Nurs 2014;23(1-2):54-64.

(36) Bakker EC, van Nimwegen - Matzinger, Carola.W., Ekkel-van der Voorden W, Nijkamp MD, Völlink T. Psychological determinants of pregnancy-related lumbopelvic pain: a prospective cohort study. Acta Obstet Gynecol Scand 2013;92(7):797-803.

(37) Eiríksdóttir VH, Ásgeirsdóttir TL, Bjarnadóttir RI, Kaestner R, Cnattingius S, Valdimarsdóttir UA. Low birth weight, small for gestational age and preterm births before and after the economic collapse in Iceland: A population based cohort study. PLoS ONE 2013;8(12):e80499.

(38) Pilkington PD, Milne LC, Cairns KE, Lewis J, Whelan TA. Modifiable partner factors associated with perinatal depression and anxiety: A systematic review and meta-analysis. J Affect Disord 2015;178:165-180.

(39) Hauge LJ, Torgersen L, Vollrath M. Associations between maternal stress and smoking: findings from a population-based prospective cohort study. Addiction 2012;107(6):1168-1173.

(40) Storksen HT, Eberhard-Gran M, Garthus-Niegel S, Eskild A. Fear of childbirth; the relation to anxiety and depression. Acta Obstet Gynecol Scand 2012;91(2):237-242.

(41) Statistic Iceland. Births per year. 2017; Available at: http://px.hagstofa.is/pxen/pxweb/en/Ibuar/Ibuar__Faeddirdanir__faeddir__faedingar/MAN05 100.px/?rxid=7f64fd7d-f954-474e-b3fb-00f528007c94.

(42) Gisladottir E, Gunnarsdottir G, Þorgeirsdottir H, Jónsson RM, Jensson V, Danielsdottir S. Talnabrunnur [Statistical well], February, 2016; Available at: https://www.landlaeknir.is/utgefid-efni/skjal/item29044/.

**III**

**Title:**

**Effect of perinatal distress and dissatisfaction in partner relationship on issuing of sick-leave certificates during pregnancy.**

**Authors:**

**Jonsdottir, S.S., Steingrimsdottir, T., Thome, M., Oskarsson, G.K., Lydsdottir, L.B., Olafsdottir, H., Sigurdsson, J.F., Swahnberg, K.**

Abstract

**Objective:** To assess the possible association between sick-leave certificates awarded during pregnancy and perinatal distress and dissatisfaction with partner relationships.

**Design:** Prospective cohort study

**Setting**: Participants were recruited from primary health-care centres in urban areas in Iceland.

**Participants**: Five hundred and sixty pregnant Icelandic women.

**Data sources:** Self-report scales on perinatal distress, and sick-leave certificates sourced from electronic medical records.

**Primary outcome measures**: 1) Frequencies of sick leave, 2) reasons for sick leave, and 3) association between sick leave and social circumstances.

**Results:** Over half (54.11%) of the women received perinatal sick leave, with no significant difference between distressed and non-distressed women. The mean number of sick leaves issued was 1.9. It was more common among distressed women than non-distressed women to initially receive part-time sick leave before full-time sick leave. The majority of sick leaves were issued between weeks 26 and 36 of pregnancy. Pelvic girdle pain was the most common reason for sick leave, but only 13 (4.29%) sick-leave certificates were issued for distress. Distressed women who were not satisfied with the division of child-rearing and household tasks were issued sick leave significantly ($p = 0.008$) more frequently than were women who were satisfied with the division. Meanwhile, distressed women who were not satisfied with their partner relationships were issued significantly ($p < 0.0001$) more sick-leave certificates than were distressed women who were satisfied with their partner relationships.

**Conclusion:** Women who reported perinatal distress initially decreased their workloads, most likely to determine if that would relieve their problems, but eventually received full-time sick

leave, like the non-distressed women. There is an association between distressed women's social

circumstances and frequency of sick-leave certificates, which highlights the importance of

assessing both the distress and social circumstances of pregnant women.

**Key words: Distress, medical reasons, pregnancy, sick leave, social circumstances**

Strengths and limitations of this study

- The main strength of this study is that it reports data from 560 women, which is a relatively large sample size for Icelandic society.
- Sick-leave data were obtained directly from pregnancy records, which increases the study´s strength while eliminating self-report bias.
- The categorising of reasons for sick leave might be questioned, as there is currently no standardised agreement regarding how to document complications during pregnancy on sick-leave certificates.
- The uneven proportion of participants who reported distress and non-distress could be seen as a limitation, since it does not reflect the population of pregnant Icelandic women.

# INTRODUCTION

Information regarding the awarding of sick leave to pregnant women is not easily accessible, with most of the little that is available provided by self-report studies conducted in the Scandinavian countries of Denmark, Norway, and Sweden.(1-6) Sick-leave benefits act as financial protection for employees in cases when they are rendered unable to work as a result of sickness or an accident. In general, medical certificates confirming sickness, issued by physicians, are required after a certain period of sickness-related absence,(7) but this duration differs among the 145 countries that offer such a benefit as part of their social structures.(8)

Considering countries for which such data are available, the frequency of sick leave during pregnancy ranges from 20.6% in Denmark (9) to 75.3% in Norway.(1) Further, a recent study by Truong et al.(6) provided some in-depth information on sick leave across several European countries. They reported that, across all countries examined, the average frequency of sick leave during pregnancy was 50.6%, with the lowest incidence being among Swedish women (31.7%) and the highest being among Polish women (71.3%). Moreover, in Norway, researchers have found that, compared to before pregnancy, the percentage of sick-leave certificates awarded to pregnant women increases rapidly from the month of conception up to birth (10). The awarding of sick-leave certificates has doubled over the last 20 years among the general population in Norway, with sick leaves for women in general counting for virtually the entire increase (11).

The primary reason for sick leave among pregnant women is lower back/pelvic girdle pain.(3,5,6,12) Other common reasons are sleeping problems, fatigue, and nausea/vomiting.(1,6) Further, in a recent study, primiparous women who were experiencing a fear of childbirth were reported to need longer sick leaves during pregnancy.(13)

Younger multiparous women have also been found to need more sick days from work than do older multiparous women.(14) The primary cause of sickness-related absence among general employees is suboptimal mental well-being,(15) and sick leave as a result of suboptimal mental health can incur high costs for employers.(16) Notably, in Iceland, 31% of women older than 18 years' experience distress on a regular basis in their daily lives.(17)

Result from this study, reported elsewhere showed the women reporting perinatal distress receive their sick leave on average 30 days earlier during pregnancy than do women who are not distressed (18). This is of importance, as the incidence of perinatal distress, defined as symptoms of depression, anxiety, and/or stress (19-21) has recently been found to be increasing among pregnant women.(22-24) Women who are dissatisfied with the division of child-rearing and household tasks in the family, as well as women who are dissatisfied with their partner relationship, are more likely to experience perinatal distress;(20) this might indicate that the modern western lifestyle, in which pregnant women are likely to be required to juggle their pregnancy with full-time employment and family and social demands, is a risk factor for the mental well-being of pregnant women and their foetuses. However, of the reasons reported, perinatal distress is currently the least common reason for sick leave.(1,6) Nevertheless, with the increased focus on the development of complications during pregnancy and childbirth among women who report perinatal distress,(20,25) determining whether there is a link between perinatal distress and sick leaves issued during pregnancy would be of value to society. In this regard, analyses of medical certificates issued by physicians would add a different perspective to that of self-reports from pregnant women and might provide valuable information to health-care professionals, as well as employers and society in general.

The primary aim of the present study was to assess the possible association between sick-leave certificates issued by physicians and perinatal distress during pregnancy. A secondary aim was to identify whether women's social circumstances have an influence on the sick-leave certificates issued, considering distressed and non-distressed pregnant women.

## METHODS

### Study design and population

This is a prospective cohort study, conducted between 2006 and 2013. Thorough details of the study procedure have previously been published elsewhere.[20] In brief, at booking visit, midwives in 11 primary health-care centres located in urban areas in Iceland introduced the study to pregnant women. Then, during their following visit, the women were asked to participate. The sample consisted of 562 women who, after being screened for perinatal distress, underwent a semi-structured psychiatric diagnostic interview in which they completed screening scales and provided data regarding background variables. After the interviews, two women withdrew from the study, leaving a final number of 560 participants. These women were among 2,523 women participating in a larger research project, called the 'Icelandic Study of Perinatal Mental Health' (ISPMH). Participants were screened three times during pregnancy for perinatal distress, using self-report scales. Sick-leave certificates issued during the index pregnancy were collected from the women's electronic medical records.

**The Icelandic system and policy regarding sick leave**

In Iceland, antenatal care is free of charge, and almost 100% of pregnant women avail of the service. The overall structure of Iceland's antenatal care is based on the UK NCIE guidelines of Antenatal care for uncomplicated pregnancies.(26) Midwives are the primary care professionals responsible for the antenatal care of healthy women. When women have severe medical needs, midwives share their care with general practitioners and/or obstetricians. Physicians confirm the need for and issue sick-leave certificates during pregnancy. When health problems occur, sick-leave certificates help individuals protect their financial situations; however, the scale of sick-leave benefits differs between the private and public sector. In Iceland, the participation of women in the labour market is 78.2%, which is the highest percentage of all countries in the Organization for Economic Co-operation and Development (OECD).(27) Women in Iceland are entitled to three months of sole maternity leave and may commence the leave one month before their due date. The father is also entitled to three months, and then both parents have an additional three months that they can share among themselves.(28) A thorough description of sick leave and maternity benefits in Iceland is available in Appendix 1 (on the web).

**Variables**

The three independent variables studied in this research were perinatal distress, satisfaction with partner relationship, and social support. The main background and social circumstance variables were: age, marital status, education, employment, smoking during pregnancy, history of mental health therapy, living with a partner, satisfaction with the division of household tasks and child-rearing, social support, and satisfaction with partner relationship.

**Perinatal distress**

The women were screened for perinatal distress on three occasions (T-times): at 16 (T1), 25 (T2), and 36 (T3) weeks gestation. Detailed information regarding the screening procedure has been published previously.(20) In brief, the participants' distress was measured using the Edinburgh Postpartum Depression Scale (EPDS) (29) and the Depression Anxiety Stress Scales (DASS).(30) Distress was identified using cut-off scores for the four scales. Specifically, for the DASS these cut-off points were $\geq 10$, $\geq 8$, and $\geq 15$ points for the depression, anxiety, and stress subscales, respectively,(30) while for the EPDS the cut-off point was $\geq 12$.(28) Based on their results, participants were assigned to the perinatal distressed group (PDG) or the non-distressed group (NDG).

**Satisfaction with partner relationship and social support**

Satisfaction with partner relationship was assessed using the Dyadic Adjustment Scale (DAS).(31) In this scale, possible scores range from 0 to 153, with scores $\leq 107$ suggesting that the individual is not satisfied with their partner relationship, and scores $\geq 108$ indicating satisfaction with their partner relationship.(32) Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (33). This scale comprises three subscales: support from family, friends, and significant others. Scores range from 4–28, and higher scores indicate higher support. In this study, scores lower than 16 were considered to indicate weak support, and scores higher than 16 to indicate strong support. Detailed information regarding the screening procedures for these two scales has been published previously.(20)

**Outcome measures**

The primary outcome measures were: 1) Frequency of sick leaves, 2) reasons for sick leaves, and 3) the association between sick leaves and social circumstances. Both part-time and full-time sick-leave certificates issued during the index pregnancy were analysed.

Reasons for sick leaves were determined based on physicians' diagnoses of health-care problems, which were documented in electronic medical records created on the same date the sick leave was issued. As diagnostic systems, Iceland uses the World Health Organization's ICD-10 (International classification of diseases and other health problems),(8) and the International Classification of Primary Care (ICPC).(34) This investigation identified 148 reasons for sick-leave certificates, many of which describe the same disease /problem. Consequently, two of the authors, who were antenatal care clinical experts, consolidated the reasons into the following nine categories:

1) 'Distressed', comprising 18 different reasons such as acute stress reaction, anxiety disorder, feeling anxious, emotional distress, depression mentis, depressive disorder, depressive episode, feeling low, feeling tense, feeling anxious, panic disorder, adjustment disorder, and psychosocial problems.

2) 'Pelvic girdle pain', comprising five reasons.

3) 'Fatigue', comprising five reasons: lethargy, malaise, fatigue, tiredness, and reduced working capacity.

4) 'Nausea/vomiting', comprising seven reasons.

5) 'Sleeping problems', comprising three reasons.

6) 'Urinary tract infections', comprising eight reasons.

7) 'Back pain', comprising 15 reasons.

8) 'Other pregnancy problems', comprising 48 reasons. These included high/low blood pressure, vaginal bleeding, vomiting, premature contractions, haemorrhoids, iron deficiency, and gestational diabetes.

9) 'Other health-related problems', which concerned issues not connected with pregnancy; this comprised 40 different reasons, such as bronchitis, asthma, essential hypertension, headache, diarrhoea, migraine, sinusitis acuta, cystitis acuta, and sore throat.

**Statistical analyses**

Data from the electronic medical records were obtained in an Excel file, and were merged with data from the ISPMH. The following statistical analyses were conducted: descriptive analyses, the Mann-Whitney U test, and chi-square tests. The level of significance was set at < 0.05, and the confidence interval at 95%. For data management and analyses, we used SPSS version 22 (IBM Corp., 2013). Single women were excluded from the analyses of satisfaction with partner relationship. We then assessed differences between the PDG and the NDG concerning receiving part-time and full-time sick leave, or no sick leave at all. Background variables were age, marital status (married, cohabiting, single), education (elementary or lower, secondary or post-secondary, and university education), living with a partner (yes/no), employment (yes/no), percentage of employment (in terms of a full-time work week), financial situation (good/difficult), previous mental health therapy (yes/no), smoking during pregnancy (yes /no), and primiparous or multiparous. Multiparous women were also categorised into 'younger' (17–24 years) or 'older' (25–47 years), based on results from Ariansen.(14) The women's satisfaction with the division of child-rearing and household tasks was also determined (categorised as yes/no), along with

satisfaction with partner relationship (yes/no), with social support from family (weak/strong), and with support from friends (weak/strong).

