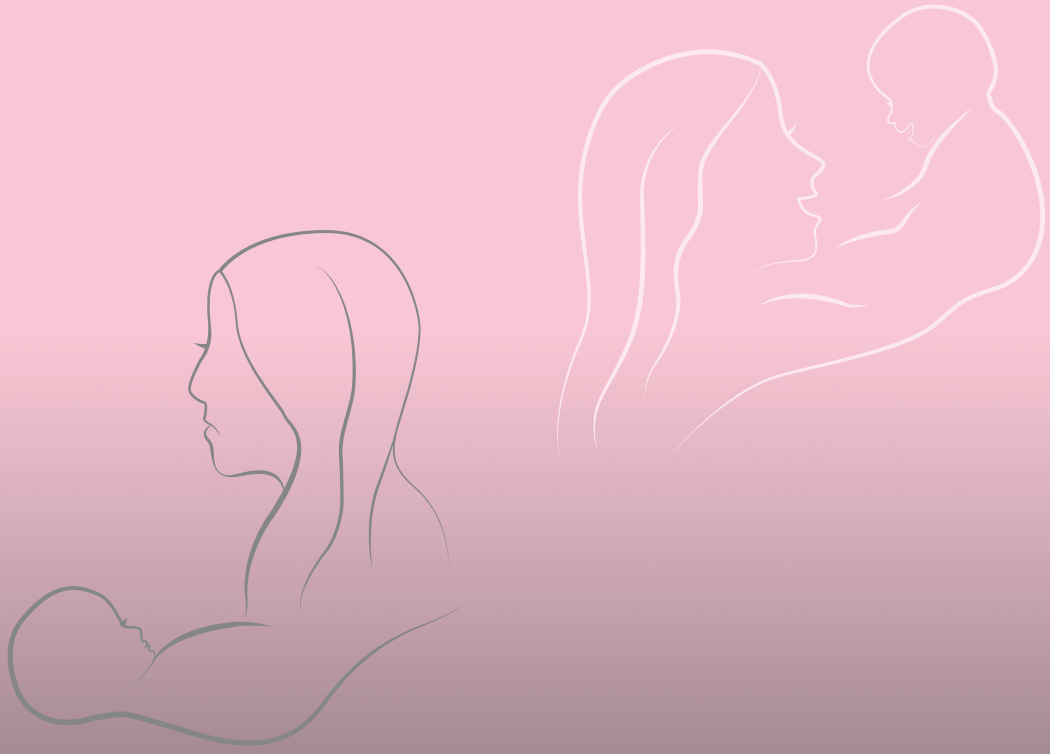

Investing in Maternal and Infant Mental Health

Screening for postpartum depression
by Preventive Child Health Care

Angarath I. van der Zee - van den Berg

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INVESTING IN MATERNAL AND INFANT MENTAL HEALTH

SCREENING FOR POSTPARTUM DEPRESSION BY PREVENTIVE CHILD HEALTH CARE

DISSERTATION

to obtain
the degree of doctor at the University of Twente,
on the authority of the rector magnificus,
prof.dr.ir. A. Veldkamp,
on account of the decision of the Doctorate Board,
to be publicly defended
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Paranymphs

Elles Beekhuizen
Tanja Gellweiler-Woeltjes

CONTENTS

CHAPTER 1

General introduction

GENERAL INTRODUCTION

The general aim of this thesis is to investigate the effectiveness of screening for postpartum depression (PPD) by Preventive Child Health Care (PCHC), and explore options to extend screening to anxiety, and thus to promote maternal and child well-being. This chapter/ introduction describes the broader context of screening for PPD by PCHC by providing background information on PPD and its impact on the woman and her environment, the consequences of PPD for the newborn, and the impact on society. Also, the partial overlap of PPD and anxiety is discussed. Next, we address the potential for early detection and treatment, and the Dutch healthcare system for mother and child in the postpartum period including PCHC. The chapter also introduces the PostUp study, which was set up to investigate the effectiveness of screening for PPD, and the Academic Collaborative Centre Youth in which the PostUp study was embedded.

Postpartum depression, definition, prevalence and treatment

PPD affects mothers frequently in the neonatal period. In the first week after giving birth, the majority of women experience days with emotional swings, or moments of feeling overwhelmed. Major hormonal changes, lack of sleep, and discomfort with the new responsibility are common explanations for these temporary fluctuations in mood, often referred to as 'baby blues'. Women may also in overall feel down, irritated, or listless. For most women these feelings do not last longer than 7 to 10 days. However, for some women these feelings do not disappear, or even get worse. When a woman experiences low mood or loss of interest or pleasure for more than 2 weeks, it is possible that the mother is developing a PPD.

Criteria for PPD according to the Diagnostic and Statistical Manual of Mental Disorders (DSM) IV-TR are identical to those for major depression, i.e. requiring at least 5 depressive symptoms (box 1) and functioning being clearly disabled due to the symptoms of depression. A specifier to describe the postpartum onset has been added to the diagnosis of PPD, i.e. an onset within four weeks of delivering a child. The WHO and the Centers for Disease Control and Prevention extend the risk period to 12 months postpartum (1), which is in line with recommendations of experts on PPD for DSM-5. However, the period specifier in DSM-5 has not been extended to the period beyond 4 weeks. The specifier was renamed "with peripartum onset", including depression that starts with symptoms during pregnancy.

When some of the core symptoms are present, but not enough to meet the criteria for major depression, DSM IV-TR gave the label of minor depression. The current study has been based on DSM IV-TR criteria (see Box 1) and therefore also uses the label 'minor depression'. It should be noted that this sub-diagnosis was no longer used in the DSM-5 (implemented in the Netherlands from 2017 onwards).

With period prevalences (until 3 months postpartum) in high income countries of 7.1% for major depression and 19.2% for a minor or major depressive episode (2) at least one out

of ten postpartum women experiences depressive symptoms in the postpartum period to a greater or lesser extent. Reported point prevalences in the Netherlands for a major depressive episode are 8% at 2 months postpartum (3) and 8.5% for a major or minor depressive episode at 6 months postpartum (4).

Box 1 DSM diagnostic criteria for Major Depressive Episode (version DSM IV - TR)

Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either *depressed mood or loss of interest or pleasure:*

1. depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful).
2. markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day
3. significant weight loss when not dieting or weight
4. insomnia or hypersomnia nearly every day
5. psychomotor agitation or retardation nearly every day
6. fatigue or loss of energy nearly every day
7. feelings of worthlessness or excessive or inappropriate guilt nearly every day
8. diminished ability to think or concentrate, or indecisiveness, nearly every day
9. recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

Symptoms of PPD may resolve within 3 to 6 months, but may also last for years (5), especially when left untreated. Treatment of PPD is comparable with treatment of depression in general, with both psychotherapy and antidepressants being an option. As antidepressants enter the breastmilk, starting or continuing antidepressants in a nursing woman should be considered with care and asks for adequate monitoring. For several antidepressants the risks and side effects for the infant appear to be limited (6). When symptoms are mild, life style adjustments may be the first choice, e.g. ask for support, give priority to getting rest and sleep, pick up exercising and get in contact with other new mothers. These life style adjustments are also an addition to treatment in PPD with more severe symptoms.

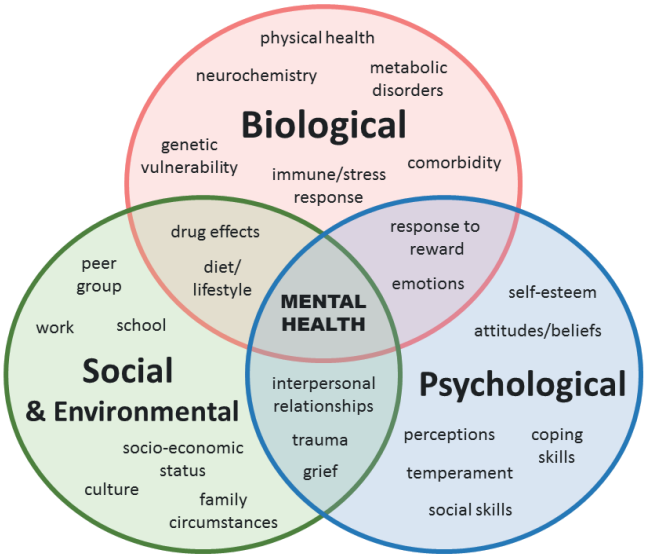
Etiology of PPD, overlap with anxiety

Consensus lacks on the full mechanism of the etiology of PPD. In general, mental health problems are assumed to be due to biogenetic, social en psychological factors that interact (Figure 1) (7) and have their influence at different developmental stages in life. In the biopsychosocial model of the pathogenesis of depression these influences contribute to the

forming of a personal vulnerability, due to which stressors trigger distress in a disproportionate way (8, 9) resulting in a negative downward loop to depression. There is an ongoing debate if PPD is phenomenologically different from depression in general which also leads to the discussion on the need for a specific diagnosis. On the one hand it is argued that PPD is specifically related to childbearing and has a unique presentation, on the other hand the perinatal period is seen as a trigger like any other stressful life events and PPD should be treated like depression in general. Regardless of the evidence for etiological differences, PPD is unique in the consequences the timing of depression may have for the infant.

An extra factor of debate is the distinction between depression and anxiety; previously, anxiety in the postpartum period was considered to be a feature of PPD, and received little attention. More current evidence shows that postpartum anxiety is at least as common as depression, with prevalence figures (0-24 months) of 13.7% for anxiety symptoms and 8.4% for anxiety disorders (10). Though comorbidity is frequent, a substantial part of women present with only anxiety symptoms (11, 12). Difficulties to distinct depression and anxiety are due to the overlap of part of the symptoms, e.g. nervousness, irritability, and problems with sleeping or concentrating. The overlap and differences between depression and anxiety are incorporated in the tripartite model (13), according to which depression and anxiety are both characterized by negative affectivity on the experience of distress. They however differ in other aspects, as depression is characterized by the absence of positive affect, and anxiety by the presence of hyperarousal. Most research and interventions targeted mainly PPD in general, but the relatively high prevalence figures for anxiety ask for specific attention for anxiety separately as well.

Figure 1 The bio-psycho-socio-environmental model for mental health (7)



Impact of PPD on mothers, children, and society

PPD can affect several aspects of the wellbeing and functioning of mothers and children. Regarding its effects on mothers, most people with major depression experience it as a very dark episode of their life in general. For postpartum women it may even be more difficult to face their depression as the postpartum period and becoming a parent in general is depicted as a period of joy. Women may feel ashamed to admit how they feel and are afraid to be judged to fail as a parent. Depending on the severity of symptoms, daily life functioning is disabled (14). Depression symptoms may resolve in a couple of months, but may also become chronic and last for years (5). Depressive symptoms may lead to suicidal thoughts and for some women to suicidal attempts (15). PPD puts stress on the relationship with the partner, and the family system (14). A woman with PPD may be unable to return to work. The prospect of experiencing PPD again after a new pregnancy may form an extra burden.

For children, PPD may have important consequences on the short term but also on the long term. Negative effects in children of PPD mothers are a disturbed emotional regulation in the first year after birth, internalizing and externalizing behavioral difficulties or less developed social competences in (pre)school age, and depression and attention deficit hyperactivity disorder in adolescence (16). The continuation of depression seems a stronger predictor of child outcome than the occurrence of PPD per se (17-20).

Apparently the impact of PPD on the mother is translated in impact on the child. Details on causal factors and mediating factors remain unclear (21, 22). However, parenting appears to be a mediator, especially aspects that influence the sensitivity of the parent/mother. Pivotal for a sound social-emotional development of a child is the process of building up a relationship with its primary caregivers, as described by Bowlby, founder of the attachment theory (23). Ainsworth added the concept of a secure-base phenomenon (24), which refers to the need of attachment for an infant to feel save to explore the surrounding. The quality of the interaction between a parent and his/her child, mostly described as sensitivity, determines if the child can create a secure attachment bond. A sensitive parent responds to his/her infant's cues in a timely and appropriate manner (25). Compared to mothers without PPD, mothers with PPD gaze less at their infant, respond less to infant utterances, show flat affect and little or negative facial expressions, have a low activity level, and also show alternating disengagement and intrusiveness with their infant (26). These are all aspects compromising sensitivity (27). In response, the child's responsiveness decreases.

Regarding effects on society, depression leads to a major burden of disease. According to the WHO, unipolar depressive disorder is the second leading cause of disease burden worldwide and current predictions indicate that it will be the first leading cause by 2030 (28). PPD contributes to this burden, not only by the depression of mothers, but also by the increased risk for the offspring to develop a depression in later life. This burden of disease also has a large economic impact. For the United States the economic burden due to major depression in general in 2010 was 210.5 billion per year, 50% of these costs were work related (absenteeism

and reduced productivity) (29). In the Netherlands, work-related costs are estimated as 1.8 billion euro per year and costs related to depression care as 1.6 billion euro (30). Combined, these costs form an economic burden of at least 3.4 billion euro. This is likely to be still an underestimation as depression is frequently accompanied by comorbidity, and also is known to lead to higher usage of healthcare services in general. Though figures for PPD are missing, costs in the same range can be expected.

The evidence on the consequences of anxiety is limited, and the effects of anxiety on child outcomes have been instigated less thoroughly than the effects of depression (31). However, recent studies did report negative effects of anxiety on mother–infant interactions, feeding practices, infant temperament, and social-emotional development (32-34). Similarly, the economic burden of anxiety is also taken into consideration increasingly, when analyzing the impact of mental disorders (35).

To summarize, PPD has major effects on mothers, children and the society as a whole. Though PPD occurs frequently, its symptoms are often missed by professionals who encounter the women in the postpartum period. As a consequence, mothers are receiving treatment with delay or not at all. Investing in early detection therefore is likely to be beneficial for both mothers and families and for society as a whole and could have even more added value if addressing anxiety as well.