**Patient and public involvement**

No patients or members of the public were involved in the design or performance of this research.

**RESULTS**

**Participants' characteristics**

The pregnant women's work percentage per week was, on average, 88% of full-time work (range 15–150%, SD = 22.09). Nine women (1.6%) reported that they worked more than 100% of the full-time work week. Overall, 358 (63.93%) and 202 (36.07%) of the participants were allocated, after screening, to the PDG and NDG, respectively. No difference was found in regard to job percentage, neither between distressed and the non-distressed women nor between women who received sick-leave certificates and those who did not. The participants took, on average, 60% (range from 0–100%, SD = 24.5) of the division of child-rearing and household tasks; 121 (22.2%) women were not satisfied with the division, and a Mann Whitney test revealed a significant difference in satisfaction with the share of child-rearing and household tasks between women who received sick-leave certificates (M = 58.34, SD = 23.197) and those who did not (M = 63.50, SD = 25.82; p = 0.015).

**Frequency and time of sick-leave-certificate issuance**

Overall, 499 sick leaves were issued to 303 (54.11%) women. The mean number of sick leaves issued to the women was 1.9 (range = 1–6, SD = 1.11); 137 (45.2%) received one, 102 (33.7%) received two, 36 (11.9%) received three, and 28 (9.2%) received four or more. Over 90% of the women were issued full-time leave of absence upon receiving their third sick leave. The majority of sick leaves were issued to the women when they were between 25 and 36 gestational age (to 129 women; 42.6%). The second largest group of women (76, 25.1%) received sick leave from the beginning of pregnancy up to the 16 gestational weeks. Fifty women (16.5%) received sick leave for the final four pregnancy weeks, but the fewest women (48, 15.8%) received sick leave during the middle of the pregnancy: from beginning of week 17 to the end of week 25. One hundred and eighty-five (51.7%) of the women who received a sick leave were in the PDG, and 118 (58.4%) were in the NDG, which was not a significant difference (p = 0.124). Table 1 shows the difference in sick leaves issued between the two groups. In particular, a significant difference was identified regarding the second sick-leave certificate, with women in the NDG receiving full-time sick leave more often than did women in the PDG. Overall, women in the NDG received a higher ratio of sick-leave certificates than did women in the PDG; however, the difference was not significant.

<div align="center">Please insert Table 1 around here</div>

**Sick-leave certificates, women's background, and perinatal distress**

Women who were 25 years or older (n = 255, 82.4%) received sick leave significantly more frequently than did younger women (n = 48, 15.8%) (p = 0.002), but the younger women needed significantly more sick days (M = 139, SD = 88.00) than did the older women (M = 101, SD = 78.30; p = 0.003). This trend was also present in the PDG, except that the difference in sick days

was not significant. The younger distressed women (n = 7; 4.2%) had, on average, 25 more sick

days than did the older distressed women (n = 158, 95.8%). Table 2 shows the association

between sick leave and background variables issued for the overall sample, but also in terms of

the PDG and NDG. Women who reported perinatal distress and who had no previous history of

mental health therapy were more likely to receive sick leave than were those who were distressed

and had a history of mental-health therapy. Also, women who smoked during pregnancy were

significantly less likely to receive sick leave than were those who did not smoke; however,

distressed women who smoked were significantly more likely to receive sick leave than were

non-distressed smokers.

**Reasons for sick-leave certificates**

A total of 566 reasons for sickness were documented on the certificates, and these were

categorised into the nine categories. On average, 2.6 reasons were documented for each sick

leave. Pelvic girdle pain was the most common reason, followed by 'other pregnancy problems'.

Figure 1 shows the primary reason for the first sick-leave certificate, and Figure 2 the primary

reason for the second sick-leave certificate. Information regarding whether the sick leaves were

issued part-time or full-time were missing in 27 (9.8%) cases. Thirteen women (4.29%) were

issued sick-leave certificates due to distress. Ninety (29.7%) sick-leave certificates did not

include any reason, and they were equally distributed between the PDG and the NDG (p = 0.447).

**DISCUSSION**

To our knowledge, this is the first study to compare sick-leave certificates issued by physicians to distressed and non-distressed pregnant women. Notably, the reason women in the NDG received full-time sick leaves earlier than did the PDG women is not obvious. It is possible that either physicians, midwifes, or the distressed women suggested initial part-time sick leave to determine whether decreased work hours would alleviate the women's complications. Results from this study, reported elsewhere support this, because distressed women have been found to obtain up to 30 days more sick leave during pregnancy than are non-distressed women (18). This adds important knowledge regarding the difference between full-time and part-time sick leave, which has been poorly studied.(1)

Despite the uneven proportion in our study of participants in the PDG (63.9%) and the NDG (37.1%), our results are similar to self-reported sick leave frequencies for 15 European countries, including women from Poland, Croatia, Norway, Finland, Russia, Italy, the United Kingdom, and Sweden.(6) The number of sick leaves issued was congruent with the structure of the Icelandic sick-leave certificates system, and gives an indication that the majority of the women in our study were able to avail of sick-leave benefits from their employers. Employed women received sick leave significantly more often than did non-employed women or students, which was expected. That perinatally distressed women received sick leave primarily due to pelvic girdle pain rather than to distress conforms with results from Jonsdottir et al (18), which showed no difference between the frequency or period during pregnancy that distressed and non-distressed women complained of pelvic girdle pain. Unexpectedly, however, few sick-leave certificates were issued as a result of nausea/vomiting or sleeping disturbances, which have previously been found to be common self-reported reasons for sick leave.(1,6) Additionally,

analysing our entire sample, we found that women who smoked were significantly less likely to receive sick-leave certificates than were women who did not smoke. The most likely explanation for this is that the main consequences of smoking during pregnancy are effects on the foetus and preterm birth, rather than physical problems for mothers.(35)

Our results add important knowledge regarding the association between sick leave and perinatally distressed women's dissatisfaction with partner relationships and the division of child-rearing and household tasks. Previously, such information was not available.

Almost one-third of the sick-leave certificates in our study contained no documented reason. This has also been found in other research; in a Swedish study, 18 of 39 obstetricians stated that they were generally unable to exactly determine the correct medical diagnosis when a pregnant woman asked for a sick-leave certificate.(36) Our participants' mean percentage of standard working hours worked reflected the typical work hours of Icelandic women.(37) The issuing of sick-leave certificates may indicate that the women experience an increased burden as pregnancy advances, which adds to the burdens of everyday life, (21,38) and that sick leave is considered a means of increasing rest during pregnancy. Regarding reporting distress symptoms, in a previous study postpartum Icelandic women reported feeling that health-care centres are not suitable places in which to reveal their symptoms.(39) Further, women have also reported a fear of being judged if they did not show an expected level of excitement about their pregnancy,(40-42) Thus, these women might decide not to report their distressed moods. This may explain the under-diagnosing of mental health problems during pregnancy,(43) and why physicians who focus on somatic conditions rather than non-somatic conditions on sick-leave certificates decide to omit a reason for the sick leave.

Distressed women who have not previously received mental health therapy require special attention during pregnancy, as they are more likely to need sick-leave certificates. This indicates a need to screen for distress during pregnancy and to offer consultation services that can relieve distress during antenatal care. Our results indicate that this is especially important for young distressed women who have elementary or lower education levels and who are working.

**Limitations**

There are several limitations to this study. We were unable to determine whether employers adjusted participants' work condition due to the pregnancy. Further, our categorising of reasons for sick leave could be questioned, as there is no consensus in Iceland regarding the selection or documentation of sick-leave certificates. Additionally, we did not ask the participants about fear of childbirth. A recent Italian study has shown that primiparous women with depressive or anxiety symptoms as well as dissatisfaction with their partner relationships are more likely to experience fear of childbirth.(44) Primiparous women with fear of childbirth have been found to needed longer sick leave during pregnancy.(13)

The main strength of the study was that we analysed data from 560 women, which is a relatively large sample size for Icelandic society. Iceland has a public health-care system, so all pregnant women receive similar care, which makes the comparison more accurate. The sick-leave-certificates data were gathered directly from pregnancy records, thereby eliminating self-reporting bias.

**Future research**

Thorough research is needed to assess the possible association between women's everyday-life-related burdens and less optimal well-being during pregnancy, and whether this can lead to distress and sick leave. Further, the communication between midwives, physicians, and distressed

women when the reason for sick leave is discussed, either part- or full-time, must be studied further. In addition, research is needed to explore the relationship between distress, dissatisfaction with partner relationships and fear of childbirth. Moreover, our results warrant further investigations of the association between distress and the division of household tasks and sickness during pregnancy.

**CONCLUSION**

Pelvic girdle pain is the most common single reason for sick leave, both among distressed women and women who do not report distress. The findings of the present study indicate that pregnant women who report perinatal distress initially begin decreasing their workload, most likely in an attempt to relieve their problems, but later receive full-time sick leave. Women reporting distress receive full-time sick leave later than do non-distressed women. Dissatisfaction with partner relationship and with the division of child-rearing and household tasks among distressed women was also determined to be associated with more sick leave. These results indicate a possible connection between sick leave, distress, and women's social circumstances, and indicate the need for early screening of distress.

**Table 1. Differences in sick-leave certificates issued to non-distressed and distressed women during pregnancy.**

| | NDG | PDG | p-value* |
|---|---|---|---|
| | n (%) | n (%) | |
| **All women** | | | |
| No sick-leave certificate | 84 (41.6) | 173 (48.3) | 0.124 |
| Sick-leave certificate | 118 (58.4) | 185 (51.7) | |
| **Sick-leave certificate no. 1** | | | |
| Part-time sick leave | 51 (49.5) | 64 (41.0) | 0.178 |
| Full-time sick leave | 52 (50.5) | 92 (59.0) | |
| **Sick-leave certificate no.2** | | | |
| Part-time sick leave | 4 (7.3) | 20 (21.1) | **0.027** |
| Full-time sick leave | 51 (92.7) | 75 (78.9) | |
| **Sick-leave certificate no.3** | | | |
| Part-time sick leave | 1 (7.7) | 4 (9.5) | 0.841 |
| Full-time sick leave | 12 (92.3) | 38 (69.1) | |

* Chi-square test; NDG = non-distressed women; PDG = perinatal distressed women.

**Table 2. Association between sick-leave certificates and background variables and perinatal distress (N = 560).**

| Variables | Any sick leave | | p | Difference in sick leave | | p |
|---|---|---|---|---|---|---|
| | | | | PDG and NDG | | |
| | No n/% | Yes n/% | | PDG n/% 185 (51.7) | NDG n/% 118 (58.4) | |
| **Age** | | | **0.014** | | | **0.048** |
| 17–24 years | 67 (56.8) | 51 (43.2) | | 38 (74.5) | 13 (25.5) | |
| 25–47 years | 175 (44.0) | 223 (56.0) | | 133 (59.6) | 90 (40.4) | |
| Missing: 44 | | | | | | |
| **Marital status** | | | 0.116 | | | 0.112 |
| Married | 82 (49.7) | 83 (50.3) | | 43 (51.8) | 40 (48.2) | |
| Cohabiting | 145 (42.4) | 197 (57.6) | | 126 (64.0) | 71 (36.0) | |
| Single | 28 (11.0) | 23 (45.1) | | 16 (69.6) | 7 (40.4) | |
| Missing: 2 | | | | | | |
| **Education** | | | **0.021** | | | **0.016** |
| Elementary or lower | 62 (57.4) | 46 (42.6) | | 34 (73.9) | 12 (26.1) | |
| Secondary or post- secondary | 88 (45.1) | 107 (54.9) | | 71 (66.4) | 36 (33.6) | |
| University education | 107 (41.6) | 150 (58.4) | | 80 (53.3) | 70 (46.7) | |
| Missing: 2 | | | | | | |
| **Employed** | | | **0.0001** | | | **0.013** |
| Yes | 123 (34.5) | 234 (65.5) | | 134 (57.3) | 100 (42.7) | |
| No | 133 (65.8) | 69 (34.2) | | 51 (73.9) | 18 (26.1) | |
| Missing: 2 | | | | | | |
| **Financial situation** | | | **0.040** | | | 0.906 |
| Good | 216 (44.1) | 274 (55.9) | | 167 (60.9) | 107 (39.1) | |
| Difficult | 39 (57.4) | 29 (46.2) | | 18 (62.1) | 11 (37.9) | |
| Missing: 2 | | | | | | |
| **Smoking during pregnancy** | | | **0.002** | | | **0.012 F** |
| Yes | 35 (66.0) | 18 (34.0) | | 16 (88.9) | 2 (11.1) | |
| No | 221 (43.7) | 285 (56.3) | | 169 (59.3) | 116 (40.7) | |
| Missing: 1 | | | | | | |
| **Previous mental health therapy** | | | 0.118 | | | **0.0001** |
| Yes | 108 (42.5) | 146 (57.5) | | 70 (47.9) | 76 (52.1) | |
| No | 147 (49.2) | 152 (50.8) | | 111 (73.0) | 41 (27.0) | |
| Missing: 7 | | | | | | |
| **Para** | | | 0.857 | | | 0.516 |
| Primiparous | 138 (45.5) | 165 (54.5) | | 98 (59.4) | 67 (40.6) | |
| Multiparous | 119 (46.3) | 138 (53.7) | | 87 (63.0) | 51 (37.0) | |
| Missing: 0 | | | | | | |
| **Number of earlier births*** | | | 0.090 | | | 0.135 |
| 1 childbirth – 195(34.8) | 83 (42.6) | 112 (57.4) | | 70 (62.5) | 42 (37.5) | |
| 2 childbirths – 89 (15.9) | 42 (47.2) | 47 (52.8) | | 23 (48.9) | 24 (51.1) | |
| ≥ 3 childbirths – 19 (3.4) | 13 (68.4) | 6 (31.6) | | 5 (83.3) | 1 (16.7) | |
| **Satisfaction with division of household tasks and child-rearing** | | | **0.031** | | | **0.008** |
| Yes | 205 (74.3) | 220 (51.8) | | 124 (56.4) | 96 (43.6) | |
| No | 45 (37.2) | 76 (62.8) | | 56 (73.7) | 20 (26.3) | |
| Missing:14 | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Living with a partner**\*\* | | | 0.226 | | | 0.232 |
| Yes | 225 (45.1) | 274 (54.9) | | 164 (59.9) | 110 (40.1) | |
| No | 32 (53.3) | 28 (46.7) | | 20 (71.4) | 8 (28.6) | |
| **Satisfied with partner relationship**\*\* | | | 0.557 | | | **0.0001** |
| Yes | 191 (46.0) | 224 (54.0) | | 121 (54.0) | 103 (46.0) | |
| No | 41 (42.7) | 55 (57.3) | | 44 (80.0) | 11 (20.0) | |
| **Perceived support from significant other** | | | 0.391 | | | 0.523 |
| Strong | 246 (45.8) | 291 (54.2) | | 178 (61.2) | 113 (38.8) | |
| Weak | 4 (33.3) | 8 (66.7) | | 4 (50.0) | 4 (50.0) | |
| Missing: 11 | | | | | | |
| **Perceived support from family** | | | 0.769 | | | 0.280 |
| Strong | 223 (45.3) | 269 (54.7) | | 161 (59.9) | 108 (40.1) | |
| Weak | 27 (47.4) | 30 (52.6) | | 21 (70.0) | 9 (30.0) | |
| Missing: 11 | | | | | | |
| **Perceived support from friends** | | | 0.497 | | | 0.182 |
| Strong | 224 (45.1) | 273 (54.9) | | 163 (59.7) | 110 (40.3) | |
| Weak | 26 (50.0) | 26 (50.0) | | 19 (73.1) | 7 (26.9) | |
| Missing: 11 | | | | | | |

\* Omitting 257 women who were primiparous; \*\* Omitting 49 women who were not in any relationship with a partner; F = Fisher's exact test.

**Figure 1. Documented reasons for first sick-leave certificate.**
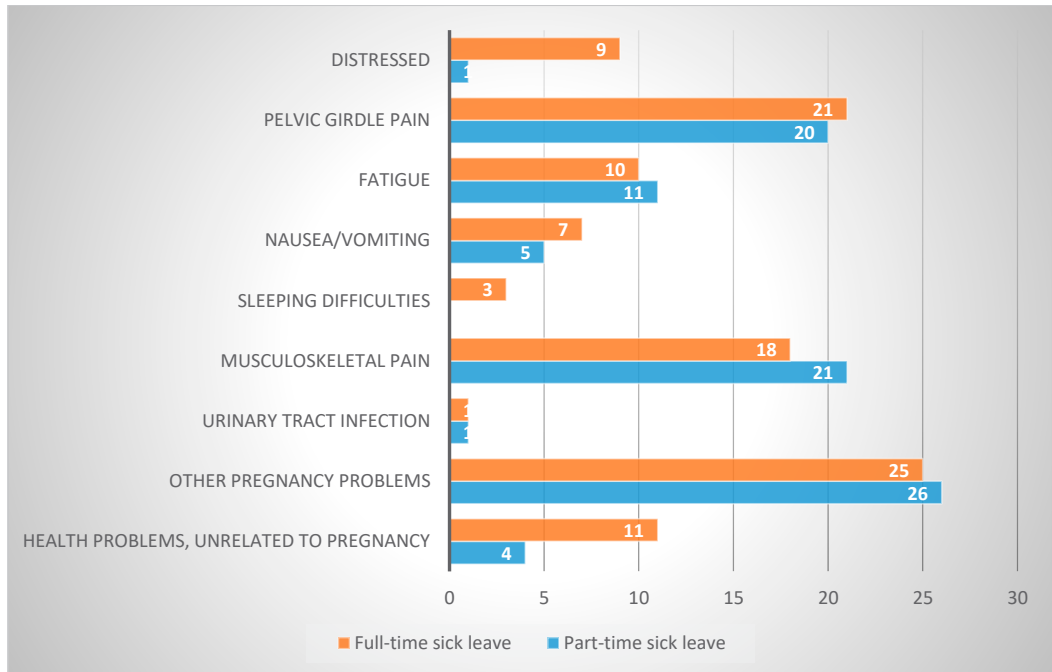
**Figure 2. Documented reasons for second sick-leave certificate.**
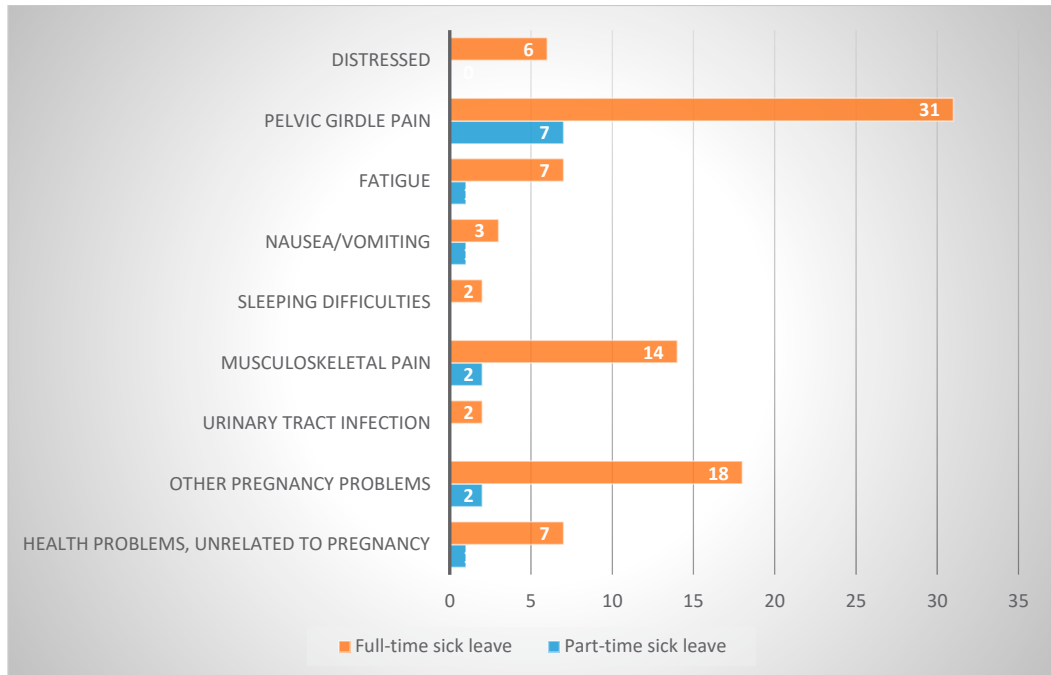
# REFERENCES

(1) Dørheim SK, Bjorvatn B, Eberhard-Gran M. Sick leave during pregnancy: A longitudinal study of rates and risk factors in a Norwegian population. BJOG Int J Obstet Gynaecol 2013;120(5):521-530.

(2) Sydsjö G, Sydsjö A, Wijma B. Variations in sickness absence and use of social benefits among pregnant women in a Swedish community 1978-1997. Acta Obstet Gynecol Scand 1999;78(5):383-387.

(3) Gutke A, Olsson CB, Völlestad N, Öberg B, Wikmar LN, Robinson HS. Association between lumbopelvic pain, disability and sick leave during pregnancy - A comparison of three Scandinavian cohorts. J Rehabil Med 2014;46(5):468-474.

(4) Mogren I. Perceived health, sick leave, psychosocial situation, and sexual life in women with low-back pain and pelvic pain during pregnancy. Acta Obstet Gynecol Scand 2006;85(6):647-656.

(5) Sydsjö A, Sydsjö G, Alexanderson K. Influence of pregnancy-related diagnoses on sick-leave data in women aged 16-44. J Women's Health Gender Med 2001;10(7):707-714.

(6) Truong BT, Lupattelli A, Kristensen P, Nordeng H. Sick leave and medication use in pregnancy: A European web-based study. BMJ Open 2017;7(8).

(7) Scheil-Adlung X, Sandner, L. The case for paid sick leave. World Health Report. Background paper No. 9. 2010; Available at: http://www.who.int/healthsystems/topics/financing/healthreport/SickleaveNo9FINAL.pdf?ua=1.

(8) WHO. International Statistical Classification of Diseases and Related Health Problems 10th Revision. 2010; Available at: http://apps.who.int/classifications/icd10/browse/2010/en. Accessed 09/02, 2012.

(9) Hansen ML, Thulstrup AM, Juhl M, Kristensen JK, Ramlau-Hansen CH. Predictors of sickness absence in pregnancy: a Danish cohort study. Scand J Work Environ Health 2015;41(2):184-193.

(10) Rieck KME, Telle K. Sick leave before, during and after pregnancy. Acta Sociol 2013;56(2):117-137.

(11) Kostøl AR, Telle K. Sykefraværet i Norge de siste tiårene. Det handler om kvinnene. 2011.

(12) Malmqvist S, Kjaermann I, Andersen K, Økland I, Larsen JP, Brønnick K. The association between pelvic girdle pain and sick leave during pregnancy; a retrospective study of a Norwegian population. BMC Pregnancy Childbirth 2015;15(1).

(13) Nieminen K, Wijma K, Johansson S, Kinberger EK, Ryding E-, Andersson G, et al. Severe fear of childbirth indicates high perinatal costs for Swedish women giving birth to their first child. Acta Obstet Gynecol Scand 2017;96(4):438-446.

(14) Ariansen AMS. Age, occupational class and sickness absence during pregnancy: A retrospective analysis study of the Norwegian population registry. BMJ Open 2014;4(5).

(15) Henderson M, Harvey SB, Øverland S, Mykletun A, Hotopf M. Work and common psychiatric disorders. J R Soc Med 2011;105(7):198-207.

(16) OECD. Sick on the Job? Myths and Realities about Mental Health and Work. Paris: OECD Publishing; 2012.

(17) Gisladottir E, Gunnarsdottir G, Þorgeirsdottir H, Jónsson RM, Jensson V, Danielsdottir S. Talnabrunnur, February, 2016. 2016; Available at: https://www.landlaeknir.is/utgefid-efni/skjal/item29044/.

(18) Jonsdottir SS, Swahnberg K, Thome M, Oskarsson GK, Lydsdottir LB, Olafsdottir H, et al. Pregnancy complications, sick leave and service needs of women who experience perinatal distress, weak social support or dissatisfaction with their partner relationship. submitted.

(19) Emmanuel E, St. John W. Maternal Distress: A concept analysis. Journal of Advanced Nursing 2010;66(9):2104-2115.

(20) Jonsdottir SS, Thome M, Steingrimsdottir T, Lydsdottir LB, Sigurdsson JF, Olafsdottir H, et al. Partner relationship, social support and perinatal distress among pregnant Icelandic women. Women and Birth 2017;30(1):e46-e55.

(21) Rallis S, Skouteris H, McCabe M, Milgrom J. A prospective examination of depression, anxiety and stress throughout pregnancy. Women and Birth 2014;27(4):e36-e42.

(22) Glover V. Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. Best Practice & Research Clinical Obstetrics & Gynaecology 2014 1;28(1):25-35.

(23) Van den Bergh BRH, van den Heuvel MI, Lahti M, Braeken M, de Rooij SR, Entringer S, et al. Prenatal developmental origins of behavior and mental health: The influence of maternal stress in pregnancy. Neurosci Biobehav Rev 2017.

(24) Woods SM, Melville JL, Guo Y, Fan M-, Gavin A. Psychosocial stress during pregnancy. Am J Obstet Gynecol 2010;202(1):61.e1-61.e7.

(25) Staneva A, Bogossian F, Pritchard M, Wittkowski A. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: a systematic review. Women and Birth 2015;28(3):179-193.

(26) NICE. Antenatal care for uncomplicated pregnancies. Clinical guideline CG62. Published 2008. National Institute for Clinical Excellence. 2017; Available at: https://www.nice.org.uk/guidance/cg62. Accessed January 10th., 2012.

(27) OECD. Employment rate (indicator). doi: 10.1787/1de68a9b-en. 2018; Available at: https://data.oecd.org/emp/employment-rate.htm.

(28) Althingi. Act on Maternity/Paternity Leave and Parental Leave, No. 95/2000. 2000; Available at: https://www.government.is/Publications/Legislation/Lex/?newsid=8ef83983-fbd6-11e7-9423-005056bc4d74. Accessed August, 14th, 2017, 2017.

(29) Cox JL, Holden J, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. The British Journal of Psychiatry 1987;150(6):782-786.

(30) Lovibond S, Lovibond P. Manual for the Depression Anxiety Stress Scales. 2nd ed. Sydney, Australia: Psychology Foundation Monograph; 1995.

(31) Spanier GB. Dyadic Adjustment Scale (DAS). User´s Manual. Toronto, Canada: Mulity-Health Systems Inc.; 1989.