Early detection of PPD and Preventive Child Health Care

Early detection of symptoms of PPD and subsequent support and/or treatment is likely to be of great value in reducing the effects of PPD on mothers and their children. Promising routes for early detection regard case-finding, selective and universal prevention. *Case-finding* implies detection of risk factors or early symptoms in persons who consult a health care professional for other reasons. When the professional suspects the possibility of PPD, he or she can offer further analysis. As signals of PPD often are not detected by professionals as such, this approach does not seem likely to be sufficient in improving early detection. In the second approach, *selective prevention*, the early detection focusses on groups that are considered to be at higher risk. For this approach knowledge on factors that increase the risk of PPD is needed. In *universal prevention*, the full population of mothers in the post-partum period are included in the early detection procedures. Though this approach requires more effort, in the case of PPD it may be the first choice as evidence on early risk factors is not conclusive and a substantial proportion of mothers without the most evident risk factor (history of mental illness) are affected by PPD.

The process of systematic identification of unrecognized disease in an apparently healthy population, leading to accessing effective treatment for individuals with the early diagnosis of the disease is called screening. Screening for PPD requires a setting where the majority of mothers encounter a health care professional with regular intervals in the early postpartum months, with in the Netherlands PCHC being the most promising option. In general, options of obstetric care in the Netherlands (offered by midwifes and gynecologists) after the first

postpartum week are limited with one contact 6 weeks postpartum. Family practitioners see mothers only on the initiative of the mother. In the Dutch setting however, the availability of PCHC offers an excellent opportunity to detect initial symptoms of PPD. One week after delivery, care is transferred from routine postpartum maternity care to the local organization of PCHC. The first contact of PCHC with the family is a home visit 2 weeks after birth. Subsequently, with ~7 standard visits within the first year to the PCHC center and a coverage of >95%, PCHC professionals have frequent contact with the majority of mothers during the postpartum period. PCHC-centers offer free preventive child health care services to parents of all newborn children nationwide, including monitoring child growth, child health and development, and vaccinations. Other countries have comparable forms of care, e.g. the well-baby and well-child care in the US and Canada, health visitors in the United Kingdom, Child and Family Health care in Australia and PCHC systems in various European countries (36). The terminology indicating PCHC, differs also per country which is reflected in some of the papers of this thesis, depending on the country of publication. We have chosen to use PCHC when referring to Preventive Child Health Care in general.

Though PCHC forms a suitable setting, screening for PPD is not part of the standard PCHC program in the Netherlands. When considering to implement a screening program, it is important to determine whether the program meets the core criteria for an effective intervention. In 1968, Wilson and Jungner composed a set of criteria (37), which the WHO extended based on the debate on criteria since then (38). In Table 1 these criteria are listed and addressed regarding screening on PPD.

Table 1 summarizes the evidence on screening for PPD in PCHC regarding the Wilson & Jungner criteria and identifies several gaps in the evidence that still need to be filled. Regarding evidence, in previous paragraphs we discussed the importance of and need for early detection, the evidence on the early symptomatic stages and natural history of depression, and the availability of treatment. The need for a suitable test is also met as several instruments are available to screen for PPD. The instrument used the most by far is the Edinburgh Postnatal Depression Scale (EPDS, see box 2) (39). This 10-item questionnaire was developed by John Cox et al. in the eighties of the past century specifically for use in community samples of postpartum mothers. Properties of the Dutch version of the EPDS are satisfying and further validation is not necessary (40). So far, these criteria support the decision to implement screening for PPD. Evidence still lacks on some other criteria, in particular on several of the added WHO criteria. Some of these criteria are requirements that have to be incorporated when implementing the screening program, e.g. aspects of informed choice, quality assurance and program evaluation, and therefore do not form an obstacle for screening in advance. However, these criteria concern aspects that should be built in when the screening program is being implemented.

Table 1 Wilson and Jungner Criteria and added WHO criteria applied to screening for PPD using the EPDS in Preventive Child Health Care (37, 38)

Wilson and Jungner Criteria	Criterion met	Substantiation
1. The condition sought should be an important health problem.	Yes	Based both on the incidence and impact on both mother and child
2. There should be an accepted treatment for patients with recognized disease.	Yes	Therapy for depression
3. Facilities for diagnosis and treatment should be available.	Yes	Primary healthcare and mental healthcare system (though not adjusted for mothers with PPD)
4. There should be a recognizable latent or early symptomatic stage.	Yes	Symptoms are known to develop in the period after birth
5. There should be a suitable test or examination.	Yes	EPDS
6. The test should be acceptable to the population.	Unclear	Simple test, though not yet evaluated on acceptability
7. The natural history of the condition, including development from latent to declared disease, should be adequately understood	Yes	The natural history is diverse, PPD may resolve within a couple of months but also last for years. Impact of PPD on the child depends on severity and chronicity.
8. There should be an agreed policy on whom to treat as patients.	Yes	Based on EPDS cut-offs it is clear which mothers may need further diagnostic work-up and treatment
9. The cost of case-finding (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.	Unclear	Evidence based on depression in general and few international studies on PPD, no studies with data from the Netherlands.
10. Case-finding should be a continuing process and not a "once and for all" project	Yes	If implemented on a national level
11. The screening program should respond to a recognized need.	Yes	With depression in general being a leading cause of burden of disease
12 The objectives of screening should be defined at the outset.	Yes	Early detection of mothers with PPD results in timely treatment, a shorter duration of depression and less impact of PPD on the child

continued on the next page

Table 1 *Continued*

Wilson and Jungner Criteria	Criterion met	Substantiation
13. There should be a defined target population.	Yes	Mothers who have given birth
14. There should be scientific evidence of screening program effectiveness.	Not yet	Evidence for screening in the PCHC setting is limited
15. The program should integrate education, testing, clinical services and program management.	Not yet	This will be built in when the screening program is implemented
16. There should be quality assurance, with mechanisms to minimize potential risks of screening.	Not yet	Implementation should include monitoring of the positive and negative effects
17. The program should ensure informed choice, confidentiality and respect for autonomy.	Not yet	This should be incorporated in the screening program
18. The program should promote equity and access to screening for the entire target population.	Yes	PCHC is accessible to all postpartum mothers in the Netherlands
19. Program evaluation should be planned from the outset.	Not yet	Should be developed when implemented nationally
20. The overall benefits of screening should outweigh the harm.	Unclear	Needs further analysis

Important aspects not yet covered by scientific evidence regard the effectiveness of screening in a PCHC setting, its cost-effectiveness, and its acceptability to the target group. Reviews on the efficacy of screening for PPD are promising, but none of these specifically addressed the value of screening in a PCHC setting. Also, evidence on the balance between costs of a screening program in PCHC and economic benefits as a consequence of screening is needed before deciding on implementing screening for PPD. Finally, the acceptability of the EPDS to postpartum women and potential harms of screening should be clarified.

Screening for PPD may thus be promising. A screening program could be even more promising if it also benefits detection of post-partum anxiety. Regarding detection of anxiety, there is some evidence that the EPDS may contain an anxiety subscale, consisting of items 3, 4 and 5 of the scale (41, 42). However, more research is needed to find out if this would make the EPDS an option to screen for anxiety as well. On top of screening, it may be of value to be able to differentiate between women at increased risk for anxiety and women at increased risk for depression. Confidence of professionals will be strengthened when they have knowledge of factors that

increase the risk for women. However, evidence on risk factors for PPD is not conclusive. Insight in overlap and differences between risk factors for PPD and anxiety may extend the detection of postpartum mood disorders, but so far the body of literature on anxiety risk factors is limited (43).

Academic Collaborative Centre Youth in Twente and the PostUp study

This thesis is based on the PostUp Study that was embedded in the Academic Collaborative Centre Youth Twente (AWJT, www.awjtwente.nl). One of the major themes within the AWJT was addressing PPD. In the Twente region, the middle eastern part of the Netherlands, use of the EPDS was initiated by PCHC professionals some years ago. However, this practice was not evidence-based as there was no evidence available on the effectiveness of screening for PPD in a PCHC setting.

In 2011 the AWJT was set up, with the focus of strengthening care for vulnerable children. An academic collaborative center (ACC) is a long-term partnership of community health services, policymakers, researchers and the education sector, aiming at bridging the worlds of the academia and health care practice and improving knowledge transfer. The realization of the AWJT was part of a ZonMw program, funding the creation of several ACC's spread across the Netherlands in the domain of Youth. Outcomes of an ACC should give healthcare professionals more concrete, applicable methods and instruments at their disposal, and support policy formulation with evidence-based knowledge. The main partners of the AWJT were GGD Twente (public health service including PCHC), the 14 municipalities in Twente, University of Twente (Enschede) and Saxion University of Applied Sciences (Enschede), with the University Medical Center Groningen as advisor.

Research questions

This thesis is aimed at investigating the effectiveness of screening for PPD by Preventive Child Health Care, and exploring options to extend the attention for mental health in the postpartum period to anxiety as well. The following research questions will be addressed:

Q1. What is the evidence on the effectiveness of screening for PPD in WCC compared to no screening, regarding mother and child outcomes?

Q2. Does repeated screening for PPD in WCC, followed by routine care for screen-positive mothers, result in improved outcomes at maternal level (state of depression, parenting, health-related quality of life, anxiety symptoms) and at child level (socioemotional problems), at the end of the first year postpartum, compared to care as usual?

Q3. Is the hypothesized EPDS anxiety subscale present in the EPDS data of our sample, and if so, does this subscale enable measurement of anxiety in addition to depression, and is it stable across the first six months postpartum?

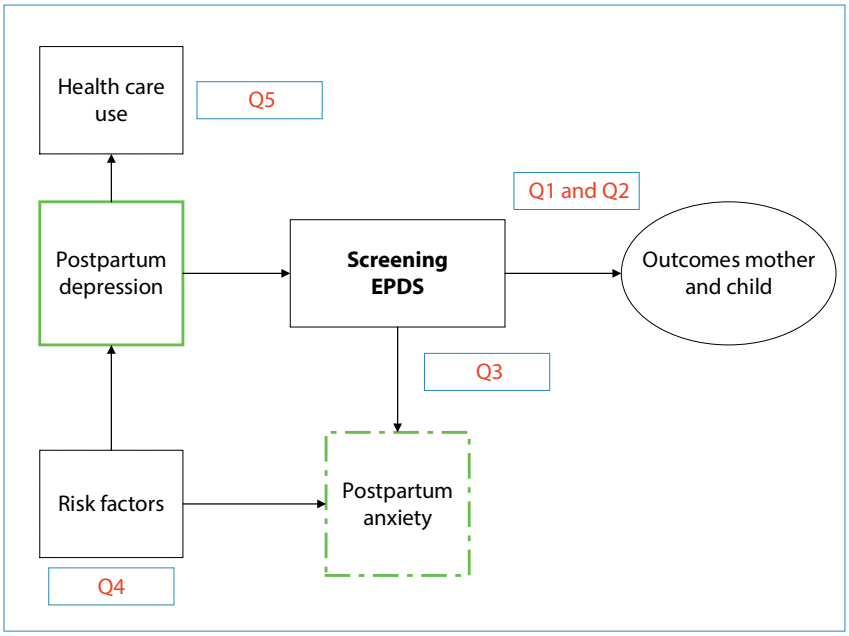
Q4. Which factors increase risks for PPD symptoms and anxiety symptoms, before, during and after pregnancy, in the general population?

Q5. What health care do mothers with PPD in the Netherlands receive for their depression?

Q6. What is the impact of PPD on use of health care in general and work participation?

Figure 2 provides an overview of the research model underlying this thesis.

Figure 2 Overview of the research model underlying this thesis



Outline of the thesis

In **Chapter 2** we provide the current evidence on the effectiveness of screening for PPD when performed in a PCHC setting, based on a systematic review. In **Chapter 3** we describe the details of the PostUp study (design, sample, intervention, procedures) and present the outcomes on both maternal level (state of depression, parenting, health-related quality of life, anxiety symptoms) and child level (decreased rates of socioemotional problems), at the end of the first year postpartum. In **Chapter 4** we focus on the factor structure of the of the EPDS and examine if it contains a subscale that could be used to detect anxiety as well, by performing an exploratory factor analysis on the EPDS data of the PostUp study and assess the correlations of the subscale with our anxiety measure (STAI-6). We also assess the stability of the found factor structure during the first six months postpartum by means of a confirmatory factor analysis. In **Chapter 5** we identify community-level risk factors in our PostUp intervention sample for developing PPD as well as anxiety, which could sustain professionals in detecting women at risk for depression or anxiety both before, during and after pregnancy. In **Chapter 6** we analyze the health care use of the PostUp women in the control group, both care sought for their depression as well as general health care. Also, the impact of PPD on work participation is examined. This thesis is completed with **Chapter 7**, drawing conclusions concerning our main findings and discussing these findings in a broader context. We will consider methodological issues and finally suggest implications for practice and policy, including implementation strategies, and future research.

Box 2 Edinburg Postnatal Depression Scale (EPDS) (39)

Please check the answer that comes closest to how you have felt **in the past 7 days**, not just how you feel today.

1. I have been able to laugh and see the funny side of things
o As much as I always could
o Not quite so much now
o Definitely not so much now
o Not at all

2. I have looked forward with enjoyment to things
o As much as I ever did
o Rather less than I used to
o Definitely less than I used to
o Hardly at all

3. I have blamed myself unnecessarily when things went wrong
o Yes, most of the time
o Yes, some of the time
o Not very often
o No, never

4. I have been anxious or worried for no good reason
o No, not at all
o Hardly ever
o Yes, sometimes
o Yes, very often

5. I have felt scared or panicky for no very good reason
o Yes, quite a lot
o Yes, sometimes
o No, not much
o No, not at all

6. Things have been getting on top of me
o Yes, most of the time I haven't been able to cope at all
o Yes, sometimes I haven't been coping as well as usual
o No, most of the time I have coped quite well
o No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping
o Yes, most of the time
o Yes, sometimes
o Not very often
o No, not at all

8. I have felt sad or miserable
o Yes, most of the time
o Yes, quite often
o Not very often
o No, not at all

9. I have been so unhappy that I have been crying
o Yes, most of the time
o Yes, quite often
o Only occasionally
o No, never

10. The thought of harming myself has occurred to me
o Yes, quite often
o Sometimes
o Hardly ever
o Never

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CHAPTER 2

Screening for postpartum depression in well-baby care settings: a systematic review

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ABSTRACT

Background and objective - Postpartum depression (PPD) is a mental health problem frequently experienced by mothers in the first year postpartum. Early detection and treatment can help to reduce its negative effect on the development of the newborn child. Well-baby care (WBC) is a promising screening setting for early detection of PPD. This systematic review investigates the evidence of the effectiveness of screening for PPD in WBC settings regarding mother and child outcomes.