(32) Crane DR, Allgood SM, Larson JH, Griffin W. Assessing marital quality with distressed and nondistressed couples: A comparison and equivalency table for three frequently used measures. Journal of Marriage and the Family 1990:87-93.

(33) Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. J Pers Assess 1988;52(1):30-41.

(34) WONCA. ICPC-2-R : international classification of primary care. 2nd. revised ed. Oxford ; New York: Oxford University Press; 2005.

(35) Cnattingius S. The epidemiology of smoking during pregnancy: smoking prevalence, maternal characteristics, and pregnancy outcomes. Nicotine Tobacco Res 2004;6(Suppl_2):S125-S140.

(36) Larsson C, Sydsjö A, Alexanderson K, Sydsjö G. Obstetricians' attitudes and opinions on sickness absence and benefits during pregnancy. Acta Obstet Gynecol Scand 2006;85(2):165-170.

(37) Center for Gender Equality Iceland. Gender Equality in Iceland. Information on Gender Equality Issues in Iceland. 2107; Available at: https://www.jafnretti.is/static/files/2018/utgefid_efni_af_gomlu_sidu/gender_equality_in_iceland_2017-1-.pdf.

(38) Meleis AI, Sawer LM, Im EO, Hilfinger Messias DAK, Schumacker K. Transitions Theory: Middle range and situation specific theories in nursing research and practice. 1st. ed. New York, USA: Springer Publishing Company; 2010.

(39) Thome M. Severe postpartum distress in Icelandic mothers with difficult infants: a follow-up study on their health care. Scand J Caring Sci 2003;17(2):104-112.

(40) NICE. Antenatal and postnatal mental health. Clinical management and service guidance. Clinical guideline [CG192]. National Institute of Clinical Excellence. 2014; Available at: https://www.nice.org.uk/guidance/cg192. Accessed January 13th., 2012.

(41) Staneva A, Bogossian F, Morawska A, Wittkowski A. "I just feel like I am broken. I am the worst pregnant woman ever": A qualitative exploration of the "at odds" experience of women's antenatal distress. Health Care Woman Int 2017;38(6):658-686.

(42) Bennett HA, Boon HS, Romans SE, Grootendorst P. Becoming the best mom that I can: Women's experiences of managing depression during pregnancy - A qualitative study. BMC Women's Health 2007;7.

(43) Lydsdottir LB, Howard LM, Olafsdottir H, Thome M, Tyrfingsson P, Sigurdsson JF. The mental health characteristics of pregnant women with depressive symptoms identified by the Edinburgh Postnatal Depression Scale. J Clin Psychiatry 2014 Feb 4.

(44) Molgora S, Fenaroli V, Prino LE, Rollè L, Sechi C, Trovato A, et al. Fear of childbirth in primiparous Italian pregnant women: The role of anxiety, depression, and couple adjustment. Women and Birth 2018;31(2):117-123.

1

## ACKNOWLEDGEMENTS

## AUTHORS' CONTRIBUTIONS

HO, JFS, LBL, and MT conceptualised and designed the original ISPMH. SSJ, KS, MT, and TS conceptualised and designed the data-gathering process from pregnancy records. SSJ, TS, and GKO designed the data collection from sick-leave certificates. LBL, HO, and SSJ conducted the ISPMH interviews. SSJ and GOK conducted the primary analyses. SSJ, TS, and GOK analysed and interpreted data. SSJ wrote the first draft of the manuscript, and SSJ, TS, MT, GKO, LBL, JFS, HO, and KS contributed towards refining the manuscript. SSJ was in charge of finalising the manuscript. All authors have approved the final manuscript.

## ETHICAL APPROVAL

The ISPMH was approved by the Icelandic National Bioethical Committee (ref. no. 05-107-SI) and the Data Protection Authority (ref. no. S2589). Data collection from electronic records was approved by the Icelandic National Bioethical Committee (VSN-15-135). Each woman was

allocated a number in the ISPMH, which was used to anonymise her data sourced from electronic medical records. The medical director, along with the director of nursing and midwifery at the Primary Health Care of the Capital Area in Reykjavik, Iceland, as well as the medical director of the Health Care Institution of North Iceland, granted permission for the study.

## DATA-SHARING STATEMENT

As a result of the regulations of the Icelandic National Bioethical Committee, data for this study are not available for sharing.

## FUNDING STATEMENT

## COMPETING INTERESTS

The authors have no competing interests to declare.

Supplement to the paper:

# Effect of perinatal distress and dissatisfaction in partner relationship on issuing of sick-leave certificates during pregnancy.

*Sick leave and maternity benefits in Icelandic society*

In Iceland, 78.2% of women participate in the labour market, which is the highest percentage among Organization for Economic Co-operation and Development (OECD) countries. Icelanders also have the highest proportion of total participation in the labour market, with 89.5% of the population age 15–64 years being part of the workforce (OECD, 2018a) Women in Iceland account for 47% of the labour force, working a mean of 42 hours per week. Icelandic men also work long hours, as their working week is, on average, 48.1 hours (Center for Gender Equality Iceland, 2107) The fertility rate among Icelandic women was previously the highest among OECD countries (driven by women born before 1980), but this trend has now regressed towards the average (for women born after 1980). Nevertheless, Icelandic women rank second-highest among OECD countries for the number of children born to each woman (OECD, 2018b)

Sick-leave benefits in Iceland differ between the public and the private sectors. An employee in the public sector who has been employed 0–3 months is guaranteed a total of 14 days of sick leave. After a year's employment, the total number of sick days increases to 133 (four months' salary). Then, after seven years of employment, these benefits increase to 175 days per 12 months. When an employee has worked for 12 years, he/she has earned 273 days (nine months). Total sick-leave time is controlled, as it cannot exceed the total number of days in a 12 month period. Finally, after 18 years, a person has earned the right to one year's sick leave. In the private sector, the benefits are different, and an employee earns two paid sick days per month for every full month worked. When a person has been employed continuously by the same employer for a year, he/she earns the right to one month of full salary as paid sick leave per year. This right increases to two months per year after five years' employment.

In Iceland, the majority of people are members of a labour/professional union. Both in the private and public sectors, 1% of an employee's monthly salary is transferred from the employer to their union. The unions are obligated to maintain a sick fund, through which union members

can apply for compensation after they have expended their paid sick-leave benefits from their employers.(Althingi, 1979)

It is customary practice by health care personnel to suggest that a woman decrease her work hours soon after becoming pregnant. This is believed to postpone the need for full sick leave further into the pregnancy. Based on this system, a woman can be expected to obtain anywhere from 0–5 sick-leave certificates during her pregnancy. One or two for decreasing working hours to part-time, and the remainder for full-time leaves of absence due to sickness. In some cases, the first 1–3 sick leaves exhaust the sick-leave benefits provided by the employer, but if/when a woman has used all her benefits, she can apply for sick-leave compensation from her union. When an individual has used both paid sick leave from their employer and their union, he/she can then apply for sick-leave compensation from Iceland's welfare system. If a woman has not reached the full eight months of pregnancy by the time she has exhausted her compensation from her union, she is entitled to daily compensation from the social security-welfare service. However, an additional sick-leave certificate is needed for the social security-welfare service. Later, when a woman has reached the full eight months of pregnancy, she can begin her maternity leave with a sick-leave certificate from a physician.(Althingi, 2000) Annually, approximately 8% of pregnant women receive maternal leave extensions based on this provision. Unemployed women are also entitled to sick-leave compensation from the social security-welfare service.

Icelandic law prohibits an employer from dismissing a pregnant woman from her employment without justifying the circumstances.(Althingi, 2000) Regulations also require work adjustment if needed; for example, if the woman habitually operates in a physically demanding working situation, or if she handles dangerous chemicals at work. If it is not possible to adjust the job role, the employee is entitled to paid leave of absence from the employer. No information on how often this provision is granted is currently available in Iceland.

**V**

# Pain management and medical interventions during childbirth among perinatal distressed women and women dissatisfied in their partner relationship: A prospective cohort study

Sigridur Sia Jonsdottir [a,b,\*], Thora Steingrimsdottir [c,d], Marga Thome [e], Guðmundur Kristjan Oskarsson [f], Linda Bara Lydsdottir [d,g], Halldora Olafsdottir [h], Jon Fridrik Sigurdsson [d,h,i], Katarina Swahnberg [a]

[a] Department of Health and Caring Sciences, Linnaeus University, Stagneliusgatan 14b, 392 34 Kalmar, Sweden
[b] School of Health Sciences, University of Akureyri, Nordurslod 2, 600 Akureyri, Iceland
[c] Women's Clinic, Landspitali University Hospital, v/Hringbraut, 101 Reykjavik, Iceland
[d] School of Health Science, Faculty of Medicine, University of Iceland, Saemundargata 2, 101 Reykjavik, Iceland
[e] School of Health Science, Faculty of Nursing, University of Iceland, Eiriksgata 34, Reykjavik, Iceland
[f] School of Business and Sciences, University of Akureyri, Nordurslod 2, 600 Akureyri, Iceland
[g] VIRK – Vocational Rehabilitation Fund, Gudrunartuni 1, 105 Reykjavik, Iceland
[h] Division of Mental Health, Landspitali University Hospital, v/Hringbraut, 101 Reykjavik, Iceland
[i] School of Business, Department of Psychology, Reykjavik University, Menntavegur 1, 101 Reykjavik, Iceland

## ARTICLE INFO

## ABSTRACT

*Objective:* The purpose of this study was to investigate possible associations between distress in pregnant women and their use of pain management and medical interventions. Furthermore, we assessed the effects of reported dissatisfaction in relationship with their partner, or weak social support.

*Design:* This was a prospective cohort study.

*Setting:* Women were invited to participate while attending prenatal care at participating Icelandic health care centres. Birth outcome data were obtained from the hospitals where these women gave birth.

*Participants:* Women in this study participated in a research project where 2523 women were screened three times during pregnancy for anxiety and depression. Women who had positive results at screening were invited to a semi-structured interview during pregnancy as well as every fourth woman who had negative results. Five hundred and sixty-two women participated in the interviews and the final sample was 442 women.

*Measurements:* Distress was defined as symptoms of anxiety, stress and depression. The Edinburgh Postpartum Depression Scale (EPDS) and the Depression, Anxiety and Stress Scales (DASS) were used for screening purposes. During the interview, the women answered the Dyadic Adjustment Scale (DAS), the Multidimensional Scale of Perceived Social Support (MSPSS), and the Adverse Experienced Interview (AEI).

The main outcome variables that were obtained from the women's childbirth records were: (1) use of pain management, categorized as: epidural analgesia, non-pharmacological pain management, nitrous oxide, pharmacological medication, or no pain management; (2) medical interventions categorized as: induction, stimulation, and episiotomy; and (3) mode of childbirth. A logistic regression analysis, adjusted for significant covariates, was conducted.

*Findings:* A significant association was found between perinatal distress at 16 weeks gestation and use of epidural as single pain management. Overall, distressed women were 2.6 times more likely than non-distressed women to use epidural as a single pain management. They were also less likely to go through

\* Corresponding author at: Department of Health and Caring Sciences, Linnaeus University, Stagneliusgatan 14b, 392 34 Kalmar, Sweden.
*E-mail addresses:* siaj@unak.is, sia.jonsdottir@lnu.se (S.S. Jonsdottir), thoraste@landspitali.is (T. Steingrimsdottir), marga@hi.is (M. Thome), gko@unak.is (G.K. Oskarsson), linda@virk.is (L.B. Lydsdottir), halldola@landspitali.is (H. Olafsdottir), jonfsig@ru.is (J.F. Sigurdsson), katarina.swahnberg@lnu.se (K. Swahnberg).

childbirth without use of any pain management method. Women who were dissatisfied in their relationship were significantly more likely to undergo induction of childbirth, an episiotomy and/or a vacuum extraction than those who were satisfied in their relationship, regardless if they were distressed or not. No association was found between social support and the outcome variables.

*Key conclusions:* Women with perinatal distress were more likely to use an epidural than non-distressed women. The use of an epidural might help them manage pain and uncertainties related to childbirth. Women who were dissatisfied in their partner relationship may be more likely to undergo induction of childbirth, episiotomy and/or vacuum extraction.

*Implication for practice:* Midwives need to acknowledge the possible association of distress and use of an epidural during childbirth and screen for distress early in pregnancy. It is important to offer counselling and help during pregnancy for expectant parents who are distressed or dissatisfied in their relationship.

## Introduction

The care of women during pregnancy and in childbirth has often focused on women's physical health and the health of the baby, while symptoms related to mental health are sometimes neglected (Glover, 2014). The expectant mother's perceived stress level has recently been found to be an important factor affecting the unborn child (Glover, 2015; Van den Bergh et al., 2017) as has a combination with anxiety or depression (Schetter and Tanner, 2012). Symptoms of depression and anxiety are highly comorbid during the perinatal period (Biaggi et al., 2016) and reported by 7–20% of pregnant women (Bennett et al., 2004; Biaggi et al., 2016; Rubertsson et al., 2014). Stress has been found to affect between 30% (Loomans et al., 2012) and 75% of pregnant women (Woods et al., 2010). When an expectant woman reports stress, anxiety, or depression symptoms, or any combination of these three, it is often referred to as perinatal distress (Emmanuel and St. John, 2010; Rallis et al., 2014; Ridner, 2004). As the distress increases, the pregnant woman experiences increased difficulties adapting to the changes associated with pregnancy (Emmanuel and St. John, 2010) and in managing her emotions (Carter and Guittar, 2014). Importantly, dissatisfaction in the relationship with her partner has been found to increase perinatal distress (Jonsdottir et al., 2017; Rosand et al., 2011).

Previous studies have identified a link between perinatal distress and caesarean section (C/S) (Andersson et al., 2004; Bansil et al., 2010). However, less is known about how perinatal distress may affect pain management, type and use of medical interventions during childbirth. In one study, a link was identified between distress, delivery analgesia (epidural/IV opiates), and acute C/S (Saunders et al., 2006). An association between distress, preterm childbirth, and low birthweight has also been found (Ding et al., 2014; Staneva et al., 2015). These findings were contradicted by a study where no associations between distress and increased likelihood of preterm birth, low birthweight, emergency-induced childbirth or C/S, forceps or vacuum extraction, or increased likelihood of new-born admission to the neonatal intensive care unit (NICU), were found (Staneva et al., 2017).

Research have shown that women who report dissatisfaction in their partner relationship are more likely to experience perinatal distress (Jonsdottir et al., 2017; Rosand et al., 2011). However, research is sparse concerning pain management during childbirth and medical interventions for these women. Strong social support has been found to protect expectant mothers from distress (O'Hara and Wisner, 2014), but knowledge on pain management during childbirth and medical interventions for women who experience weak social support is sparse.

The purpose of this study was to explore the association between distress and pain management as well as medical interventions during childbirth among expectant mothers. Furthermore, we investigated the effects of weak social support or dissatisfaction in their partner relationships on the three outcome variables, use of pain management, medical interventions and mode of childbirth. The specific research questions were:

(1) Is epidural analgesia associated with perinatal distress?
(2) Are medical interventions during childbirth more common among women with perinatal distress than those without?
(3) Are women who are dissatisfied in their partner relationships or who report weak social support more likely to undergo medical interventions during childbirth than those who are satisfied in their relationship or have stronger support?

## Methods

### Participants and procedures

Two thousand five hundred and twenty three women participated in a longitudinal research project called the Icelandic Study of Perinatal Mental Health (ISPMH). The women received antenatal care at 11 primary health care centres in Reykjavik, the capital of Iceland, and in Akureyri, the largest town outside the Reykjavik area. Women were invited by midwives to participate in the study, at their first antenatal visit around 12 gestational weeks. They were screened for depression and anxiety with self-reporting instruments, three times (T-points) during pregnancy: around 16 (T1), 25 (T2), and 36 (T3) gestational weeks. Two to four weeks after screening, those screened positive (perinatal distress group; PDG) and every fourth woman of those screened negative (non-distressed group; NDG) were invited to participate in a diagnostic semi-structured interview. In total, 562 women were interviewed. Detailed information on data collection in the ISPMH is described elsewhere (Jonsdottir et al., 2017; Lydsdottir et al., 2014). The women gave birth between 2007 and 2013 at hospitals in three different towns/cities in Iceland: Reykjavik, Akureyri, and Akranes (Hospital 1, 2, and 3, respectively).

### Inclusion and exclusion criteria

The criteria for inclusion in the ISPMH study were: (a) ≥16 years of age and participating with parents' permission if they were younger than 18 years; (b) ability to speak and read Icelandic. Women who were diagnosed with schizophrenia, acute psychotic symptoms or those who were assessed by the midwife to have impaired cognitive functions were excluded. Women with a childbirth history that greatly increased the likelihood of childbirth induction or medical interventions during childbirth were excluded from the study. This included 31 (5.52%) women with diagnosed hypertensive diseases, 16 (2.85%) with diagnosed gestational diabetes; 31 (5.52%) who had previous given birth with a C/S; 8 (1.42%) with other severe medical problems before the pregnancy, and 9 (1.60%) carrying twins. Childbirth records were inaccessible for 23 (4.09%)

women, and two women choose to withdraw from the study after participating in the interview, resulting in a final sample of 442.

## Questionnaires

The Edinburgh Postpartum Depression Scale (EPDS) (Cox et al., 1987) and the Depression, Anxiety, and Stress Scales (DASS) (Lovibond and Lovibond, 1995) were used to screen the participants for anxiety, depression and stress at all the three T-points. The Icelandic version of the EPDS has been found to be reliable (Thome, 1992). Cut-off score ≥12 on the EPDS was used in this study to identify screen positive women. Internal consistency, measured with Cronbach's alpha ($\alpha$), was 0.87 at all 3 T-points.

DASS consists of three subscales which measures symptoms of depression, anxiety and stress. Only the depression and the anxiety scales were used for initial screening. A secondary analysis was conducted to include scores from the DASS Stress subscales. In the current study, Cronbach's $\alpha$ for the Depression subscale ranged between 0.93 and 0.94 at the 3 T-points. For the Anxiety subscale, the Cronbach's $\alpha$ were 0.86, 0.86 and 0.90, respectively, at the 3 T-points. Results from the DASS Stress Cronbach's $\alpha$ were 0.94, 0.94, and 0.93, respectively, at the 3 T-points.

During the interview, women were asked about their background including questions on smoking during pregnancy, age, education, relationship with the childs father, division of household tasks and child care, employment, previous history of mental health therapy and financial situation. The women answered the three following instruments during the semi-structured interview as well:

The AEI that was developed by members of the ISPMH group and assess several adverse experiences in childhood and adulthood (Lydsdottir et al., 2018). This questionnaire is semi-structured and consists of dichotomous questions. Two questions were used in this study regarding domestic violence (mental, physical, and sexual) and sexual violence by someone other than the intimate partner. Spearman's rho correlation with a significant value pre-set at $p < 0.05$ ($p$) was conducted to assess correlation between these 2 questions. Results showed strong positive correlation ($r = 0.199$, $p < 0.0.01$), and these two questions on violence were therefore computed into one variable: violence during adulthood (yes/no).

The Dyadic Adjustment Scale (DAS) which is a 32-item questionnaire evaluating the respondent's quality of adjustment and satisfaction in their relationship, with scores ranging between 0 and 151 (Spanier, 1976). A score of 107 indicates a status between dissatisfaction and satisfaction in the relationship (Crane et al., 1990). Scores below the cut-off indicate dissatisfaction in their partner relationship, but scores above the cut-off indicate satisfaction. A meta-analysis of 128 samples found Cronbach's $\alpha$ to be 0.915 on average (Graham et al., 2006). The Cronbach's $\alpha$ in the current study was $\alpha = 0.92$.

The Multidimensional Scale of Perceived Social Support (MSPSS) which is a 12-item questionnaire, divided evenly between three subscales: family, friends, and significant other. The MSPSS is commonly used as a continuous scale, with higher scores indicating stronger support (Zimet et al., 1988). For this study, a decision was made to dichotomize the results. 'Weak support' was defined as a score of ≤16 and 'strong support' as ≥17. The argument was twofold. First, it supports the interpretation as it distinguishes between weak versus strong support. Secondly, scores of ≤16 or lower can be seen as a computation of median or lesser support. The Cronbach's $\alpha$ in the initial study was 0.92 (Zimet et al., 1990); in the present study, it was 0.96, 0.92, and 0.94, for the 'Significant other', 'Family', and 'Friends' subscales, respectively.

## Birth outcome data

Data were obtained from the women's childbirth records. Among the data were the pain management methods use by the women. These were epidural analgesia, acupuncture, hydrotherapy (bath) massage, nitrous oxide, opioid injections, and other pharmacological pain medications such as per os pain medication, like paracetamol as single ingredient or in combination with opioid. Medical interventions documented were induction of labour, stimulation of the labour and episiotomy. Mode of childbirth gathered was vaginal childbirth without interventions; vertex birth (breech or cephalic), vacuum extraction and elective or acute caesarean section (C/S). Duration of the childbirth was also obtained from the womenś childbirth records. Data on the foetus/new-born included foetal distress, Apgar scores at 1 and 5 minutes, gestational age at birth, birthweight, and NICU admission. At the time of this study, childbirth records in Iceland were handwritten.

### Outcome variables

The primary outcome variable was use of pain management. Use of opioids and other pharmacological pain medications were categorized together into the term 'pharmacological medication'. The term 'non-pharmacological pain management' was a combination of three pain management methods: hydrotherapy (bath), acupuncture, and massage. These were categorized together as they are different from pharmacological methods (Tournaire and Theau-Yonneau, 2007). Nitrous oxide and epidurals were used without categorization. Women were also divided into two groups based on amount of pain management: those who only used a single pain management method and those who used more than one pain management method.

Midwives documented the pain and strength of contractions before pain management methods were initiated. Pain and contractions lasting for about 30–45 s were 1+; those for 45–90 s were 2+; and those longer than 90 s were 3+. If a woman had three or more contractions every 10 min, they were documented as 3+ (Medforth et al., 2011). After an epidural was initiated, its effect was assessed and recorded in the midwife's progress notes: $0 =$ no effect; $1 =$ little effect; $2 =$ average effect; $3 =$ good effect. Cervical dilatation was documented as ranging from 1–10 cm when an epidural was administered. It was then dichotomized into <4 cm and >4 cm. Childbirth duration was calculated as either the time from onset, reported by the woman at the time of admission and until the time of birth; or the time of active contractions after childbirth induction.

Women who were dissatisfied in their partner relationship were divided into two categories: (1) distressed and dissatisfied in their partner relationship and (2) non-distressed and dissatisfied in their partner relationship.

## Data analyses

Analyses were performed using SPSS version 22 (SPSS for Windows, Rel. 22nd, SPSS Inc., Chicago IL, USA). Data from the childbirth records were merged with data from the ISPMH. The sample was divided into two groups for the analyses: PDG and NDG. Statistical analyses that were used to explore differences between the groups included: an independent sample $t$-test, Pearson's Chisquare, Fisher's exact tests, and two proportional tests. The relationship between the independent variables, perinatal distress, family support, friends support and satisfaction in partner relationship, was investigated with the Spearman's rho correlation. A secondary analysis was performed with the DASS Stress subscale to identify women with stress. Sixteen women in the NDG screened positive for stress and were included in the PDG.

**Table 1**

Mean scores and ranges among women in the PDG ($N = 287$).

| Psychological scales[a] | T1 (16 weeks) Mean (range, SD) | T2 (25 weeks) Mean (range, SD) | T3 (36 weeks) Mean (range, SD) |
| --- | --- | --- | --- |
| EPDS | 15.03 (12–25, 2.81) | 14.82 (12–26, 3.01) | 14.91 (12–25, 3.42) |
| DASS Anxiety scale | 12.90 (8–34, 5.30) | 12.94 (8–34, 5.80) | 14.87 (8–42, 6.73) |
| DASS Depression scale | 16.32 (10–40, 6.54) | 16.28 (10–39, 7.01) | 17.44 (10–38, 7.57) |
| DASS Stress scale | 22.14 (15–41, 6.59) | 21.54 (15–40, 5.61) | 23.45 (15–41, 6.70) |

PDG = perinatal distressed group, $T$ = time point.

[a] Positive scores: Edinburgh Postpartum Depression Scale (EPDS) $\geq 12$; Depression, Anxiety, and Stress Scales (DASS Anxiety scale) $\geq 8$; DASS depression $\geq 10$; DASS stress $\geq 15$.

Descriptive significant results from medical interventions and pain management were used to conduct a binary logistical regression with the three independent variables: perinatal distress, non-distress, and dissatisfaction in the partner relationship. Odds ratio was used to identify association with the independent variables after adjusted for possible covariates. The covariates were determined based on previous studies (Biaggi et al., 2016) and were: age, education, living with partner, employed, previous mental therapy (no/ yes), smoking (no/yes), financial problems (no/yes) and violence during adulthood (no/yes). The level of significance was pre-set at $p < 0.05$ and the confidence interval at 95. A two-proportion test was computed to compare the answers to the psychological scales at any of the three T-points during pregnancy and the significant childbirth variables ($n = 283$) to see if there might be a link between the timing of distress and outcome of pregnancy or pain management methods.

The medical directors of the three Icelandic hospitals where the women gave birth granted permission to perform the study along with the Icelandic National Bioethical committee (ref. no. VSN-15-135).

## Results

Four hundred and forty-two women were included in this study, of which 64.9% ($n = 287$) were categorized into PDG and 35.1% ($n = 155$) into NDG. An overview of the mean psychological test scores and ranges among in the PDG group is presented in Table 1. Women in PDG were significantly younger (mean age = 27.9 years, range: 17–43, standard deviation = 5.1) than those in NDG (mean age = 29.0 years, range 17–39, standard deviation = 4.8) ($t$ [407] = 2.21, $p = 0.028$). Fifty three percent of the women had previously received mental health therapy. Ninety-four women (21.3%) reported using different prescribed medications, of which 29 (6.6%) used medication for depression and anxiety. Table 2 presents a detailed overview of the differences between the two groups. A strong positive correlation was found between family and friends support (rho = 0.474, $n = 436$, $p < 0.001$) was found (see Table 3). A woman who received weak support from family was significant more likely also to report weak support from friends but due to correlations between "family support" and "friends support", further evaluation was not conducted for these two variables with the other independent variables.

As seen in Table 4, women in PDG were more likely to use epidural analgesia than women in NDG. However, women in PDG who used epidural as only pain medication did not differ from those in NDG regarding cervical dilation ($p = 0.635$), contraction strength, or pain assessment ($p = 0.611$). The effectiveness of the epidural was assessed by the attending midwives to be comparable for women in the PDG and NDG groups ($p = 0.953$). All women who chose epidural as single pain management gave birth at Hospital 1. One type of pain management method was used by 194 (43.9%) women, while 131 (29.6%) used two types of pain management, and 50 (11.3%) used three or four different types.

Table 5 shows three logistic regression models conducted to assess the impact of background factors on the use of pain management among women with perinatal distress. The first model contained the epidural as a single pain management method. Odds ratios (OR) showed that distressed women were significantly more likely to use an epidural as a single pain management method and these results were confirmed after adjusting for significant background variables such as age, education, marital status, employment, financial situation, smoking, mental therapy before, and violence during adulthood. As seen in the second model, distressed women were, however, not more likely than non-distressed women to use epidurals in combination with other pain management. The third model indicates that distressed women were significantly less likely to go through childbirth without out any pain management. As seen in Table 6, there was, however, no difference between the PDG and NDG groups regarding the mode of childbirth, duration of childbirth, or the child's outcome.