Method - Three electronic databases were searched: SCOPUS, PsychINFO and CINAHL. Two reviewers independently performed the study selection. Data extraction was based on a predefined data extraction form.

Results - Six studies were included; a quality assessment rated two studies as strong and four as weak. Four studies measuring outcomes at process level showed improvement in detection, referral and/or treatment rates. Four studies, including the two strong ones, where screening and enhanced care were combined, showed improvements in the Edinburgh Postnatal Depression Scale (EPDS) scores of the mothers in the intervention groups. No improvements were reported on other outcomes at parent level or at child level. At child level, weight was the only outcome that was measured.

Conclusions - This review provides limited yet positive evidence for the value of screening for PPD in a WBC setting. The outcomes are comparable with studies on screening for PPD in general. The evidence that we found is very promising but the small number of available studies shows a need for additional high-quality studies, to strengthen the evidence regarding the potential benefits of screening in a WBC setting.

INTRODUCTION

Children's early social-emotional development affects their mental health during their entire life-course. The parents' mental health problems can affect this development negatively. One of the most frequent mental health problems that mothers encounter after delivery is postpartum depression (PPD). An analysis of 28 prevalence studies showed that 7.1% of women suffer from major depression in the first three months postpartum. When minor depression was included, the prevalence increased to 19.2% (1). Children of mothers who had experienced PPD have more difficulties in their cognitive, socio-emotional and language development, and have higher levels of internalizing and externalizing behavior, as well as general psychopathology later in life (2-4). Early treatment of maternal PPD may reduce these problems (5, 6). Depression can be treated effectively in several ways (7), but many cases of PPD remain undetected, partly because mothers face barriers to discuss their feelings (8) and partly because the professionals they encounter do not recognize the symptoms or fail to discuss them (9). Therefore, several articles on PPD advocate incorporation of screening in public healthcare (1, 8). Well-baby care (WBC) may be a very promising setting for early detection of maternal PPD as this setting provides routine check-ups during the first year after delivery (10). The intention of WBC is to monitor the child's development and health, including the wellbeing of the parents. Examples of systems supplying this care are: the well-child care in the United States, health visitors in the United Kingdom, Child and Family Health care in Australia and preventive child health care systems in various European countries. Systems providing WBC often have large coverage. In some countries, WBC is being delivered to 95-99% of newborn children (11), thereby also reaching the majority of postpartum mothers.

A few reviews on the efficacy of screening for PPD are available (12, 13), but none of these specifically address the value of screening in a WBC setting. We therefore systematically reviewed the evidence on the effectiveness of screening for PPD in WBC compared to no screening, regarding mother and child outcomes and report our findings here according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) Statement (14).

METHODS

Search Method

A search was performed by the first author (A.Z.-B.) in three electronic databases: Scopus (including all the citations in PubMed and Embase from 1996), PsychINFO and CINAHL. We searched the databases for publications up to May 2014. The search strategies were based on the MESH-terms (MEDLINE thesaurus) available for the subject and the key terms extracted from the background literature. Three main concepts were combined and fed into the search engine: postpartum depression, early identification, and well-baby care setting.

As the subject is related to several research areas (psychiatry, child development, primary health care, women's health), we added a number of synonyms for each concept. We created several alternative terms for the well-baby care setting as the nature of this kind of setting varies from country to country. Full details of the search strategy in Scopus are reported in Appendix A. We used the same search strategy for PsychINFO and CINAHL, except for the exclusion of subject areas as these databases do not have this option.

Selection Process

Two of the authors, A.Z.-B. and M.B.-B., independently assessed the eligibility of the resulting publications in three rounds. The first selection was based on the title. Next, the abstracts of the selected articles were reviewed according to the inclusion and exclusion criteria (Table 1), based on the PICOTS categories (Population, Intervention, Comparators, Outcomes, Timing and Setting). In the final round, the selected articles were judged after full-text-reading. Selected articles that appeared to be reviews were hand searched by one reviewer, A.Z.-B., for additional references. In each stage of the selection process, the reviewers used one of three response options to indicate their opinion as to whether an article should go to the next stage; "yes", "no", and "maybe". The outcomes of the two independent reviewers were compared before proceeding to the next stage. Titles, abstracts and articles with differing opinions were discussed and reread if necessary. An independent third reviewer could be consulted to resolve remaining disagreements, but this proved to be unnecessary. The author of one article (15) was contacted to obtain more information on the setting before deciding on its inclusion.

Table 1 Inclusion and exclusion criteria

Study Characteristics	Inclusion Criteria	Exclusion Criteria
Population	• women up to 12 months postpartum	-
Intervention	• isolated screening or screening as a part of a more comprehensive prevention or intervention strategy • screening for postpartum depression using a validated screening instrument for depression	• interventions without a screening component • screening using a non-validated instrument
Comparators	• usual care without a screening instruction protocol or without specific attention for PPD • screening under different conditions (e.g. setting, timing) or with another validated instrument	• studies with no control group to compare the effectiveness of the screening

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Table 1 *Continued*

Study Characteristics	Inclusion Criteria	Exclusion Criteria
Outcomes	At least one of the following outcomes: • validated diagnostic instruments for depression • rates of referral for symptoms of depression, rates of positive diagnosis, and/or implemented treatment • validated measures of maternal well-being, health-related quality of life, parenting • validated measures of child health and development • maternal and/or child health system resource utilization, including number of visits and estimates of total and attributable costs	• reported outcomes provide no information on the effects of the screening
Timing	• screening for depression (at least partly) within the first 12 months postpartum	• screening for depression only during pregnancy
Setting	• offering routine contact with a healthcare professional in the first year postpartum to check the health and development of the child • serving the general population • study located in a high-income economic country as defined by the World Bank	• clinical setting • setting exclusively addressing the woman and not the child • study located in a non- high-income economic country as defined by the World Bank
Study design	• randomized controlled trial, • observational study with comparator (prospective or retrospective) • sample size ≥100 subjects • RCTs all sample sizes • systematic reviews	• nonsystematic review, case series, case report, editorial, letter,
Report criteria	• article in English, Dutch, German or French • peer-reviewed article • relevant systematic review, meta-analysis	• article in a language other than English, Dutch, German or French • no abstract/full text found

A flow diagram of the selection procedure is shown in Figure 1. Seven articles, concerning six individual studies, met the inclusion criteria and were used in this review.

Quality Assessment

To assess the quality of the included studies, the reviewers independently applied the Quality Assessment tool for Quantitative Studies, developed by the Effective Public Health Practice Project (EPHPP) (16). Studies were rated on 6 aspects: selection bias, study design, confounders, blinding, data collection method, withdrawals and dropouts. The aspects were explored by answering guiding questions and were next rated according to established criteria, e.g. for an aspect like data collection methods, rating depended on the validity and reliability of the data collection tools. A study received a strong global rating when none of the aspects were weak, a study with one weak aspect was rated as moderate, and two or more weak aspects resulted in a weak global rating. Differences in quality ratings were discussed and agreement was reached by critically applying the criteria again. In addition to the standard EPHPP scoring, possible study specific biases were investigated by comparing method and result sections on contradictions and missing data.

Data Synthesis

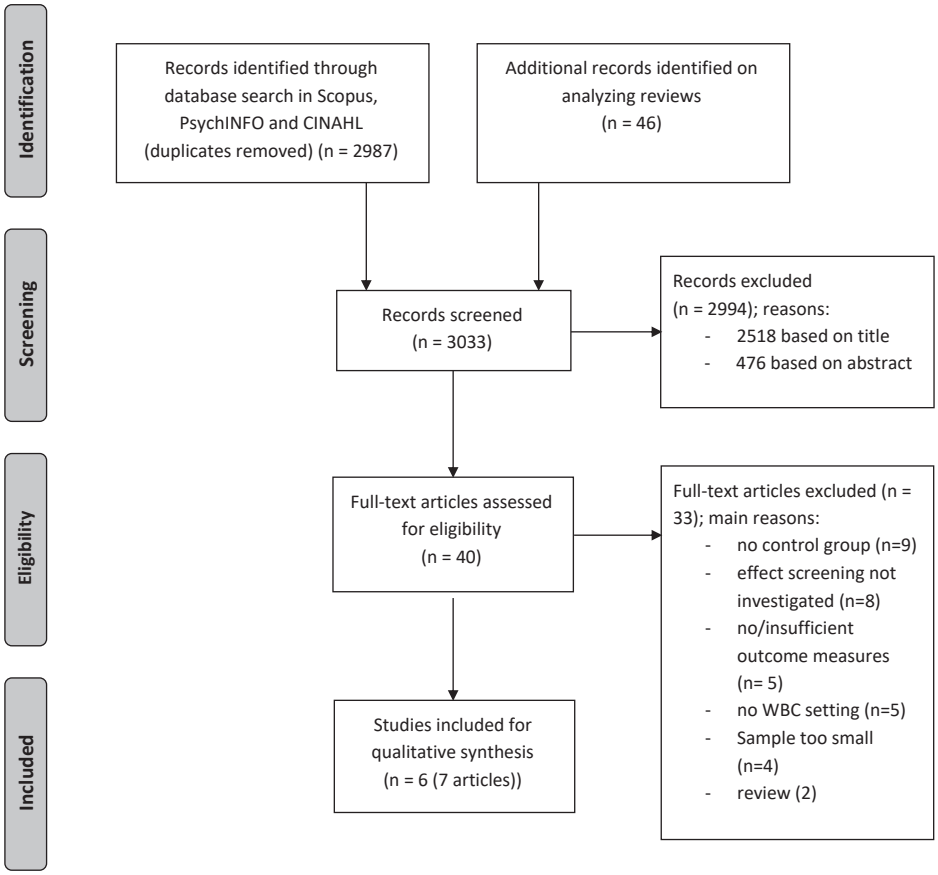
One reviewer (A.Z.-B.) extracted the data from the 6 selected studies using a predefined data extraction form, including the results of two articles by Glavin et al. (17, 18); they were compared but there were no conflicting or contradicting data. The data categories are presented in Table 2. The authors of all the included studies were approached for more information on certain aspects, like setting or population; three out of six authors responded and answered our questions. We described the differences and similarities of the studies in terms of setting, population, the intervention applied – including specific screening aspects like instrument and timing, and the used outcome measures. After presenting the results of the quality assessment, a narrative synthesis was undertaken. The included studies were reviewed for a shared summary effect measure like risk ratio (RR) or odds ratio (OR), expressing the effect of screening on primary outcomes such as an improvement of depression scores. The extracted data were not pooled or analyzed statistically because of the small number of studies, the differences in the compared interventions, and the heterogeneity of the outcome measures and time horizons.

RESULTS

Setting and population

The characteristics of the six included studies are presented in Table 2. The settings of the studies (15, 17-22) differ in location and the professionals performing the screening. In the studies by Chaudron et al. (19) and Carroll et al. (21), care was delivered by the pediatric staff from a primary care center. In the Norwegian Glavin et al. study (17, 18), public health nurses screened the mothers at well-baby clinics, a comparable setting to that of the Leung et al. (20) study in Hong Kong, where nurses screened the mothers at Maternal Child Health Centers.

Figure 1 Flow diagram of study selection



The screening investigated by Gerrard et al. (22) was carried out by trained health visitors at baby clinics in England. Yawn at al. (15) focused on family medicine research network practices in 21 USA states; 22 of the included practices offered continuity to the mother and her child, and six only to the mother. Pediatrician offices offering services only to the child were excluded. Except for the six practices studied by Yawn et al., the other practices offered frequent appointments to both mother and child. In the first year postpartum the frequency varied from 7 to 10. The intention of the settings was to service the general population and to reach 90-100% of the mothers of newborn children in their area. The frequency and outreach of the services in the Gerrard et al. study (22) could not be verified.

Intervention content

The interventions offered in the various studies differed greatly. Those in the Chaudron et al. (19) and Carroll et al. (21) studies consisted mainly of incorporating screening questionnaires into the regular visits. In addition, Carroll et al. used a decision support system, incorporated in an electronic medical support system. Depending on the answers on the screening questionnaire, reminders were created by the system to guide clinicians during their visit. Four of the six studies (15, 18, 20, 22) investigated an intervention consisting of both screening and enhanced care. In the Glavin et al. study (18) screening was one of several components of the intervention and was followed by a standard supportive counseling session for all mothers with the Public Health Nurse. Depressed mothers received follow-up supportive counseling sessions. Yawn et al. (15) compared a practice-based training program for screening, diagnosis, and management of mothers with PPD. Intervention practices were provided with a set of tools to facilitate each part of the process. Leung et al. (20) also described the steps following screening: participants with a positive EPDS were directed to another nurse for counseling. During this session, subsequent management was recommended. This could be either non-directive counseling by a Maternal and Child Health Centre (MCHC) nurse or referral to the community psychiatric team. These steps were also offered to mothers clinically observed as depressed, and were therefore not limited to the intervention. Mothers with elevated EPDS scores in the post-training group of the Gerrard et al. study (22) were offered 4-8 non-directive counselling visits by their health visitor.

Screening instrument, cut-off score and timing

Five studies used the EPDS as the screening instrument; four (15, 18-20) had the same cut-off score of ≥10 and one, by Gerrard et al. (22), selected 12 as the cut-off score. Glavin et al. (18) and Chaudron et al. (19) mentioned that clinical judgment should confirm the EPDS indication of a mother as probably being depressed. Leung et al. (20) also considered a positive answer on question ten (suicidal ideation) as indicative. Carroll et al. (21) adapted a validated two question depression screening tool into an existing pre-screening form. In the study by Yawn et al. (15), mothers with an EPDS score of ≥ 10 were asked to complete the Patient Health Questionnaire (PHQ-9) as well. A mother was considered to have PPD if her PHQ-9 score was ≥10 and the physician's evaluation revealed no other cause for the depressive symptoms. Carroll et al. (21) reported the PHQ-9 was added as a hand-out to one of the two intervention arms to assist the physician in diagnosing depression but no PHQ-9 data were shown in the results. In the studies by Leung et al. (20), Glavin et al. (18) and Yawn et al. (15), screening was performed once, at 2 months, 6 weeks and between 5-12 weeks postpartum, respectively. In the Chaudron et al. study (19), mothers received the EPDS at each well-child visit during the child's first year, starting with the routine 2 week visit. In the study by Carroll et al. (21), mothers were screened every 3 months until the age of 15 months. Health visitors in the Gerrard et al. study (22) were instructed to screen at 6-8 weeks and/or 10-12 weeks, depending on the number of training sessions attended by the health visitor.

Table 2 Main characteristics of the included studies (N=6)

Author, year, country	Study design, blinding	Setting	Sample description, participation and dropouts	Intervention and control conditions	Outcome measures	Main results
Gerrard et al. 1993, England (22)	a pre- and post- design, no blinding	health visitors in six sectors, some GP-attached and others geographically based	*Sample:* pre-training: mothers 20-26 weeks postpartum in the caseload of the untrained health visitors post-training: mothers 6-8 weeks or 10-12 weeks postpartum in the caseload of the trained health visitors *N:* · pre-training group: 1008 · post-training group:1001	*Intervention:* · screening with EPDS during regular health visits at 6-8 weeks test and/or 10-12 weeks · 4-8 non-directive counselling visits · health visitors received up to 10 training sessions including education on PPD, use of the EPDS, non-directive counselling skills and prevention of PPD *Control* · standard service provided by the health visitors; no screening, no training	*Primary (mother level):* · EPDS at 6 months postpartum	*Primary (mother level):* · improvement of the median score on the EPDS at 6 months postpartum from 7 in the pre-training group to 5 in the post-training group · decrease in prevalence of EPDS score ≥ 12 at 6 months postpartum from 19.3% (pre-training) to 9.8% (post-training)
Chaudron et al. 2004 New York State, United States (19)	a pre- and post- design, no blinding	large pediatric primary care practice at the University of Rochester Medical Center	*Sample:* randomly selected child medical records, *N:* · before initiation of screening: 110 · after initiation of screening: 110	*Intervention (after):* · screening with EPDS during each well-child visit in the child's first year, performed by a pediatric nurse practitioner or pediatrician · screening considered positive with EPDS ≥ 10 *Control (before):* · no screening during the well-child visits	*Primary (process level):* · documentation of depression or depression symptoms · documentation of referrals to social worker or other providers	*Primary (process level):* · increase in documentation of depressive symptoms: 1.6% to 8.5% · increase in social worker referrals: 0.2% to 3.6%
Glavin et al. 2010 Norway (17, 18)	a quasi-experimental post-test study with non-equivalent groups, no blinding	well-baby clinics of 2 municipalities	*Sample:* 89.6% of 2508 women with a live-born child delivered in 2005–2006 *Inclusion criteria:* - > 18 years old - able to read and understand Norwegian - not undergoing depression treatment *N:* · intervention group: 1806 · control group: 441	*Intervention:* · home visit 2 weeks postpartum with increased focus on maternal mental health · one supportive counseling session by the public health nurse after mothers completed the EPDS at 6 weeks postpartum · supportive counseling sessions for depressed mothers with EPDS ≥ 10 and judged as having PPD by the public health nurse · openness about mental health issues at every visit · system of referral for further treatment *Control:* · standard service provided by the well-baby clinics	*Primary (mother level):* · EPDS at 6 weeks, 3, 6 and 12 months postpartum *Secondary (mother level):* · PSI at 12 months postpartum	*Primary (mother level):* · OR for depression (EPDS ≥ 10) in intervention group at 6 weeks: OR 0.6 (95% CI 0.4, 0.8), 3 months: OR 0.4 (95% CI 0.3, 0.6), 6 months: OR 0.5 (95% CI 0.3, 0.8) and 12 months: OR 0.6 (95% CI 0.4, 1.0) · stronger improvement of EPDS scores at 3, 6 and 12 months of mothers with a ≥10 score on the EPDS 6 weeks after birth, effect size 6 weeks to 12 months: 0.53 *Secondary (mother level):* · marginally lower level of parenting stress at 12 months: statistical significance only on the Health subscale (PSI)

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Table 2 *Continued*

Author Year Country	Study design, blinding	Setting	Sample description, participation and dropouts	Intervention and control conditions	Outcome measures	Main results
Leung et al. 2010 Hong Kong (20)	RCT, individual randomization, blinding of participants and nurses	Maternal and Child Health Centers (MCHCs)	*Sample:* 83.7% of 552 mothers of 2 month old children visiting the MCHCs *Exclusion criteria:* - non-local residents - not using the Chinese language - participating in other PPD screening programs - receiving psychiatric treatment *N:* · intervention group: 231 · control group: 231	*Intervention:* · EPDS 2 months after birth · screening considered positive with EPDS ≥ 10 or positive answer on Q10 (suicidal ideation) *Control:* · no screening using the EPDS *Intervention and control (same procedures in both groups to mask allocation):* · clinical assessment by one MCH nurse at 2 months blind to participant's group status and scores · referral of screen-positive women or women clinically assessed as depressed, to another MCH nurse (blind to participant's group status and scores) for further exploration of the condition and non-directive counselling · recommendation by MCH nurse for further MCH nurse counselling or community psychiatric team referral	*Primary (process level):* · screen-positives rates · treatment rates *Primary (mother level):* · EPDS at 6 months postpartum *Secondary (mother):* · EPDS: 18 months GHQ-12, PSI, CKMSS at 6 and 18 months · number of doctor visits *Secondary (child level):* · body weight at 6 and 18 months	*Primary (process level):* · screen-positives: 29% (67/231) in the intervention group (I) versus 6.0% (14/231) clinically assessed as probably depressed in the control group (C) · received treatment: 23.8% (55/231) in I, 4.8% (11/231) in C *Primary (mother level):* · EPDS at 6 months ≥ 10: 13% of the mothers in I, 22.1% of the mothers in C (RR = 0.59 (95% CI 0.39-0.89)) · Number Needed to Treat = 25 (after adjustment for positive predictive value of the EPDS) *Secondary (mother/child level):* · More doctor visits in I compared to C (p = 0.039) · no difference in all other outcome measures at 6 and 18 months
Yawn et al. 2012 21 states, United States (15)	cluster RCT, randomization of practices, no blinding	family medicine research network practices	*Sample:* 97.7% of 2398 women receiving continuing care at 28 family practices *Inclusion criteria:* - English or Spanish speaking - ≥18 years - 5-12 weeks postpartum *N:* · intervention group: 1353 · control group: 990	*Intervention:* · set of tools for the practices to facilitate diagnosis, follow-up, and management of PPD · access to EPDS and PHQ-9 scores (filled in by the mothers 5-12 weeks postpartum) · EPDS ≥ 10 followed by the PHQ-9, evaluated by the physician · mother considered depressed when PHQ-9 ≥10, confirmed by physician evaluation *Control:* · usual care · no access to the EPDS and PHQ-9 scores	*Primary (mother level):* · decrease in PHQ-9 score from baseline to 6 or 12 months postpartum *Secondary (mother level):* · changes from baseline to 12 months postpartum in PSI and DAS-6 scores · rates of PPD diagnoses, therapy initiation and referrals registered in the medical record	*Primary (mother level):* · 12 months: OR for a ≥ 5-point drop in PHQ-9 score between baseline and 12 months: 1.82 (95% CI 1.14-2.91), adjusted OR: 1.74 (95% CI 1.05-2.86) *Secondary (mother level):* · no relation between intervention and changes in the PSI or the DAS-6 from baseline to 12 months

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Table 2 *Continued*

Author Year Country	Study design, blinding	Setting	Sample description, participation and dropouts	Intervention and control conditions	Outcome measures	Main results
Carroll et al. 2013 Indiana, United States (21)	RCT, no blinding	main primary clinic	*Sample:* mothers of 3520 children aged 0 to 15 months between October 2007 and July 2009 *N:* · intervention group PSF: 1167 · intervention group JIT: 1167 · control group: 1186	*Intervention:* · validated 2-question screening tool every 3 months, with one or two positive answers intervention followed: o PSF-group: automatic reminder alerting the physician to the risk and recommending assessment for depression o JIT-group: the same reminder as the PSF-group plus two 'just in time' handouts (JIT): 1. PHQ-9 2. educational handout with information about maternal depression and community resources for treatment *Control:* · no questions adapted in the pre-screening form · generic reminder on depression presented to the physician	*Primary (process level):* · registered suspected depression (in the decision support and electronic medical record system) · answers on the 2-question screening (depressed mood or signs of anhedonia) · documentation of rate of referral	*Primary (process level):* · registered depressed mood: PSF-group: 8.8% (OR 7.93, 95% CI 4.51 to 13.96), JIT-group: 8.7% (OR 8.10, 95% CI 4.61 to 14.25), control group: 1.2% · registered signs of anhedonia: PSF-group: 5.1% (OR 12.58, 95% CI 5.03 to 31.46), JIT-group: 5.2% (OR 13.03, 95% CI 5.21 to 32.54), control group: 0.4% · rate of referral: control group: 1.2%, PSF-group and JIT-group: 2.4% (OR 2.06, 95% CI 1.08 to 3.93)

RCT = randomized controlled trial; GP = general practitioner; MCHC = Maternal and Child Health Center; EPDS = Edinburgh Postnatal Depression Scale; PPD= postpartum depression; MCH = Maternal and Child Health; PHQ-9 = Patient Health Questionnaire; PSF = pre-screening form; JIT = 'just in time' handout; PSI = Parenting Stress Index; GHQ-12 = 12-item General Health Questionnaire; CKMSS = Chinese Kansas Marital Satisfaction Scale; DAS-6 = Dyad Adult Satisfaction short form; OR = odds ratio; CI = confidence interval ; RR = risk ratio

Outcome measures

The types of primary outcomes depended on the study design. Studies examining screening without enhanced care (19, 21) used documented depressive symptoms and referrals, indicated in Table 2 as primary outcomes at process level. Five studies (15, 18-21) reported the rates of the elevated scores on their screening instrument at the moment of intervention. None of the studies used a golden standard to confirm the PPD diagnosis. The four studies (15, 18, 20, 22), which examined screening combined with enhanced care, used the screening instrument of their intervention also as a primary outcome measure for maternal depressive symptoms later in the postpartum year. Regarding secondary outcomes, different outcome measures were used. Three (15, 18, 20) of those studies used the Parenting Stress Index (PSI). The only secondary outcome at child level was the child's body weight at 6 and 18 months presented by Leung et al. (20).

Study quality

Table 3 shows the outcomes of the Quality Assessment tool for Quantitative Studies (16). Four (18, 19, 21, 22) of the six studies were globally rated as weak, according to this Quality Assessment tool. All four studies had a weak score on description and control of possible confounders. In both Chaudron's (19) and Carroll's (21) study the data collection methods were weak as their data were based on health care provider documentations, which were incomplete and not based on valid instruments in the control groups.

Table 3 Quality of the 6 included studies, assessed with the Quality Assessment tool for Quantitative Studies (16)

	Gerrard et al. 1993	**Chaudron et al. 2004**	**Glavin et al. 2010**	**Leung et al. 2010**	**Yawn et al. 2012**	**Carroll et al. 2013**
Selection bias	Weak	Strong	Strong	Moderate	Strong	Strong
Study design	Moderate	Weak	Moderate	Strong	Strong	Strong
Confounders	Weak	Weak	Weak	Strong	Strong	Weak
Blinding	Weak	Moderate	Moderate	Moderate	Moderate	Strong
Data collection method	Strong	Weak	Strong	Strong	Strong	Weak
Withdrawals and dropouts	Weak	Not applicable	Weak	Moderate	Moderate	Not applicable
GLOBAL RATING	**Weak**	**Weak**	**Weak**	**Strong**	**Strong**	**Weak**

Interpretation of results

Four studies presented screening outcomes at process level (Table 2) (15, 19-21). The effect on the detection rate when screening for PPD was quantified in three of the six studies (19-21). The calculated RRs for detection of PPD in the studies by Chaudron et al. (19) and Leung et al. (20) were, respectively, 5.31 (8.5%/1.6%) and 4.8 (29%/6%). Improvement in the rate of referral

in the study by Carroll et al. (21) was presented with an OR of 2.06 (95% confidence interval (CI) 1.08 to 3.93). We calculated the RRs for the other three studies: for the referral to a social worker in the study by Chaudron et al. (19) the RR was 18 (3.6/0.2), for receiving treatment in the study by Leung et al. (20) the RR was 4.9 (23.8/4.8), and for being diagnosed as PPD in the study by Yawn et al. (15) the RR was 1.6 (66%/41%). Carroll et al. (21) mentioned that adding handouts to the screening process resulted in earlier referral, but no data were presented.