A total of 409 women answered the DAS questionnaire, of whom 335 (81.9%) reported satisfaction and 74 (18.1%) reported dissatisfaction in their partner relationship. Thirty-three (7.47%) women did not answer the DAS as they did not have any relationship with the expectant father. Results indicated no difference between the use of pain management among women who were satisfied in their relationship and those who were not. Women who were dissatisfied in their partner relationship were significantly more likely than women who were satisfied to have an induced childbirth, an episiotomy and/or to give birth with vacuum extraction. As seen in Table 7, the difference was not significant after adjusting for background variables. Based on these findings, a decision was taken to further analyse the group with regards to whether they reported distress or not. The 64 women who were distressed and dissatisfied in their partner relationship were categorized in the first subgroup. We found no significant difference between them and women who did not belong to this group. The 10 women who were non-distressed and dissatisfied with their partner were categorized in the second subgroup. The women in this group were significantly more likely to undergo an episiotomy and/or a vacuum extraction than women who did not belong to this group. However, this group was deemed too small for further analysis.

A possible association between the periods when the distressed women were screened and the use of an epidural was analysed by a two-proportion test. Results from the 3 pregnancy screening T-points were assessed with respect to epidural use. Results showed that women who reported distress at T1 (16 weeks) had a significantly higher use of epidural as a single pain management (Fig. 1) than other participants. A significantly lower proportion of women who reported distress at T1 went through childbirth without using any pain management (Fig. 2) than women who did not report distress.

**Table 2**
Background characteristics and level of stress of the 442 participants.

| | PDG<br>*N* (%)<br>287 (64.93) | NDG<br>*N* (%)<br>155 (35.07) | *p* |
|---|---|---|---|
| **Relationship with partner (*m* = 0)** | | | **0.010** |
| Living with the childś father | 250 (87.11) | 147 (94.89) | |
| Not living with the childś father | 37 (12.89) | 8 (5.16) | |
| **Education (*m* = 2)** | | | **<0.001** |
| Elementary or lower | 73 (25.52) | 17 (11.04) | |
| Secondary or post-secondary | 102 (35.66) | 47 (30.52) | |
| University | 111 (38.81) | 90 (58.44) | |
| **Employment status (*m* = 2)** | | | **0.011** |
| Employed | 170 (59.44) | 112 (72.73) | |
| Unemployed | 63 (22.03) | 18 (11.69) | |
| Students | 53 (18.53) | 24 (15.58) | |
| **Financial situation (*m* = 1)** | | | **0.013** |
| Good | 243 (84.67) | 143 (92.86) | |
| Bad | 44 (15.33) | 11 (7.14) | |
| **Smoking (*m* = 1)** | | | **<0.001** |
| Yes | 38 (13.24) | 5 (3.25) | |
| Stopped when pregnancy confirmed | 53 (18.47) | 14 (9.09) | |
| No | 196 (68.29) | 135 (87.66) | |
| **Violence during adulthood (*m* = 12)** | | | **0.005** |
| No | 206 (73.31) | 127 (85.23) | |
| Yes | 75 (26.69) | 22 (14.77) | |
| **Mental health therapy before (*m* = 6)** | | | **<0.001** |
| No | 105 (37.10) | 99 (64.71) | |
| Yes | 178 (62.90) | 54 (35.29) | |
| **Medication for anxiety or depression[a] (*m* = 0)** | | | **0.015** |
| No | 262 (91.29) | 151 (97.42) | |
| Yes | 25 (8.71) | 4 (2.58) | |
| **Satisfied with division of household tasks and child care[b] (*m* = 5)** | | | 0.060 |
| No | 61(24.80) | 24 (16.67) | |
| yes | 185 (72.50) | 120 (83.33) | |
| **Satisfied in partner relationship[b] (*m* = 8)** | | | **<0.001** |
| No | 54 (22.13) | 9 (6.25) | |
| Yes | 190 (77.87) | 135 (93.75) | |
| **Perceived support from significant other (*m* = 5)** | | | 0.373 |
| Strong | 279 (98.59) | 149 (97.39) | |
| Weak | 4 (1.41) | 4 (2.61) | |
| **Perceived support from family (*m* = 5)** | | | **0.013** |
| Strong | 247 (87.28) | 145 (94.77) | |
| Weak | 36 (12.72) | 8 (5.23) | |
| **Perceived support from friends (*m* = 4)** | | | **0.014** |
| Strong | 250 (88.34) | 146 (95.42) | |
| Weak | 33 (11.66) | 7 (4.58) | |
| **Para (*m* = 0)** | | | 0.541 |
| Primipara | 132 (45.99) | 76 (49.03) | |
| Multipara | 155 (54.01) | 79 (50.97) | |
| **Number of earlier births (*m* = 0)** | | | 0.432 |
| 1 childbirth | 105 (67.74) | 49 (62.03) | |
| 2 childbirths | 39 (25.16) | 27 (34.18) | |
| ≥3 childbirths | 11 (7.10) | 3 (3.80) | |
| **History of problems during previous childbirths (*m* = 0)** | | | |
| History of pre-eclampsia | 10 (3.48) | 6 (3.87) | 0.834 |
| History of bleeding during pregnancy | 5 (1.47) | 4 (2.58) | 0.551 |
| History of bleeding during birth | 10 (3.48) | 8 (5.16) | 0.395 |
| History of SGA[c] | 7 (2.52) | 1 (0.65) | 0.399 |
| History of preterm labour | 6 (2.09) | 3 (1.94) | 0.177 |
| History of C/S | 6 (2.09) | 0 (0) | 0.758 |
| **Childbirth place in current study (*m* = 0)** | | | 0.070 |
| Hospital 1 | 251 (87.46) | 139 (89.68) | |
| Hospital 2 | 26 (9.06) | 13 (8.39) | |
| Hospital 3 | 10 (3.48) | 3 (1.94) | |

*m* = missing; PDG = perinatal distress group; NDG = non-distressed group.
[a] Fisherś Exact Test.
[b] 45 women not living with partner excluded.
[c] SGA = small for gestational age.

## Discussion

Women in the PDG were significantly more likely to use an epidural as single pain management than women in NDG. These results indicate an association between distress and use of epidural, as there was no difference in strength of contractions or cervical dilation when an epidural was administered to participants in both groups. Pain relief from the epidural was assessed as satisfactory in both groups. Our results answer the first research question positively as they support the link between distress and the use of an epidural. These results go beyond the findings of an American study by Saunders et al. (2006) who were unable to

**Table 3**

Spearman's rho correlation between perinatal distress and variables assessing the woman's satisfaction with her relationship with her partner and social support.

| Variables | Distressed vs. none distressed | Satisfaction with partner relationship | Family support | Friends support |
|---|---|---|---|---|
| Distressed vs. none distressed | – | | | |
| Satisfaction with partner relationship | −0.222** | – | | |
| Family support | −0.119* | −0.136** | – | – |
| Friends support | −0.117* | .097 | .474** | |

The correlation is significant at level: *0.05 ** 0.01 (two-tailed).

**Table 4**

Methods of pain management during childbirth ($N = 442$).

| Variables | PDG $N = 287$ (%) | NDG $N = 155$ (%) | p-value | Total $N = 442$ (%) |
|---|---|---|---|---|
| **Total pain management** | | | | |
| Nitrous oxide | 107 (37.28) | 54 (34.84) | 0.610 | 161 (36.43) |
| Epidural analgesia | 133 (46.34) | 54 (34.84) | **0.020** | 187 (42.31) |
| Non-pharmacological pain management | 137 (47.74) | 87 (56.13) | 0.092 | 224 (50.68) |
| Pharmacological medication | 29 (10.10) | 87 (56.13) | 0.717 | 43 (9.73) |
| **Single pain management** | | | | |
| Nitrous oxide | 21 (7.32) | 11 (7.10) | 0.932 | 32 (7.24) |
| Epidural analgesia | 60 (20.91) | 14 (9.03) | **0.001** | 74 (16.74) |
| Non-pharmacological pain management | 50 (17.42) | 34 (21.94) | 0.248 | 84(19.00) |
| **No pain management** | 34 (11.85) | 33 (21.29) | **0.008** | 67 (15.16) |

PDG = perinatal distress group; NDG = non-distressed group.

**Table 5**

OR and aOR for the association between perinatal distress and pain management during childbirth.

| Variables | n | % | p | OR | 95% CI | | aOR | 95% CI | |
|---|---|---|---|---|---|---|---|---|---|
| **Epidural alone as pain management** | | | | | | | | | |
| PDG | 60 | 20.91 | **0.001** | **2.66** | 1.43 | 4.94 | **2.86** | 1.38 | 5.91 |
| NDG | 14 | 9.03 | | | | | | | |
| **Total use of epidural** | | | | | | | | | |
| PDG | 133 | 46.34 | **0.020** | **1.62** | 1.08 | 2.42 | 1.24 | 0.77 | 2.00 |
| NDG | 54 | 34.84 | | | | | | | |
| **No pain management** | | | | | | | | | |
| PDG | 34 | 11.85 | **0.008** | **0.50** | 0.29 | 0.84 | **0.43** | **0.23** | **0.80** |
| NDG | 33 | 21.29 | | | | | | | |

PDG: $N = 155$; NDG: $N = 287$; OR = odds ratio; aOR = adjusted odds ratio, adjusted for: age, education, marital status, employment, financial situation, smoking, mental therapy before, and violence during adulthood; CI = confidence interval; PDG = perinatal distress group; NDG = non-distressed group.

**Table 6**

The frequency of medical intervention during childbirth, mode of childbirth, and the new-born's outcome.

| Variables | Total (%) 442 (100) | PDG N (%) 287 (100) | NDG N (%) 155 (100) | p | National data 2007–2012 %/SD |
|---|---|---|---|---|---|
| **Intervention** | | | | | |
| Induction | 73 (16.52) | 51 (17.77) | 22 (14.19) | 0.334 | 22.9/15.6–38.0 |
| Stimulation of labour | 148 (33.48) | 101 (35.19) | 47 (30.32) | 0.301 | n/av |
| Episiotomy | 49 (11.09) | 32 (11.15) | 17 (10.97) | 0.954 | 9.3/5.0–13.7 |
| **Mode of childbirth** | | | | | |
| Vaginal birth without intervention | 224 (50.68) | 146 (50.87) | 78 (50.32) | 0.912 | n/av |
| Vertex birth (breech and cephalic) | 393 (88.91) | 258 (89.90) | 135 (87.10) | 0.371 | 77.2/74.1–83.3 |
| Vacuum extraction | 28 (6.33) | 15 (5.23) | 13 (8.39) | 0.193 | 6.0/6.0–7.8 |
| Elective C/S | 17 (3.85) | 9 (3.14) | 8 (5.16) | 0.291 | 6.0/5.4–6.5 |
| Acute C/S | 32 (7.24) | 20 (6.97) | 12 (7.74) | 0.765 | 9.9/9.0 –10.8 |
| **Duration of childbirth, minutes** | | 672.2 (406.0/270) a | 700.5 (429.2/139)a | 0.51b | n/av |
| **Outcome of the new-born** | | | | | |
| Foetal distress | 45 (10.18) | 30 (10.45) | 15(9.68) | 0.797 | n/av |
| One-min Apgar scores | | 7.90 (1.57/287) a | 7.68 (1.46/155)a | 0.148 | n/av |
| Five-min Apgar scores | | 9.3 (1.0/287)a | 9.3 (1.00/155)a | 0.415 | n/av |
| Birthweight <2500 g | 8 (1.81) | 7 (2.44) | 1(0.65) | 0.177 | 3.8 |
| Birthweight (g) | | 3698 (548/287)a | 3723 (477/155)a | 0.635b | 3621 |
| Preterm childbirth <37 weeks | 13 (2.94) | 9 (3.14) | 4 ( 2.58) | 0.742 | 5.1c |
| Gestational age at birth | | 40.0 (1.5/287)a | 40.0 (1.28/155)a | 0.96b | n/av |
| Admission to the NICUd | 38 (8.70) | 24(8.50) | 14(9.00) | 0.836 | 8.1 |

n/av = National data not available from either the Registration of Birth in Iceland or from Statistic Iceland; a = mean (standard deviation(n); b = Independent *t*-test, c = including all multiple preterm childbirths; d = missing 3; PDG = perinatal distress group; NDG = non-distressed group; C/S = caesarean section; NICU = neonatal intensive care unit.