Four of the six studies (15, 18, 20, 22) (including the two strong studies) in which screening and enhanced care were combined in the intervention, showed significant improvement of depression scores later in the postpartum year in the intervention arms. In the Leung et al. study (20), mothers in the intervention group had an RR of 0.59 (95% CI 0.39-0.89) for having an elevated EPDS (≥ 10) at six months postpartum. In the Glavin et al. study (18), mothers in the intervention group had an OR of 0.5 (95% CI 0.3-0.8) for having an elevated EPDS (≥10) and in the Gerrard et al. study (22) the post-training group had an RR of 0.51 (9.8%/19.3%) for an EPDS of 12 or above. Mothers in the intervention group in the Yawn et al. (15) study had an OR of 1.74 (95% CI 1.05-2.86) for having a ≥ 5-point drop in PHQ-9 score between baseline and 12 months postpartum. Of the mothers in the study of Glavin et al. (18) who had an EPDS score of 10 or above at 6 weeks postpartum, those in the intervention group had a larger improvement in EPDS scores from 6 weeks to 12 months postpartum compared to the those in the control group (effect size 0.53). We could not create a summarized effect size as the measurement moments and outcome measures in the included six studies varied too much.

Regarding secondary outcomes, there were no results on child development or social-emotional wellbeing. No significant difference was found with respect to the child's weight in the Leung et al. study (20). At parent level, no statistical significant differences were found in secondary outcomes regarding measuring long-term effects (Table 2), except in the study by Glavin et al. (18) The intervention group's PSI Health subscale 12 months postpartum demonstrated a better score.

DISCUSSION

This review has identified limited but promising evidence for the effectiveness of screening for PPD on maternal health outcomes. Four (15, 18-21) of the six studies indicate an increase in detection rate of depressive symptoms or referral or treatment rates and four studies report a reduction in depressive symptoms at 3 months (18), 6 months (18, 20, 22) or 12 months (15, 18) postpartum. Screening on PPD leads to significant changes in the measured secondary outcomes at mother level in only one study; no relevant outcomes were measured at child level. Both strong quality studies were conducted in a setting providing care for both mother and child, with an intervention consisting of a combination of screening with some enhancement of care. It was not possible to untangle the effect of screening from the offer of extra care.

The improvement in depression scores, and yet the lack of the effect on secondary outcomes is comparable with studies on screening for PPD in general. In the HTA-review of Hewitt et al. (13) outcomes were combined. This resulted in a pooled OR of 0.64 (95% CI 0.52 to 0.78) for scoring above the threshold for depression for women in an intervention group compared to the control group. This effect is comparable to those demonstrated by Leung et al. (20) and Yawn et al. (15). The HTA review also encountered the same problem of disentanglement regarding the effect of screening and enhancement of care, and the lack of evidence of improving other maternal and child outcomes. The Agency for Healthcare Research and Quality (AHRQ) report (12) selected some of the same studies as our review, and also concludes that screening has a positive effect on depressive symptoms, but effects on secondary outcomes have not been proven.

The included studies may not have fully exploited the potentials of screening for PPD in WBC, for several reasons. One aspect is the timing of screening; the potential benefit of screening in a WBC setting may lie mainly in the possibility of repeated screening and continuous follow-ups. However, only three (19, 21, 22) (weak quality) studies had repeated screening interventions. Furthermore, mothers in the control group of other studies (15, 20), with high scores on the screening instrument or suicidal thoughts at the time of intervention, were also given follow-up advice for ethical reasons. This may have reduced the effect of the intervention on secondary outcomes.

Another factor influencing the secondary outcomes may have been the follow-up-process after screening. Recent studies (12, 23) advise to incorporate follow-up care within the same (primary care) setting as the screening, which is the case in the two strong studies (15, 20). Although significantly more mothers in the intervention groups were diagnosed and/or treated, a substantial number of the depressed women did not receive this follow-up care. As a consequence, screening might have been less effective. Finally, most of the included studies used ≥10 as the EPDS screening cut-off score. According to Hewitt et al. (13) this is the optimal cut point if screening for both major and minor depression, while 12 is optimal if screening for major depression only. Use of different cut points may affect the effectiveness of screening.

Only one study measured the effect of screening for PPD at child level by including the child's weight. As the effect of PPD on the child's wellbeing is an important argument in favor of the necessity of screening, we expected studies examining both screening and enhanced care to also include some outcomes at child level. Possible explanations for not including outcomes at child level might be the limited options for standardization of the quality of care after screening and for measuring social-emotional development in the first year after birth. In addition, controlling the moderators and mediators influencing the social-emotional development is difficult.

Strengths and limitations

Although many countries have preventive child health care incorporated in their health care system, nomenclature proved to be quite diverse. We carefully identified the different options to ensure we included the most relevant articles in our search. Another strength of our review is the thorough systematic search of three extensive databases, supplemented by systematic hand searches of reviews included in the search. Every step of the selection process was consistently executed and judged by two independent reviewers.

A limitation may be that we did not search the grey literature for evidence, thus some relevant studies may have been missed. Reporting bias may have influenced the outcomes of this review, as the studies included in the review only reported the positive effect of screening.

Implications

Screening for postpartum depression calls for a setting that has the facility to combine screening with the judgment of a professional, reaches most new mothers, has professionals available who are in a position to create a bond of trust, and offers frequent contact to the mother in the first year postpartum. Professional preventive services for child healthcare can meet all of these criteria, and our current review supports the potential of screening in WBC with positive evidence. The small number of studies limits the precision of the effect estimates.

Future research should aim at creating stronger evidence of the possible benefits of this combination of characteristics when screening in a WBC setting. General aspects of the design and intervention need attention, such as cut-off scores, golden standards to be used, a control group and the possibility of separating the effect of screening and subsequent offers of extra care. Moreover, new research should explore the benefits of repeated screening during the first year postpartum and, preferably, also include outcomes at child level.

CONCLUSIONS

The evidence in this review on the effectiveness of screening for PPD in a WBC setting is promising, though based on a limited number of studies. The use of a validated instrument like the EPDS led, in all the included studies, to significantly higher detection of mothers with depressive symptoms or, when screening was combined with enhanced care, to improvement of depression scores. Whether this leads to better outcomes for mother and child on the long term needs additional high-quality research. The potential health gains of screening for PPD in a WBC setting are large but need to be confirmed.

APPENDIX A

Final search terms in SCOPUS, listed per topic

Postpartum depression:
((TITLE-ABS-KEY(postpartum OR postnatal OR perinatal OR "after birth" OR puerperal) AND TITLE-ABS-KEY(depress* OR mood)))

Screening:
AND (TITLE-ABS-KEY(screening OR screen OR screened OR identif* OR "at risk" OR preventi* OR interven* OR recogni* OR "depression scale" OR tool OR program* OR strategy))

Well-baby care setting:
AND (TITLE-ABS-KEY(pediatr*) OR TITLE-ABS-KEY(paediatr*) OR TITLE-ABS-KEY(well child) OR TITLE-ABS-KEY("well-child") OR TITLE-ABS-KEY("well baby") OR TITLE-ABS-KEY("well-baby") OR TITLE-ABS-KEY("youth health care") OR TITLE-ABS-KEY("child health care") OR TITLE-ABS-KEY("home visit*") OR TITLE-ABS-KEY("health visit*") OR TITLE-ABS-KEY("maternal and child health") OR TITLE-ABS-KEY("maternal child health") OR TITLE-ABS-KEY("primary care") OR TITLE-ABS-KEY("primary health care") OR TITLE-ABS-KEY("public health") OR TITLE-ABS-KEY("community health") OR TITLE-ABS-KEY("postpartum care") OR TITLE-ABS-KEY("maternal care") OR TITLE-ABS-KEY("perinatal care") OR TITLE-ABS-KEY("perinatal health services"))

Excluded subject areas :
AND (EXCLUDE(SUBJAREA, "NEUR") OR EXCLUDE(SUBJAREA, "BIOC") OR EXCLUDE(SUBJAREA, "NEUR") OR EXCLUDE(SUBJAREA, "BIOC") OR EXCLUDE(SUBJAREA, "PHAR") OR EXCLUDE(SUBJAREA, "AGRI") OR EXCLUDE(SUBJAREA, "ENVI") OR EXCLUDE(SUBJAREA, "IMMU") OR EXCLUDE(SUBJAREA, "BUSI") OR EXCLUDE(SUBJAREA, "CENG") OR EXCLUDE(SUBJAREA, "DENT"))

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CHAPTER 3

Post-Up study: postpartum depression screening in well-child care and maternal outcomes

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ABSTRACT

Objective - Postpartum depression is common after childbirth, but often remains unaddressed. Screening in well-child care (WCC) may improve early detection, promote maternal recovery and reduce effects of postpartum depression on child development. We assessed the effectiveness of screening for postpartum depression in WCC, compared to care as usual (CAU), on outcomes at mother and child levels, i.e. the Post-Up study.

Methods - In a prospective, quasi-experimental comparative design, mothers visiting Dutch WCC centers were exposed either to screening at 1, 3 and 6 months postpartum (n=1843), or to CAU (n=1246). Assessments were at baseline (1 month), 9 months (MINI interview) and 12 months (STAI, SF-12, SENR and ASQ-SE questionnaires) postpartum.

Results – Significantly fewer mothers of the intervention group were depressed at 9 months postpartum compared to the CAU group (0.6% versus 2.5% for major depression), adjusted odds ratio 0.30 (95% confidence interval 0.13 - 0.66; Cohen's d 0.66). For minor plus major depression, figures were 3.0% versus 8.4%, adjusted odds ratio 0.38 (0.24 - 0.61); Cohen's d 0.53. On most secondary outcomes at maternal level (parenting, anxiety symptoms and mental health functioning) the intervention resulted in small effect sizes ranging from 0.23 to 0.27. At child level, the effect on socioemotional development was negligible.

Conclusion - Further implementation of screening for postpartum depression in a WCC setting should be seriously considered, given its positive effects on maternal mental health. The effects of optimized treatment and follow-up after screening for children of postpartum depression mothers need further attention.

INTRODUCTION

Postpartum depression is a common complication after childbirth, with a 7.1% period prevalence of major depression until 3 months postpartum (1). Most at risk are mothers with a history of depression, negative life events and lack of social support (2). Postpartum depression not only affects the well-being of the mother but may also have long-term consequences for her newborn child. Postpartum depression is associated with disturbed emotional regulation of infants, internalizing and externalizing behavioral difficulties of toddlers and schoolchildren, less developed social competences, and depression and ADHD in adolescence (3). Parental sensitivity in parenting seems to be an important mediator (3).

Early detection, support and treatment can promote fast recovery of the mother (4, 5) and may reduce the effects of postpartum depression on the child's development, but postpartum depression symptoms frequently remain unadressed (6). Implementing a structured assessment in primary care with a screening instrument like the Edinburgh Postnatal Depression Scale (EPDS) (7) can improve early detection. In the Netherlands, routine postpartum maternity care ends one week after delivery. There is only one standard follow-up contact with the midwife or gynecologist 6 weeks postpartum. Well-child care (WCC) professionals have frequent contacts with mothers during the entire postpartum year, which makes WCC a particularly suitable screening setting. WCC professionals can build a trust relationship, offer repeated screening, and motivate to seek further treatment if necessary.

Despite the potential benefits of the WCC setting, and promising results of screening for postpartum depression in general (4, 5), evidence on the value of screening for postpartum depression in the setting of WCC is limited. A recent systematic review found six studies examining the effectiveness of screening compared to care as usual (CAU) (8). Though limited, the evidence was indicative of a positive effect of screening for postpartum depression on detection, referral and treatment rates, and a reducing effect of screening on depression symptoms at follow-up. No effects were found for other outcomes at parent level. Relevant outcomes at child level were not examined, and only studies of weak quality examined the effects of repeated screening. Therefore, the aim of the Post-Up study was to determine whether repeated screening for postpartum depression in WCC, followed by routine care for screen-positive mothers, results in improved outcomes at both maternal level (state of depression, parenting, health-related quality of life, anxiety symptoms) and child level (decreased rates of socioemotional problems), at the end of the first year postpartum, compared to CAU.

PATIENTS AND METHODS

Design and participants

This study had a prospective, quasi-experimental comparative design. Participants were mothers visiting Dutch WCC centers, included after childbirth between December 1, 2012 and April 1, 2014. Participants were exposed either to a procedure of screening at 1, 3 and 6 months postpartum (intervention condition) or to CAU (control condition). Participants' allocation to intervention or CAU was based on their living area as registered in the municipal population register (MPR). Each living area was connected to a specific WCC organization. In total 23 WCC centers of one organization formed the intervention region, and 19 centers of two organizations the CAU region. Intervention and CAU regions were selected based on comparability of urbanity and the absence of specific interventions related to parental mental wellbeing. Exclusion criteria are indicated in the flowchart (Figure 1).

Ethical permission

The Medical Ethics Committee Twente assessed the study protocol and concluded that the measures pertaining to confidentiality and informed consent were appropriate and further that the study was beyond the remit of the Medical Sciences Research with Human Subjects Act.

Setting

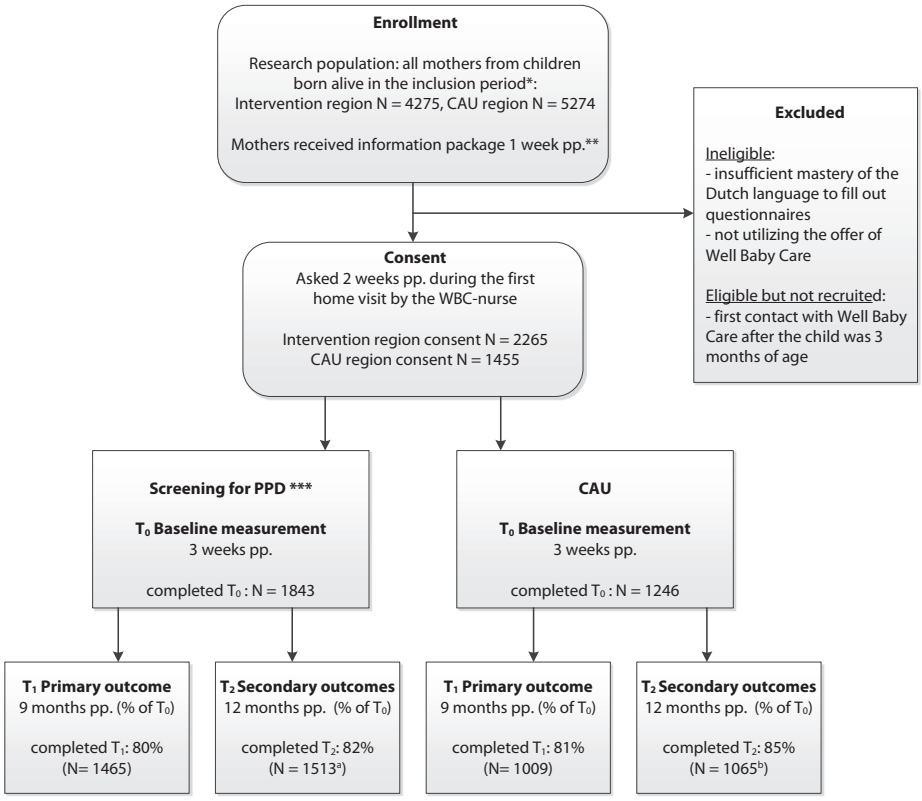
WCC centers offer free well-child care to parents of all newborn children in the Netherlands, including monitoring child growth, health and development, and vaccinations. Coverage is over 95% of the children registered in the MPR. The first contact is a home visit 2 weeks after birth.

Subsequently there are about 7 standard visits to the WCC center within the first year, usually carried out alternately by a WCC physician and nurse (9). WCC is nation-wide offered in a standardized way, with professionals working according to multiple guidelines of the Dutch Center on Preventive Child Health Care. Two institutes perform the training of all WCC physicians nation-wide. The quality of WCC is supervised by the Dutch Health Care Inspectorate.

Intervention

The intervention comprised early detection of postpartum depression by repeated screening, followed by advice on treatment options and by referral when needed. The EPDS (7) was used for screening. This widely utilized 10-item self-report measure was developed specifically for use in community samples of postpartum mothers. According to the pooled data in the review of Hewitt et al. (4), the EPDS will correctly identify 79% of the women with postpartum depression (sensitivity: 0.79 (95% confidence interval (CI) 0.74 to 0.83)), and 89% of the women with no postpartum depression (specificity: 0.89 (95% CI 0.85 to 0.92)). The Cronbach's alpha of the Dutch version is 0.82[10], which implies that the 10 items of the EPDS interrelate well and measure the same concept.

Figure 1 Flow chart of participants through the Post-Up study



* Inclusion period intervention region = 1-1-2013 to 31-3-2014, inclusion period CAU region = 1-12-2012 to 31-3-2014 ;
** pp. = postpartum ; *** EPDS at 1, 3 and 6 months pp. including subsequent advice and referral.
[a] 1287 mothers who completed T_0 and T_1 + 226 mothers who completed only T_0
[b] 919 mothers who completed T_0 and T_1 + 146 mothers who completed only T_0

Upon initiation of the screening, a guideline was developed, containing instructions on use of the EPDS, interpretation and referral options. The guideline was discussed in group intervision meetings of the professionals.

During the home visit 2 weeks postpartum, the WCC nurse explained the purpose of screening for postpartum depression and asked the mother to complete an EPDS form prior to the WCC visits at 1, 3 and 6 months. During these visits, the WCC physician scored the EPDS and discussed the outcome with the mother. A score ≥13 was interpreted as indicating a high risk of having major depression. If the physician's clinical impression was consistent with the score, guideline instructions were to refer the mother to her family practitioner or mental health care professional. EPDS scores from 9 to 12 were an indication for minor depression. According to the guideline, mothers with a 9-12 score were offered a home visit by the WCC

nurse, to clarify if the mother could cope with these symptoms on her own or with support from WCC, or needed further referral. In case of suicidal ideation, 24-hour crisis services were available, provided by the mental health care organizations in each region. Follow-up was part of standard care.

Care as usual (CAU)

In the CAU group, mothers and their newborns visited WCC at the same regular basis, but received no EPDS screening that guided further advice and referral. The professional conducted a routine interview with the mother; although the professional could ask about maternal depressive symptoms, this was not a standard part of the consultation. When depression was suspected, a home visit or referral for further help could be offered.

Procedures

Participation implied 3 assessments, at 3 weeks (T_0, baseline), 9 (T_1) and 12 months (T_2) postpartum for intervention and control mothers, plus the 3-fold EPDS filling-in for intervention mothers only. Participating mothers gave written informed consent during the WCC home visit. Invitations to fill in the online questionnaires at T_0 and T_2 were sent by email and mothers were reminded by email or telephone. Hardcopy versions were available on request. T_1 consisted of a telephone interview, administered by three master students in psychology, trained and supervised by a healthcare psychologist. Mothers not reached by telephone received a request to answer the questions online. Participating professionals were informed of the procedures of the Post-Up study in a face-to-face presentation, and received a manual explaining the procedures.

Blinding

Allocation of participants to screening or CAU groups could not be blinded as it was linked to the separate organizations providing WCC. Assessors of T_1 outcomes were blinded.

Primary outcomes

The primary outcome of this study was the presence of depression (major or minor) at 9 months postpartum, measured with the depression subscale of the Dutch Mini International Neuropsychiatric Interview (11) (MINI, version 5.0.0). The MINI is a structured diagnostic interview, developed to assess psychiatric diagnoses according to DSM-IV and ICD-10 criteria. The reliability of the MINI proved to be excellent, and validity sufficient (11-13). Depression definitions correspond to the DSM-IV criteria, with major depression implying the presence of at least 5 depressive symptoms and minor depression the presence of at least 2, but fewer than 5, symptoms, during a 2-weeks period.

Secondary outcomes at mother and child level

Secondary outcomes at mother level concerned health-related quality of life (HRQL), maternal anxiety, quality of parenting, and child socioemotional development, all at 12 months postpartum. The Short-Form 12-Item Health Survey (SF-12) (14) was used to measure HRQL. It is a validated instrument, with a physical and mental summary scale (PSC and MSC) which are calculated based on scoring algorithms (15). The SF-12 has good psychometric properties(14, 16).

Anxiety level was measured with the 6-item short form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI) (17). The Dutch translation showed good reliability and validity (18). Quality of parenting was measured with the Dutch version of the Maternal Self-Efficacy in the nurturing role questionnaire (SENR) (19), consisting of 16 statements regarding a mother's perceptions of her competence in caring for her infant. The Cronbach's Alpha of the Dutch version ranged from .78 to .89 (20, 21).

Socioemotional development of the children was measured with the 12 months version of the Ages and Stages Questionnaires: Social Emotional (ASQ:SE) (22, 23). Psychometric properties ranged from satisfactory to good (22, 24, 25).

Sample Size

Sample size was determined based on the expected difference in identified cases when performing a threefold screening, assuming a prevalence rate of postpartum depression of 6%, and detection rates of 70% through screening with the EPDS and 40% through CAU. Demonstrating a difference in identified cases between groups of 1.8% (4.2% vs. 2.4%) at $p<.05$ and with a power of 80% then required 1545 women in each group.

Background characteristics

Background characteristics measured at T_0 concerned demographic characteristics of the mother and her current partner (age, native country, living in an urban area, education level, employment, single mother); pregnancy characteristics (complications, preterm birth, firstborn); history of depression; and breastfeeding of the child.

Statistical analyses

First, we assessed the flow of participants through the study. Second, we described the background characteristics of the two groups; we assessed differences by using Chi-square tests. Third, we assessed differences between intervention and control conditions regarding the primary and secondary outcomes, based on intention-to-treat analyses, using Chi-square tests and independent sample t-tests. We further analyzed the differences between the conditions with regression models, and included as covariates those factors known to be associated with postpartum depression, with a significantly different frequency in intervention and CAU, i.e. urbanity of living area, employment of the mother, lifetime history of depression and initiation of breastfeeding after birth. To account for potential clustering of the effects per WCC we used

multilevel linear and logistic regression models. Moreover, we performed multiple imputation of missing values with the method based on chained equations (26). To calculate effect sizes, for dichotomous (yes/no) outcomes the corresponding odds ratio (OR) was transformed to Cohen's d (according to Hasselbald et al (27)). In case of regression coefficients, i.e. regarding continuous outcomes, B/SD was used as effect size. We performed data analyses using SPSS 24, and used R for multiple imputation and multilevel regression models.

RESULTS

A flow-chart of the Post-Up study is provided in Figure 1. Response rates for T_0 were 81% (n=1843) in the intervention group and 86% (n=1246) in the CAU group. In the intervention group subsequently 80% (n=1465) completed T_1 and 82% (n=1513) T_2, compared to 81% (n=1009) and 85% (1065) in the CAU group, respectively.

Background characteristics

Sociodemographic characteristics like age and education did not differ significantly between the intervention and CAU groups (Table 1). However, significantly more mothers in the CAU group were living in an urban area, were employed (>12hours/week), had a lifetime history of depression, had delivered their first-born child and had started breastfeeding after birth.

Effects on primary and secondary outcomes

In the intervention group significantly fewer mothers were depressed at 9 months postpartum (major depression: 0.6%, n = 11, minor + major depression: 3.0%, n = 56) than in the CAU group (major depression: 2.5%, n = 31, minor + major depression: 8.4%, n = 105), with an adjusted OR of 0.30 for major depression (95% CI 0.13 - 0.66) (Table 2), being a medium effect on depressive symptoms (Cohen's d 0.66). Regarding minor plus major depression, the adjusted OR was 0.38 (95% CI 0.24- 0.61; Cohen's d 0.53).

Mothers in the intervention group had significantly better scores on most secondary outcomes at maternal level (parenting, anxiety symptoms and mental health functioning), resulting in small effect sizes ranging from 0.23 to 0.27. We found no differences for the SF-12 PCS. At child level, the effect on the ASQ-SE was negligible (effect size 0.10). We observed no adverse events in the intervention group nor in the CAU group.

Table 1 Background characteristics (mean or %) of participants in the intervention and CAU group

Background characteristic	Intervention Participating Mothers (N = 1843)	CAU Participating Mothers (N =1246)	*p*[a]
Age mothers (mean)	30.6	30.8	.27
Age partners (mean)	33.5	33.4	.58
Mother Dutch born	95.3%	95.2%	.85
Partner Dutch born	95.2%	94.8%	.58
Single mother	0.9%	1.2%	.45
Living in urban area*	12.4%	40.4%	<.001
Mother education (medium-high)	88.3%	90.0%	.28
Partner education (medium-high)	81.4%	84.0%	.16
Mother employed (>12hours/week)	81.1%	84.6%	.04
Partner employed (>12hours/week)	93.9%	93.6%	.71
Depression	17.7%	23.0%	<.001
• Lifetime	1.6%	1.6%	.95
• During pregnancy	4.1%	5.6%	.06
• Previous postpartum **			
First-born child	45.1%	48.6%	.05
Preterm birth***	3.7%	3.0%	.28
Complications during pregnancy	24.0%	25.0%	.54
Breastfeeding started after birth	74.1%	82.5%	<.001

[a] Differences tested between participating mothers in intervention and CAU group

* ≥ 1000 addresses/km2; ** percentage of whole sample; *** birth before 37 weeks gestation

Process outcomes

Of 91.4% of the intervention mothers, EPDS forms were returned. Cumulative incidence of an EPDS-score ≥9 at 1, 3 or 6 months was 12.0%, including 4.0% of women with a score ≥13. Of the intervention mothers who could recall at T2 to have experienced a depressive period since giving birth, 60% reported to have consulted their family practitioner in relation to their depression and 38% to have received further treatment. Rates for CAU mothers were 60% and 37% respectively.

Table 2 Effects of screening for postpartum depression in well-child care on primary and secondary outcomes, crude and adjusted for potential confounders: multilevel logistic models leading to odds ratios, ORs, and multilevel linear regression models leading to regression coefficients, Bs, based on imputed data sets

Outcomes	Intervention (n=1843)	CAU (n=1246)	Crude Difference	*p*	Adjusted Difference[1]	*p*	Effect size
Primary * (% (n); OR (95% CI); Cohen's *d*)	0.6% (11)	2.5% (31)	0.23 (0.10 ; 0.49)	<.001	0.30 (0.13 ; 0.66)	.001	0.66
MINI major depression	3.0% (56)	8.4% (105)	0.33 (0.21 ; 0.53)	<.001	0.38 (0.24 ; 0.61)	<.001	0.53
MINI minor + major depression							
Secondary ** (mean; B (95% CI); B/SD)							
Mother level							
SENR total score[a]	100.8	98.0	2.68 (1.77 ; 3.59)	<.001	2.19 (1.48 ; 2.89)	<.001	0.23
SF-12 PCS score[a]	52.4	52.8	-0.43 (-1.12 ; 0.32)	.12	-0.53 (-1.29 ; 0.23)	.07	0.06
SF-12 MCS score[a]	51.7	49.2	2.56 (1.59 ; 3.53)	<.001	2.17 (1.33 ; 3.02)	<.001	0.26
STAI-6 total score[b]	33.9	37.3	-3.47 (-4.99 ; -1.98)	<.001	-3.09 (-4.43 ; -1.75)	<.001	0.27
Child level							
ASQ-SE score[b]	13.0	14.4	-1.36 (-2.45 ; -0.26)	.003	-1.06 (-2.14 ; 0.01)	.02	0.10

OR = Odds Ratio; B = regression coefficient; CAU = care as usual; CI = Confidence Interval; MINI = Mini International Neuropsychiatric Interview; SD = standard deviation; SENR = Maternal Self-Efficacy in the nurturing role questionnaire; SF12 PCS = Short-Form 12-Item Health Survey - Physical Composite Summary; SF-12 MCS = Short-Form 12-Item Health Survey - Mental Composite Summary; STAI-6 = State-Trait Anxiety Inventory - 6-item short form (state scale); ASQ-SE: Ages and Stages Questionnaires: Social Emotional

[1] Based on logistic regression model with variables: urbanity of living area + mother employed + lifetime history of depression + started breastfeeding after birth

* measured 9 months postpartum; ** measured 12 months postpartum

[a] higher score indicates more positive outcome; [b] lower score indicates most positive outcome

DISCUSSION

This study found a medium effect of screening for postpartum depression in a WCC setting, compared to CAU, on depression of mothers at 9 months postpartum. We also found small effects for secondary outcomes at mother level, including parenting, anxiety symptoms and mental health functioning, but negligible effects on the socioemotional development of the child.