**Table 7**

OR and aOR for the association between dissatisfaction in relationship with partner and medical interventions during childbirth ($N = 409$).

| Variables | Dissatisfied in relationship $n$ (%) | Satisfied in Relationship $n$ (%) | $p$-value | OR | 95% CI | | aOR | 95% CI | |
|---|---|---|---|---|---|---|---|---|---|
| **All women** | 74 (18.09) | 335 (81.91) | | | | | | | |
| Induction | 19 (25.68) | 52 (15.52) | **0.037** | **1.88** | **1.03** | **3.42** | 1.71 | 0.81 | 3.63 |
| Episiotomy | 13 (17.57) | 30 (8.96) | **0.029** | **2.17** | **1.07** | **4.39** | 2.32 | 0.96 | 5.59 |
| Vacuum extraction | 10 (13.51) | 14 (4.18) | **0.002** | **3.58** | **1.52** | **8.42** | 2.23 | 0.76 | 6.51 |
| **PDG women** | 64 (24.52) | 197 (75.48)) | | | | | | | |
| Induction | 17 (26.56) | 34 (17.26) | 0.103 | 1.73 | 0.89 | 3.38 | 1.44 | 0.61 | 3.38 |
| Episiotomy | 9 (14.06) | 20 (10.15) | 0.387 | 1.45 | 0.62 | 3.36 | 1.83 | 0.66 | 5.05 |
| Vacuum extraction | 6 (9.38) | 7 (3.55) | 0.063 | 2.81 | 0.91 | 8.69 | 2.46 | 0.60 | 10.02 |
| **NDG woman** | 10 (6.76) | 138 (93.24) | | | | | – | – | – |
| Induction | 2 (20.00) | 18 (13.04) | 0.534 | 1.67 | 0.33 | 8.48 | –[a] | – | – |
| Episiotomy | 4 (40.00) | 10 (7.25) | **0.001** | **8.53** | **2.06** | **35.29** | – | – | – |
| Vacuum extraction | 4 (40.00) | 7 (5.07) | **<0.001** | **12.50** | **2.85** | **55.56** | – | | |

Bold text = significant results; missing $n = 33$; OR = odds ratio; CI = confidence interval; aOR = adjusted odds ratio, adjusted for: age, education, marital status, employment, financial situation, smoking, mental therapy before, and violence during adulthood, PDG = perinatal distress group; NDG = non-distressed group; CI = confidence interval.

[a] The NDG were too few to analyse.
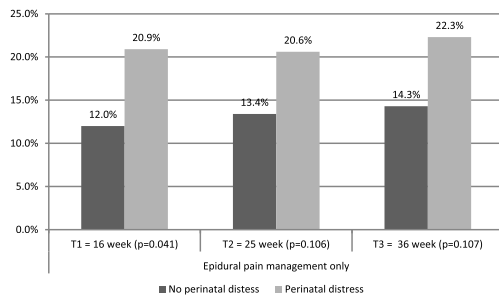


**Fig. 1.** Proportion of perinatal distress and epidural management as single pain management during childbirth ($N = 283$).
$P$ values are from two proportions test. $T$ = time point.
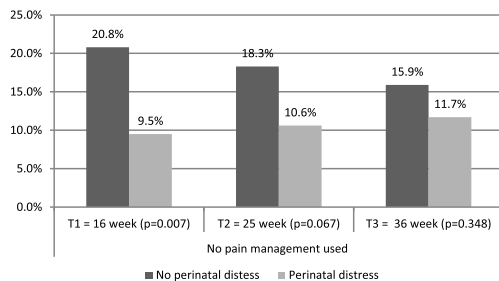


**Fig. 2.** Proportion of perinatal distress and no pain management used during childbirth ($N = 283$).
$P$ values are from two proportional tests. $T$ = time point.

conclude whether the use of an epidural was linked either to more intensive experience of distress or to more severe pain.

In 2012, epidurals were available as pain management during childbirth in 5 hospitals in Iceland, and 44.8% of women used it (Bjarnadottir et al., 2013). An epidural is traditionally not offered as first-line pain management during childbirth in Iceland but recommended to treat pain that is not acceptably managed with less-invasive methods. A woman who insists on receiving an epidural as a single pain management during childbirth will therefore most likely have to first refuse suggestions from the midwife for other less-invasive pain management methods. The fact that all the women who chose epidurals as the single pain management gave birth at Hospital 1 further supports our conclusion on the link between distress and epidural. During the years when the study was conducted, two childbirth units were operated at Hospital 1. One of them was identified as a low-technology unit and was not offering epidural as pain management and the other as a high-technology unit where epidurals was offered. Women were asked during their pregnancy to identify which unit they would choose. As our results indicated that women who were experiencing distress at T1 had a higher frequency of epidural use, they most likely had decided early during the pregnancy to choose the high-technology unit.

These results raise speculation on why distressed women are likely to use an epidural. Perinatal distress has been found to decrease women's ability to cope with pain (Rallis et al., 2014). This was also apparent in our study, where women who did not report distress, were more likely to go through childbirth without any pain medication. An explanation might be that when a woman can manage her pain, she can better manage her emotions. Emotional management describes an individual's aim to behave appropriately in a particular situation (Hunter and Deery, 2009). Distressed women might feel overwhelmed and incapable of managing the situation during childbirth (Dixon et al., 2014). The decision to undergo an epidural makes them more capable of handling other uncertainties of the childbirth, and to interact with other human beings around them (Carter and Guittar, 2014; Dixon et al., 2014). Women giving birth in the largest birthing unit in Iceland are usually meeting the unit's midwives and obstetricians for the first time when entering the childbirth unit. This may result in increased distress, leading to a use of an epidural (Edwards, 2009). The women who participated in this study were not offered midwifery-led care during pregnancy and childbirth, because such midwifery models are unavailable in Iceland, despite systematic review-based recommendations (Renfrew et al., 2014; Sandall et al., 2016).

Our findings indicate that there was no difference in the type and rate of medical interventions among distressed and non-distressed women, negatively answering the second research question. There was no significant difference between distress and low birth weight as well as unplanned C/S. These results are supported by findings from an Australian study where the researchers did not find significant differences between distress and preterm birth, low birth weight, emergency induction of childbirth or C/S, forceps or vacuum extraction, or increased likelihood of NICU admission (Staneva et al., 2017). Our results, however, contradict findings from other studies (Andersson et al., 2004; Ding et al., 2014;

Staneva et al., 2015). A possible explanation for this contradiction could be the differences in how health care is organized or the difference in the quality of health care. A recent study indicates that health care services in Iceland are of high quality (Murray, 2017) and antenatal care is not an exception as women receive valuable support from midwives and obstetricians, who share the care during pregnancy. Good quality may also be reflected by a relatively low C/S rate (around 16%) in Iceland, which is among the lowest in the developed world. Yearly, 4000–4500 children are born in Iceland, of which 98% are born in hospitals (Bjarnadottir et al., 2013) and of these, 75% are born in Hospital 1. This speculation regarding quality of care was seen in a recent Icelandic study, in which the researchers found a 5% prevalence of negative birth experience, which is less than found in foreign studies (Sigurdardottir et al., 2017).

We found an association between medical intervention and satisfaction in partner relationship, yielding a positive answer to the third research question. Women who are dissatisfied in their partner relationship might not receive the same encouragement by the partner during childbirth than those who are satisfied, leading to induction, episiotomy, and/or giving birth with vacuum extraction. These results were however not associated with the women's level of distress. To our knowledge, no other study is available, in which the association between medical interventions, childbirth outcomes, and satisfaction in partner relationship has been explored.

Our findings also identified an association between the use of epidural and distress early in pregnancy. Conversely, we also found an association between not being distressed early in pregnancy and going through labour without any pain management. These results are important and emphasize the importance of assessing perinatal distress early in pregnancy.

The study has several strengths. Information was available regarding all medication used, and relatively few participants took medication for anxiety- and/or depressive symptoms. Based on this information, the effect from medication use should not interfere with our conclusions. Birth outcome data came from medical records instead of relying on womeńs memory. We included both women with no (low–risk) or severe medical needs (high–risk), and the prevalence of epidural analgesia was similar to the national average.

The main limitation of this study is that few women who scored below the cut-off for the EPDS and the DASS scales participated compared with women who scored above the cut-off. Results need to be interpreted based on this restriction. There are several other limitations. No information was gathered regarding women who declined to participate or whether the midwives followed the ISPMH protocol for recruiting women. The fact that 53% of the participants had a history of mental health treatment raises speculation as to the possibility that these women were more willing to participate in the study. We cannot draw any firm conclusion regarding this preselection bias as no national data are available on the extent of mental health treatment among Icelandic citizens. Only a few participants had given birth to a preterm infant or had a history of obstetrical problems or underwent elective C/S. These results differ from the national data and a possible explanation might be the small number of participants who had negative results at screening or the characteristics of those who chose to participate in the NDG. Another explanation could be that women with history of obstetric problems did chose not to participate. Women with severe mental health problems might also have decline participation. As few women were represented in some of the variables in the regression models, there is an increased risk of bias in interpreting the results (Steyerberg et al., 1999). The women were not asked about their fear of childbirth or experience of childbirth pain. Head circumference of the children was not collected although its association with medical interventions has been shown previously (Elvander et al., 2012). The childbirth records were all handwritten and non-standardized, which may be viewed as a weakness because the documented information depended solely on individual healthcare staff member's accuracy.

In future studies the association between medical interventions, childbirth outcomes, and dissatisfaction in partner relationships should be further investigated. A large nationwide study is needed to verify our findings, with a focus on younger women, single women and couples. Perinatal distress of women with migration background also needs to be assessed. A possible association between elective C/S and distress needs to be studied further. Distressed women should also be interviewed about their attitude and experience with pain management during childbirth.

Our results indicate the importance for midwives and other health care professionals to evaluate women's distress level early during pregnancy and to offer assistance in distress management. The aim should be to increase womeńs ability to manage their situation and to help them prepare for the upcoming childbirth with less-invasive pain management than that provided by an epidural. For midwives and other health care professionals, assisting women during childbirth, the link between distress and use of epidural analgesia should be acknowledged. It is also important to evaluate the expecting couple's satisfaction with their relationship and to offer counselling and assistance to those who want to strengthen it.

## Conclusion

Women who experience perinatal distress during pregnancy are likely to use an epidural as the single pain management method during childbirth. A link exist between the use of an epidural and the level of distress experienced during early pregnancy. Our results indicated that medical intervention during childbirth are not more common among women who report prenatal distress than women who do not report perinatal distress, as long as high quality care is offered during pregnancy and childbirth. Women who are dissatisfied in their relationship with their partner might however be more likely to undergo induction of childbirth; episiotomy, and/or vacuum extraction.

## Ethical approval

The medical directors of the three Icelandic hospitals where the women gave birth granted permission to perform the study. The study was approved by the Icelandic National Bioethical Committee (ref. VSN-15-135), who initially approved the ISPMH project (ref. no. 05-107-SI) and the Icelandic Data Protection Authority (ref. no. S2589). All participating women signed an informed consent form and the 1964 Helsinki declaration were used when developing and conducting the research. All parts of the study were in accordance with ethical standards of the institutions involved and the Icelandic National Bioethical committee.

## Funding sources

## Conflict of interest

None to declare

## Acknowledgments

## References

Andersson, L., Sundstrom-Poromaa, I., Wulff, M., Astrom, M., Bixo, M., 2004. Implications of antenatal depression and anxiety for obstetric outcome. Obstet. Gynecol. 104 (3), 467–476. doi:10.1097/01.AOG.0000135277.04565.e9.

Bansil, P., Kuklina, E.V., Meikle, S.F., Posner, S.F., Kourtis, A.P., Ellington, S.R., Jamieson, D.J., 2010. Maternal and fetal outcomes among women with depression. J. Women's Health 19 (2), 329–334. doi:10.1089/jwh.2009.1387.

Bennett, H.A., Einarson, A., Taddio, A., Koren, G., Einarson, T.R., 2004. Prevalence of depression during pregnancy: systematic review. Obstet. Gynecol. 103 (4), 698–709. doi:10.1097/01.AOG.0000116689.75396.5f.

Biaggi, A., Conroy, S., Pawlby, S., Pariante, C.M., 2016. Identifying the women at risk of antenatal anxiety and depression: a systematic review. J. Affect. Disord. 191, 62–77. doi:10.1016/j.jad.2015.11.014.

Bjarnadottir, R.I., Garðarsdóttir, G., Smárason, A.K., Pálsson, G.I. Skýrsla úr fæðingarskráningunni 2012. [Registration of births in Iceland in 2012]. Retrieved from: https://www.landlaeknir.is/servlet/file/store93/item2216/Faedingaskraning_2010.pdf.

Carter, S.K., Guittar, S.G., 2014. Emotion work among pregnant and birthing women. Midwifery 30 (9), 1021–1028. doi:10.1016/j.midw.2014.05.003.

Cox, J.L., Holden, J., Sagovsky, R., 1987. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br. J. Psychiatry 150 (6), 782–786. doi:10.1192/bjp.150.6.782.

Crane, D.R., Allgood, S.M., Larson, J.H., Griffin, W., 1990. Assessing marital quality with distressed and nondistressed couples: a comparison and equivalency table for three frequently used measures. J. Marriage Fam. 87–93. doi:10.2307/352841.

Ding, X., Wu, Y., Xu, S., Zhu, R., Jia, X., Zhang, S., Tao, F., 2014. Maternal anxiety during pregnancy and adverse birth outcomes: A systematic review and meta-analysis of prospective cohort studies. J. Affect. Disord. 159, 103–110. doi:10.1016/j.jad.2014.02.027.

Dixon, L., Skinner, J., Foureur, M., 2014. The emotional journey of labour – women's perspectives of the experience of labour moving towards birth. Midwifery 30 (3), 371–377. doi:10.1016/j.midw.2013.03.009.

Edwards, N.P., 2009. Women' s emotion work in the context of current maternity service. In: Hunter, B., Deery, R. (Eds.), Emotions in Midwifery and Reproduction. Palgrave MacMillan, Basingstoke, UK: Hampshire, pp. 36–55.

Elvander, C., Högberg, U., Ekeus, C., 2012. The influence of fetal head circumference on labor outcome: a population-based register study. Acta Obstet. Gynecol. Scand. 91 (4), 470–475. doi:10.1111/j.1600-0412.2012.01358.x.

Emmanuel, E., St. John, W., 2010. Maternal distress: a concept analysis. J. Adv. Nurs. 66 (9), 2104–2115. doi:10.1111/j.1365-2648.2010.05371.x.

Glover, V., 2014. Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. Best Pract. Res. Clin. Obstet. Gynaecol. 28 (1), 25–35. doi:10.1016/j.bpobgyn.2013.08.017.