Our findings of the substantial effect of screening on maternal depression later in the postpartum year confirm findings of other studies on screening for postpartum depression in WCC (8) and other settings (4, 5). However, our use of the MINI structured diagnostic interview provided us with a more valid outcome than that of most previous studies, which used a screening instrument instead. Our study therefore provides stronger evidence that screening for postpartum depression in a WCC setting is an effective way to reduce maternal depressive symptoms.

Other studies found zero to modest effects of screening on the secondary outcome maternal mental health functioning, using various measures(8),(28, 29). The findings in our study are most in line with the cluster randomized trial of Morrell et al(29), but with larger effect sizes. In previous studies no effects of screening were found on another secondary outcome; parenting at one year postpartum (4, 5, 8, 29). In contrast, we found a modest improvement of maternal self-efficacy in parenting (SENR), which underlines the potential beneficial effect of screening for postpartum depression on parenting.

We found screening for postpartum depression to have a negligible effect on socioemotional development of the child, with no former evidence to compare with. An explanation could be that a longer interval may be required to determine effects from undetected maternal depression on the child's socioemotional development. Also, the relatively low sensitivity of the ASQ:SE (25) may have led to underestimation of the number of children with problematic socioemotional development.

Strengths and limitations

Our study has several strengths. First, it was performed in a large community-based sample and was adequately powered. Second, we had relatively high retention rates at T_1 and T_2, limiting the potential of selective dropout. Third, the primary outcome was measured with a strong golden standard, i.e. the MINI interview.

A potential limitation is that our quasi-experimental design might have led to differences between groups, thereby affecting our findings. However, differences between groups were generally small, limiting any potential bias. Another limitation regards potential clinic-specific effects on the outcomes. However, we expect this bias, if any, to be small, as WBC is carried out in a very standardized way in the Netherlands. The same goes for the care provided by family practitioners, as they work according to a national depression guideline(30). A final limitation is the limited information on the trajectory of referral and received care in both groups.

Implications

The Post-Up study provides strong evidence for a moderate effect of screening with the EPDS on maternal depressive symptoms and, to a lesser extent, on levels of maternal anxiety and general mental well-being. This implies that we should seriously consider further implementation of screening for postpartum depression in WCC, which fits well with the recent recommendation statement on screening for depression in adults of the US Preventive Services Task Force (31) and the 2017 recommendations for preventive pediatric healthcare released by the American Academy of Pediatrics (32). WCC appears to be a suitable and effective screening setting, enabling repeated screening of the majority of postpartum mothers.

Benefits are likely to increase further, when optimizing the trajectory after screening (33), as less than 40% of the women who reported at T2 to have had postpartum depression, actually received treatment in addition to visiting their family practitioner. The supporting and normalizing role of WCC may have prevented the need for further treatment, especially in mild cases. Intensifying professionals' training with motivational skills and more attention for follow-up could further improve the outcomes. Further research is needed to clarify this. We found a promising effect on parenting, though not reflected in the child's socioemotional functioning. Attention for the mother-child interaction in the trajectory after screening may improve child outcomes (34, 35); this evidently requires further study.

The size of the effects that we found suggests that screening for postpartum depression is likely to be cost-effective for society, as besides the additional time needed for the professional, other investments required for screening for postpartum depression are low. When considering further implementation, more information on the received care of screen-positives, including the false positives, is needed to determine the impact on costs.

CONCLUSION

Screening for postpartum depression in WCC in this study resulted in improvement of both maternal depressive symptoms and overall mental health and parenting. This promising finding warrants wider implementation of screening on postpartum depression.

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Note: A small inconsistency in the original publication between Table 2 and the main text/summary has been corrected.

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CHAPTER 4

The Edinburgh Postpartum Depression Scale: stable structure but subscale of limited value to detect anxiety

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ABSTRACT

Purpose - The Edinburgh Postnatal Depression Scale (EPDS) aims at detecting postpartum depression. It has been hypothesized that a subscale (items 3, 4, 5) may detect anxiety. The aim of this study is to assess whether this EPDS anxiety subscale is present in a community-based dataset, and if so, to assess its validity and stability during the first six months postpartum.

Methods - We obtained EPDS data of a community sample of 1612 women at 1 month, with follow-up at 3 and 6 months, postpartum (Post-Up study). We performed an exploratory factor analysis on the EPDS forcing two- and three-factor solutions. We assessed the correlations of the extracted factor subscales and the total EPDS with the short-form of the STAI (STAI-6). We examined the stability of the identified factors by means of a confirmatory factor analysis (CFA), using the EPDS data collected at 3 and 6 months postpartum.

Results - Both the two- and three-factor solutions contained a hypothesized anxiety subscale of items 3,4,5,10, and fitted well with the 3- and 6-months EPDS data, with CFI and TLI values >.99 and RMSEA and SRMR values <.035 and <.45. The subscale's Pearson correlations with the STAI-6 were moderate: .516, compared to .643 for the total EPDS.

Conclusions - The factor structure of the EPDS is stable across the first six months postpartum, and includes the subscale assumed to represent anxiety. However, this subscale as well as the total EPDS correlate only moderately with anxiety criteria. Using the EPDS thus does not imply adequate screening for anxiety.

INTRODUCTION

In the postpartum period, both depression and anxiety frequently occur, with reported meta-analysis period prevalence rates of 19.2% for major and minor depression (0-3 months postpartum) (1), and 13.2% for anxiety (0-24 weeks postpartum) (2). The co-occurrence of depression and anxiety seems to be high; Fallah-Hassani et al. reported meta-analysis prevalence rates of 3.5 to 9.2% in the first 24 weeks postpartum (3). Comorbidity of depression and anxiety is associated with more persistent depression (4, 5), which increases the risk of negative consequences for the offspring (6, 7). Therefore, adequate recognition and treatment of both depression and anxiety are essential. However, until now interventions focusing on postpartum maternal mental wellbeing have mainly addressed postpartum depression (PPD) (8).

A key step in addressing maternal mental disorders in the postpartum period is early detection. Primary care settings usually make use of the Edinburg Postnatal Depression Scale (EPDS) (9) to screen for PPD (10). Though the EPDS was developed to detect PPD, many studies of its structure detect two or three factors, recently summarized in an overview by Coates et al. and Kozinsky et al. (11, 12). Interestingly, the majority of the factor solutions found contained a subscale formed by three items (3, 4 and 5), interpreted as being an anxiety subscale, even though evidence on the total number of factors and item allocation is inconclusive. This hypothesized anxiety subscale, named the EPDS-3A by Matthey (13), might be of clinical interest when considering screening for anxiety along with PPD. However, evidence for the validity of the EPDS-3A to detect anxiety is limited, provided by studies with small or selected populations (13-15). The same limited evidence applies to the postpartum stability of the subscale, with only one study in a community based sample (12) finding a stable structure at two postpartum intervals, thereby making conclusions on clinical use rather premature. Therefore, the aim of this study is to assess whether the hypothesized EPDS anxiety subscale is present in EPDS data of a large community based sample, and if so, to assess whether this subscale enables measurement of anxiety in addition to depression, and is stable across the first six months postpartum.

MATERIALS AND METHODS

Procedures and sample

We used data of the Post-up study, a study on the effectiveness of repeated screening for PPD with the EPDS, compared to care-as-usual in well-child care. The current study was limited to data on the intervention region. Procedures, including details on enrollment and exclusion criteria and on data collection, are fully described elsewhere (16). In the intervention region, 4275 women with a newborn child visiting the participating well-child care centers in the inclusion period were eligible for enrollment. Informed consent was obtained from 2265 mothers, of whom 1843 completed the baseline assessment (3 weeks postpartum). Prior to their

visit to the well-child care center at 1, 3 and 6 months, intervention mothers were asked to fill in a hardcopy version of the EPDS. During their consultations, well-child care professionals used the EPDS results, and afterwards returned the anonymized EPDS forms to the research team for further analysis. Data of mothers with a completed baseline assessment and at least one EPDS returned were used in this study, resulting in a sample of 1612 women, i.e. a retention of 71.1%.

Measures

The Edinburg Postnatal Depression Scale is a 10-item self-report measure, developed specifically for use in community samples of postpartum mothers (9). By choosing one of four responses (scored 0 to 3), women can indicate the extent to which each statement corresponds to their mood over the past 7 days. The sum of item scores forms the total score, with higher scores implying more depressive symptoms. The Dutch version was validated in 1992 (17), showing adequate concurrent validity, and a standardized Cronbach's alpha of .82.

Anxiety level was measured at baseline assessment at 3 weeks postpartum with the 6-item short form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI-6) (18). For each item (calm, tense, upset, relaxed, content and worried) the experienced current status is indicated on a 4-point scale. The Dutch version has been shown to have good reliability (Cronbach's alpha .83) and validity (correlation with the STAI full version: .95) (19).

Background characteristics, measured at 3 weeks post-partum, concerned demographic characteristics of the mother (age, native country, living in an urban area, educational level, employment, single mother); pregnancy characteristics (complications, preterm birth, firstborn); history of depression; and breastfeeding of the child.

Statistical analysis

First, we described the sample. Second, we examined the suitability of our data for structure detection by performing the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test (KMO) and Bartlett's test of sphericity. Third, we assessed the factor structure of the EPDS and whether in mothers one month post-partum we could indeed identify an anxiety subscale, in addition to a depression subscale. We did so by assessing the factor structure of the EPDS, using an Exploratory Factor Analysis (EFA) with maximum likelihood extraction and oblique rotation (direct oblimin) (20, 21), based on a polychoric covariance matrix. In this EFA we forced two- and three-factor solutions as parallel analyses. We used a polychoric correlation matrix because of the skewness of distribution of answer categories of the EPDS items. We evaluated the EFAs based on eigenvalues, total amount of variance explained, factor loading and Cronbach's alpha. Fourth, we assessed whether one of the extracted factor subscales indeed measured anxiety, by calculating the Pearson correlations of the subscale scores and of the total EPDS score with the STAI-6. In addition we computed the area under the receiver operating characteristic (ROC) curve (AUC) for both the anxiety-subscale and the total EPDS scores, with the STAI-6 (cut-off $\geq$ 42, prorated score) (22, 23). Finally, we assessed the stability of the EPDS structure, i.e. its measuring of both depression and anxiety, across the first six months postpartum. We did so by

determining whether the structure of the EPDS at 3 and 6 months differed from that at 1 month, using CFA. Items were fixed on the factor with the highest loading. Fit indices reported are Chi-square (including (df) and *p*), the comparative fit index (CFI), the Tucker-Lewis fit index (TLI), the root mean square error of approximation (RMSEA) (including 90 % confidence interval (CI) and *p*) and the Standardized Root Mean Square Residual (SRMR). CFI and TLI values greater than .95, RMSEA < .06 and SRMR < .08, were considered indicative of good fit, preferably in combination (24, 25). We performed data analyses using SPSS 24 and R with the lavaan package (26).

RESULTS

Background characteristics

Background characteristics of the sample are presented in Table 1. National demographic data of the Dutch population of 2013 show comparable characteristics for mean age at giving birth (31.0 years), first-born child (46%) and medium-high education (84.7 % for all women aged 25 to 45 years) (27).

Of the total sample of 1612 mothers, of whom at least one EPDS had been returned to the research team, 1339 mothers filled in an EPDS at 1 month (SD 1.1 weeks), 1272 at 3 months (SD 1.7 weeks) and 1040 at 6 months (SD 1.5 weeks). Mean EPDS scores were 3.7 at 1 month, 2.8 at 3 months and 2.7 at 6 months.

Table 1 Background characteristics (mean plus standard deviation (SD), or %) of participants

Background characteristic	Participating Mothers (N = 1612)
Age mothers (mean)	30.6 (SD=4.0)
Age partners (mean)	33.5 (SD = 4.8)
Mother Dutch born	95.8%
Partner Dutch born	96.0%
Single mother	1.0%
Living in urban area*	11.5%
Mother education** (medium-high)	88.8%
Partner education** (medium-high)	81.6%
Mother employed (>12hours/week)	83.0%
Partner employed (>12hours/week)	94.5%
Depression	
• Lifetime	17.7%
• During pregnancy	1.6%
• Previous postpartum ***	4.1%
First-born child	45.0%
Preterm birth****	3.6%
Complications during pregnancy	24.6%
Breastfeeding started after birth	74.4%

* ≥ 1000 addresses/km2; ** comparable with level 3 or higher of the ISCED classification (International Standard Classification of Education)(28)*** percentage of whole sample; **** birth before 37 weeks gestation

Factor structure of EPDS at one month postpartum

The EPDS data at one month postpartum were found suitable for factor analysis with a KMO statistic of .91 and a significant Bartlett's test of sphericity ($p< 0.001$). Table 2 shows the outcomes of the EFA with forced two -and three-factor solutions. Both the two- and three-factor solutions resulted in a factor formed by items 3, 4, 5 and 10, labeled as 'anxiety subscale'. In the two-factor solution the other factor was formed by the remaining items 1, 2, 6, 7, 8, 9, labeled 'two-factor depression subscale'. In the three-factor solution these items were split up in a subscale formed by items 1 and 2, labeled the 'three-factor anhedonia subscale', and a subscale formed by items 6,7, 8, 9, labeled the 'three-factor depression subscale'.