Glover, V., 2015. Prenatal stress and its effects on the fetus and the child: possible underlying biological mechanisms. Advances in neurobiology. In: Antonelli, M. (Ed.), Perinatal Programming of neurodevelopment. Advances in neurobiology. Springer, New York, NY, pp. 269–283. doi:10.1007/978-1-4939-1372-5_13.

Graham, J.M., Liu, Y.J., Jeziorski, J.L., 2006. The dyadic adjustment scale: a reliability generalization meta-analysis. J. Marriage Fam. 68 (3), 701–717. doi:10.1111/j.1741-3737.2006.00284.x.

Hunter, B., Deery, R., 2009. Emotions in midwifery and reproduction. In: Hunter, B., Deery, R. (Eds.), Emotions in Midwifery and Reproduction. Palgrave Macmillan, Basingstoke, UK, pp. 1–13. ISBN-13: 978-0-230-54251-8.

Jonsdottir, S.S., Thome, M., Steingrimsdottir, T., Lydsdottir, L.B., Sigurdsson, J.F., Olafsdottir, H., Swahnberg, K., 2017. Partner relationship, social support and perinatal distress among pregnant Icelandic women. Women Birth 30 (1), e46–e55. doi:10.1016/j.wombi.2016.08.005.

Loomans, E.M., Van Dijk, A.E., Vrijkotte, T.G., Van Eijsden, M., Stronks, K., Gemke, R.J., Bergh, Vanden, Bea, RH, 2012. Psychosocial stress during pregnancy is related to adverse birth outcomes: Results from a large multi-ethnic community-based birth cohort. Eur. J. Publ. Health 23 (3), 485–491. doi:10.1093/eurpub/cks097.

Lovibond, S., Lovibond, P., 1995. Manual for the Depression Anxiety Stress Scales, 2nd ed. Psycology Foundation Monograph, Sydney, Australia.

Lydsdottir, L.B., Howard, L.M., Olafsdottir, H., Einarsson, H., Steingrimsdottir, T., Sigurdsson, J.F., 2018. Adverse life experiences and common mental health problems in pregnancy: a causal pathway analysis. Arch. Women's Ment. Health 1–9. doi:10.1007/s00737-018-0881-7.

Lydsdottir, L.B., Howard, L.M., Olafsdottir, H., Thome, M., Tyrfingsson, P., Sigurdsson, J.F., 2014. The mental health characteristics of pregnant women with depressive symptoms identified by the Edinburgh Postnatal Depression Scale. J. Clin. Psychiatry doi:10.4088/JCP.13m08646.

Medforth, J., Battersby, S., Evans, M., Marsh, B., Walker, A., 2011. Oxford Handbook of Midwifery, 2nd ed. Oxford University Press.

Murray, C.J.L., 2017. Healthcare access and quality index based on mortality from causes amenable to personal health care in 195 countries and territories, 1990–2015: a novel analysis from the global burden of disease study 2015. GBD 2015 healthcare access and quality collaborators. Lancet 390 (10091), 231–266. doi:10.1016/ S0140-6736(17)30818-8.

O'Hara, M.W., Wisner, K.L., 2014. Perinatal mental illness: definition, description and aetiology. Best Pract. Res. Clin. Obstet. Gynaecol. 28 (1), 3–12. doi:10.1016/j.bpobgyn.2013.09.002.

Rallis, S., Skouteris, H., McCabe, M., Milgrom, J., 2014. The transition to motherhood: towards a broader understanding of perinatal distress. Women Birth 27 (1), 68–71. doi:10.1016/j.wombi.2013.12.004.

Renfrew, M.J., McFadden, A., Bastos, M.H., Campbell, J., Channon, A.A., Cheung, N.F., Malata, A., 2014. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. Lancet 384 (9948), 1129–1145. doi:10.1016/S0140-6736(14)60789-3.

Ridner, S.H., 2004. Psychological distress: concept analysis. J. Adv. Nurs. 45 (5), 536–545. doi:10.1046/j.1365-2648.2003.02938.x.

Rosand, G.M., Slinning, K., Eberhard-Gran, M., Roysamb, E., Tambs, K., 2011. Partner relationship satisfaction and maternal emotional distress in early pregnancy. BMC Public Health 11. doi:10.1186/1471-2458-11-161, 161-2458-11-161.

Rubertsson, C., Hellström, J., Cross, M., Sydsjö, G., 2014. Anxiety in early pregnancy: Prevalence and contributing factors. Arch. Women's Ment. Health 17 (3), 221–228. doi:10.1007/s00737-013-0409-0.

Sandall, J., Soltani, H., Gates, S., Shennan, A., Devane, D., 2016. Midwife-led continuity models versus other models of care for childbearing women. Cochrane Database System. Rev. 2016 (4). doi:10.1002/14651858.CD004667.pub5.

Saunders, T.A., Lobel, M., Veloso, C., Meyer, B.A., 2006. Prenatal maternal stress is associated with delivery analgesia and unplanned cesareans. J. Psychosom. Obstet. Gynecol. 27 (3), 141–146. doi:10.1080/01674820500420637.

Schetter, D.C., Tanner, L., 2012. Anxiety, depression and stress in pregnancy: Implications for mothers, children, research, and practice. Curr. Opin. Psychiatry 25 (2), 141–148. doi:10.1097/YCO.0b013e3283503680.

Sigurdardottir, V.L., Gamble, J., Gudmundsdottir, B., Kristjansdottir, H., Sveinsdottir, H., Gottfredsdottir, H., 2017. The predictive role of support in the birth experience: a longitudinal cohort study. Women Birth doi:10.1016/j.wombi.2017.04.003.

Spanier, G.B., 1976. Measuring dyadic adjustment: new scales for assessing the quality of marriage and similar dyads. J. Marriage Fam. 38 (1), 15–28.

Staneva, A., Morawska, A., Bogossian, F., Wittkowski, A., 2015. Pregnancy-specific distress: the role of maternal sense of coherence and antenatal mothering orientations. J. Ment. Health 1–8. doi:10.3109/09638237.2015.1101425.

Staneva, A., Morawska, A., Bogossian, F., Wittkowski, A., 2017. Maternal psychological distress during pregnancy does not increase the risk for adverse birth outcomes. Women Health 1–20. doi:10.1080/03630242.2017.1282395.

Steyerberg, E.W., Eijkemans, M.J.C., Habbema, J.D.F., 1999. Stepwise selection in small data sets: a simulation study of bias in logistic regression analysis. J. Clin. Epidemiol. 52 (10), 935–942. doi:10.1016/S0895-4356(99)00103-1.

Thome, M., 1992. Mat heilsugæsluhjúkrunarfræðinga á vanlídan íslenskra kvenna 2–6 mánudum eftir barnsburd (Assessment of distress by community nurses in Icelandic women 2–6 months postpartum). Hjúkrun [Nursing] 68 (1), 8–15.

Tournaire, M., Theau-Yonneau, A., 2007. Complementary and alternative approaches to pain relief during labor. Evid.-Based Complement. Altern. Med. 4 (4), 409–417. doi:10.1093/ecam/nem012.

Van den Bergh, B.R.H., van den Heuvel, M.I., Lahti, M., Braeken, M., de Rooij, S.R., Entringer, S., Schwab, M., 2017. Prenatal developmental origins of behavior and mental health: the influence of maternal stress in pregnancy. Neurosci. Biobehav. Rev. doi:10.1016/j.neubiorev.2017.07.003.

Woods, S.M., Melville, J.L., Guo, Y., Fan, M., Gavin, A., 2010. Psychosocial stress during pregnancy. Am. J. Obstet. Gynecol. 202 (1), 61.e1–61.e7. doi:10.1016/j.ajog.2009.07.041.

Zimet, G.D., Powell, S.S., Farley, G.K., Werkman, S., Berkoff, K.A., 1990. Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. J. Personal. Assess. 55 (3-4), 610–617.

Zimet, G.D., Dahlem, N.W., Zimet, S.G., Farley, G.K., 1988. The multidimensional scale of perceived social support. J. Personal. Assess. 52 (1), 30–41.

## Linnaeus University Dissertations

Below please find a list of recent publications in the series Linnaeus University Dissertations. For a full list and more information: Lnu.se

332. Thomas Nordström, 2018, *Measures that matter: facilitating literacy through targeted instruction and assistive technology,* (psychologi/ psychology) ISBN: 978-91-88898-02-9 (print), 978-91-88898-03-6 (pdf).

333. Innocent Ngao Wanyonyi, 2018, *Migrant ('dago') fishers in coastal East Africa: Understanding fisher migration and its role in artisanal fisheries,* (biologi/biology) ISBN: 978-91-88898-04-3 (print), 978-91-88898-05-0 (pdf).

334. Martin Holgersson, 2018, *Finans och Existens: Tolkning av vardagslivets finansialisering* (företagsekonomi/business administration) ISBN: 978-91-88898-12-8 (print), 978-91-88898-13-5 (pdf).

335. Suejb Memeti, 2018, *Programming and Optimization of Big-Data Applicatoins on Heterogeneous Computing Systems* (datavetenskap/computer science) ISBN: 978-91-88898-14-2 (print), 978-91-88898-15-9 (pdf).

336. Susanna Nordmark, 2018, *A Multimodal Seamless Learning Approach Supported by Mobile Digital Storytelling (mDS)* (data- och informationsvetenskap/computer and information science) ISBN: 978-91-88898-14-2 (print), 978-91-88898-15-9 (pdf).

337. Josefin Rahmqvist, 2018, *Forensic care for victims of violence and their family members in the emergency department* (hälso- och vårdvetenskap/caring science) ISBN: 978-91-88898-18-0 (print), 978-91-88898-19-7 (pdf).

338. Sofia Svensson, 2018, *Språkhandlingar i flerspråkiga elevers gruppsamtal – en studie av identitetskonstruktion.* (svenska språket/Swedish language) ISBN: 978-91-88898-20-3 (tryckt), 978-91-88898-21-0 (pdf).

339. Fredrik Ahlgren, 2018, *Reducing ships' fuel consumption and emissions by learning from data* (sjöfartsvetenskap/maritime science) ISBN: 978-91-88898-22-7 (print), 978-91-88898-23-4 (pdf)

340. Oscar Nordahl, 2018, *Intraspecific diversity of pike (Esox lucius) in the Baltic Sea and new insights on thermoregulation in fish,* (ekologi/ecology) ISBN: 978-91-88898-24-1 (print), 978-91-88898-25-8 (pdf).

341. Annelie E. K. Johansson, 2018, *Lärares bedömningsspråk; Språkhandlingar, bedömning och språklig utformning i grundskolans skriftliga omdömen,* (svenska språket/Swedish language) ISBN: 978-91-88898-26-5 (tryckt), 978-91-88898-27-2 (pdf).

342. Katarina Ståhlkrantz, 2019, *Rektors pedagogiska ledarskap – en kritisk policy-analys*, (pedagogik/pedagogy) ISBN: 978-91-88898-29-6 (tryckt), 978-91-88898-30-2 (pdf).

343. Björn Zimmer, 2019, *Guided Interaction and Collaborative Exploration in Heterogeneous Network Visualizations*, (datavetenskap/computer science) ISBN: 978-91-88898-33-3 (print), 978-91-88898-34-0 (pdf).

344. Tinh Sjökvist, 2019, *Coated Norway Spruce – Influence of Wood Characteristics on Water Sorption and Coating Durability*, (skogsindustriella produktionssystem/forestry and wood technology) ISBN: 978-91-88898-39-5 (print) 978-91-88898-40-1 (pdf).

345. Fredrik Lindblad, 2019, *Identifying drivers and barriers for market growth within the industry producing wooden multi-family houses – Land allocation process for future growth*, (skogsindustriella produktionssystem/forestry and wood technology) ISBN: 978-91-88898-42-5 (print), 978-91-88898-43-2 (pdf).

346. Margaret Wallace Nilsson, 2019, *Kin, Friends and Unfriends :A Study of the Axelsson Tott Network during the Period of the Kalmar Union*, (historia/history) ISBN: 978-91-88898-45-6 (print) 978-91-88898-46-3 (pdf).

347. Kostiantyn Kucher, 2019, *Sentiment and Stance Visualization of Textual Data for Social Media*, (datavetenskap/computer science) ISBN: 978-91-88898-47-0 (print), 978-91-88898-48-7 (pdf).

348. Gustaf Waxegård, 2019, *Conceptualizing professionals´ strategies in care pathways for neurodevelopmental disorders*, (psykologi/psychology) ISBN: 978-91-88898-51-7 (print) 978-91-88898-52-4 (pdf).

349. Anders Svensson, 2019, *Räddningsaktörers tidiga närvaro vid akuta situationer på svensk landsbygd* (hälso- och vårdvetenskap/caring science) ISBN: 978-91-88898-53-1 (tryckt), 978-91-88898-54-8 (pdf).

350. Maria C. Johansson, 2019, *The institutionalisation of validation and the transformation of vocational knowledge* (pedagogik/pedagogy) ISBN: 978-91-88898-55-5 (print), 978-91-88898-56-2 (pdf).

351. Johanna Thulin, 2019, *Putting words to child physical abuse – Possible consequences, the process of disclosure, and effects of treatment. From children's perspectives* (pedagogic/pedagogy) ISBN: 978-91-88898-57-9 (print), 978-91-88898-58-6 (pdf).

352. Sigridur Sia Jonsdottir, 2019, *Effects of perinatal distress, satisfaction in partner relationship and social support on pregnancy and outcome of childbirth* (hälso- och vårdvetenskap/caring science) ISBN: 978-91-88898-60-9 (print), 978-91-88898-61-6 (pdf).