Table 2 Factor solutions of items of the Edinburgh Postpartum Depression Scale for the forced two- and three-factor solutions at 1 month: factor loading, Eigenvalues, variances explained and Cronbach's alphas

	Two-factor			**Three-factor**			
EPDS items	**1**	**2**		**1**	**2**	**3**	
1. I have been able to laugh and see the funny side of things	**.822**	.004		.032	.094	**.821**	
2. I have looked forward with enjoyment to things	**.873**	.168		.096	.065	**.786**	
3. I have blamed myself unnecessarily when things went wrong	-.032	**.766**		.244	**.647**	-.168	
4. I have been anxious or worried for no very good reason	.060	**.623**		.092	**.587**	.030	
5. I have felt scared or panicky for no good reason	.023	**.760**		.113	**.826**	.142	
6. Things have been getting on top of me	**.611**	.213		**.330**	.221	.325	
7. I have been so unhappy that I have had difficulty sleeping	**.622**	.245		**.510**	.245	.152	
8. I have felt sad or miserable	**.859**	.003		**.771**	-.036	.155	
9. I have been so unhappy that I have been crying	**.795**	.093		**.888**	.007	.015	
10. The thought of harming myself has occurred to me	.303	**.482**		.375	**.421**	.003	
Eigenvalues	3.90	2.17		2.52	2.07	1.85	
Variance explained %	39.04%	21.67%	60.71%*	25.21%	20.71%	18.46%	64.39%*
Cronbach's alpha	0.79	0.61		0.73	0.61	0.67	

Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization.
Rotation converged in 20 iterations.
* Total variance explained

In both solutions item 10 presented with low loadings and minimal cross loadings. This was also the case for item 6 in the three-factor solution. Eigenvalues ranged from 1.85 to 3.90, and resulted in a total variance explained of 60.7% for the two-factor solution and 64.4% for the three-factor solution. Cronbach's alphas for the two- and three-factor solutions varied from .61 to .79, implying acceptable reliability. Correlations between the factors in the factor models can be found in S1 and S2 Figs.

Correlations of total EPDS and subscales with STAI-6

The correlation with the STAI-6 (maximum administration interval of 7 days (N=550)) was strongest for the total EPDS (Pearson correlation .643). Moreover, the correlation of the STAI-6 with the two-factor depression subscale was stronger (.605) than the correlation with the anxiety subscale (.516). The three-factor subscales resulted in correlations with the STAI-6 of .520 (anhedonia subscale) and .565 (depression subscale). Similar correlations resulted from including more mothers by enlarging the maximum administration interval between EPDS and STAI-6 to 7 weeks (N=1256), and from leaving item 10 out of the anxiety subscale. AUC for the anxiety-subscale was .729 versus .811 for the total EPDS.

Stability of EPDS structure across the first six months postpartum

Table 3 shows the extent to which the two- and three-factor models fit the EPDS data collected at three and six months postpartum. CFI and TLI values > .99 and RMSEA and SRMR values < .035 and <.45 respectively, indicate good fit for both models. The three-factor model found in the EFA performed the best. Omitting item 10 out from the CFA resulted in comparable outcomes (S1 Table).

Table 3 Fit indices corresponding with the Confirmatory Factor Analysis of the two- and three- factor model for 3 and 6 months

Fit indices	3 months two-factor model	3 months three-factor model	6 months two-factor model	6 months three-factor model
Chi square	73.8	29.6	71.8	47.1
(df)	34	32	34	32
p (Chi square)	<.001	0.587	<.001	<.001
RMSEA (90%)	.030 (.021-.040)	.000 (.000-.019)	.033 (.022-.043)	.021 (.004-.034)
p-value RMSEA <= .05	100%	100%	99.7%	100%
CFI	.997	1.0	.997	.999
TLI	.996	1.0	.996	.998
SRMR	.039	.023	.044	.034

DISCUSSION

During our factor structure analysis of the EPDS data, collected in a large community sample of postpartum women, we found the EPDS to have a subscale formed by items 3, 4, 5 and 10, in both the two- and three-factor solutions. This hypothesized anxiety subscale was stable across the first six months postpartum. We further found only a moderate correlation of this subscale with the STAI-6 as criterion for anxiety, at one month postpartum. Correlations with the STAI-6 were stronger, though still moderate, for the total EPDS, and also for the depression subscale from both the two- and three-factor solutions.

Findings compared to current evidence

The presence of a subscale containing EPDS items 3, 4 and 5 in our EPDS factor structure analysis confirms previous findings from comparable studies with a large community sample and timing of the EPDS within 4-6 weeks postpartum (12, 29-32). Our finding also confirms findings from studies with broader or different postpartum timeframes or more specific populations (13, 14, 33, 34). Our study results differ from these studies regarding the position of item 10 (the item asking for suicidal ideation), as in most studies item 10 is loading more on the depression factor. Our inclusion of item 10 in the anxiety subscale may have been caused by our use of a polychoric matrix, which may better suit the data concerned. However, as in previous studies, loadings of item 10 were low, i.e. the item was rather undetermined. This may align with the vision to consider item 10 as an item with the specific function to detect potential suicidal risk. Regarding the stability of the EPDS in the postpartum period, our findings correspond to the outcomes of Coates et al. (12), who found a stable structure with the hypothesized anxiety subscale, from 8 weeks to 8 months postpartum. In sum, the hypothesized anxiety subscale appears to be present and stable in large community samples.

Our findings on the correlation of the hypothesized anxiety subscale are in line with the study of Brouwers et al. (35), who also found moderate correlations during pregnancy for the anxiety subscale and the STAI, and somewhat stronger correlations for the total EPDS as well as the depression subscale. Other studies assessing only correlations between the STAI (full-form) and the total EPDS, reported substantially stronger correlations (36-38). Two studies with positive conclusions on the value of using the anxiety subscale to detect anxiety did not validate the subscale (39, 40). The only study providing evidence in favor of the validity of a 3, 4, 5 item anxiety subscale was that of Matthey (13) (N=238, 7.6%, met the anxiety disorder criteria), with a subscale sensitivity of 67% and a specificity of 82% at 6 weeks postpartum (criterion Diagnostic Interview Schedule).

The limited evidence for the hypothesized subscale's representation of anxiety might imply that this subscale actually does not represent anxiety. Brouwers et al. (35) noted the subjective, negative judgement, incorporated in items 3, 4 and 5 (e.g. "for no good reason"), which may relate to another construct like low self-esteem. The correlations of the total EPDS

and other subscales with anxiety, indicate that anxiety is measured at least as much by the other EPDS-items. This implies that the total EPDS does to some extent detect anxiety symptoms in addition to depression symptoms, but that its subscales do not have added value for this.

Strengths and limitations

Strengths of our study are its community based sample and its large sample size. Another strength is our use in the analyses of a polychoric matrix, which is a more adequate statistical method when performing a factor analysis with ordinal data (41), but as yet rarely used in factor analyses of the EPDS.

A limitation of our study might be the use of the STAI-6 as anxiety criterion, as it probably measures depression in addition to anxiety, as is similar to the STAI full form (42, 43). Further, the non-simultaneous administration of the EPDS and STAI-6 may have deflated the correlations, though in our analyses we minimized this effect by limiting the maximum interval to 7 days.

Implications

Our study provides clear evidence for an EPDS subscale of items 3, 4, 5 and 10 which is stable across the first six months postpartum, but could not ascertain this subscale to adequately detect anxiety symptoms. The total EPDS performed better than our hypothesized anxiety subscale, but still correlates only moderately with our anxiety measure. This implies that using the EPDS in routine care, does not enable the professional to detect most cases of both depression and anxiety, nor enables to discriminate between the two. Research findings based on the EPDS subscales should be interpreted with caution.

Further research is needed to assess the maximum potential of the EPDS in the detection of anxiety, and whether additional efforts should be made to detect both depression and anxiety reliably and efficiently in an early stage. This may add to screening policies for both depression and anxiety regarding women during pregnancy and the postpartum period (44, 45), and thus promote maternal mental health.

CONCLUSION

Our large community based study shows that the factor structure of the EPDS is stable across the first six months postpartum and includes a subscale generally assumed to represent anxiety. This subscale correlates only moderately with our anxiety criterion though, with the total EPDS performing slightly better. Adequate screening for anxiety may require an additional effort on top of the current EPDS.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

ACKNOWLEDGEMENTS

We would like to express our gratitude to all mothers who participated in this study.

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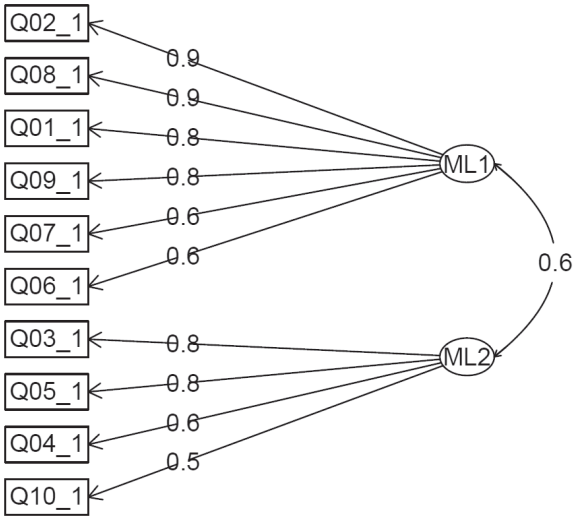
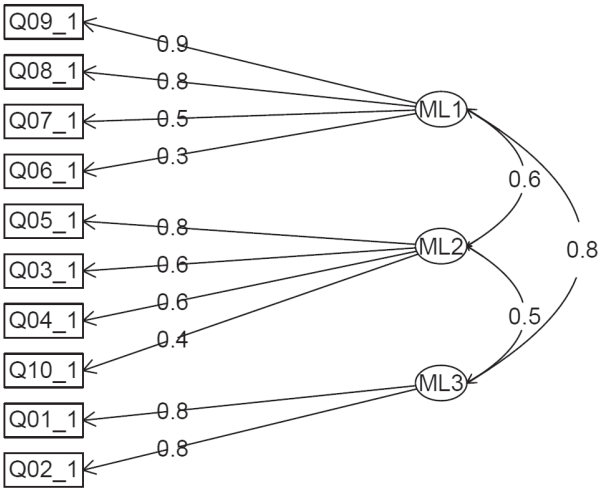
SUPPORTING INFORMATION

S1 Fig Correlations two-factor model



S2 Fig Correlations three-factor model



S1 Table Fit indices corresponding with the Confirmatory Factor Analysis leaving item 10 out of the two- and three- factor model for 3 and 6 months

Fit indices	**3 months two-factor model**	**3 months three-factor model**	**6 months two-factor model**	**6 months three-factor model**
Chi square	65.1	20.1	71.8	47.1
(df)	26	24	34	45
p (Chi square)	<.001	.691	<.001	<.001
RMSEA (90%)	.035 (.024-.045)	0.000 (0.000-0.018)	.033 (.022-.043)	.021 (.004-.034)
p-value RMSEA <= .05	99.3%	100%	99.7%	100%
CFI	.997	1.000	.997	.999
TLI	.996	1.000	.996	.998
SRMR	.042	.023	.044	.034

CHAPTER 5

Postpartum depression and anxiety: a community based study on risk factors before, during and after pregnancy

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ABSTRACT

Background - Depression and anxiety occur frequently postpartum, calling for early detection and treatment. Evidence on risk factors may support early detection, but is inconclusive. Our aim was to identify risk factors for postpartum depression and anxiety, before, during and after pregnancy.

Methods - We used data from 1406 mothers of the intervention arm of the Post-Up study. Risk factors were collected at 3 weeks and 12 months postpartum. Depression and anxiety symptoms were measured in the first month postpartum by the Edinburgh Postnatal Depression Scale (EPDS) and 6-item State-Trait Anxiety Inventory (STAI-6), respectively. We used stepwise logistic regression to identify relevant risk factors.

Results - Of the mothers, 8.0% had EPDS-scores ≥9 and 14.7% STAI-6-scores ≥42. Factors associated with higher risk of depression were: foreign language spoken at home, history of depression, low maternal self-efficacy and poor current health of the mother. No initiation of breastfeeding was associated with lower risk of depression, no breastfeeding at 3 weeks postpartum increased the risk. Factors associated with higher risk of anxiety were: higher educational level, history of depression, preterm birth, negative experience of delivery and first week postpartum, excessive infant crying, low maternal self-efficacy, low partner support and poor current maternal health.

Limitations - Use of a self-report instrument, potential bias by postpartum mood status, and no inclusion of emerging depression cases after one month postpartum..

Conclusions - The shared and separate risk factors for postpartum depression and anxiety may help professionals in identifying mothers at increased risk and provide opportunities for preventive interventions and treatment.

INTRODUCTION

Maternal mental well-being during the postpartum period is of major importance both for the mother and for a healthy development of the newborn. However, such well-being is not a matter of course, as at least one out of ten mothers suffer from depression symptoms (1). In fact, more recent studies show that a similar or even greater share of mothers experience anxiety symptoms (2, 3). A meta-analysis by Dennis et al. showed a postpartum period prevalence (0-24 weeks) of 13.7% for anxiety symptoms and 8.4% for anxiety disorders (4). Infants of mothers with depression have a greater chance of negative outcomes in development, especially when the mother's symptoms are severe or become chronic (5, 6). Although the effects of anxiety on child outcomes have been less thoroughly investigated than the impact of depression (7), recent studies have reported negative effects of anxiety on mother–infant interactions, feeding practices, infant temperament, and social-emotional development (8-10).

Addressing both postpartum depression and anxiety at an early stage may help to reduce the severity and chronicity of symptoms, as well as the impact on the child's health and development. Knowledge of the factors influencing the risk of developing postpartum depression and anxiety may support early detection. These factors may already be present before women get pregnant, but may also arise during pregnancy, or afterwards, implying opportunities for health care professionals to reduce risk factors at different stages, thereby preventing mothers from developing depression and/or anxiety.

More than twenty years ago, both O'Hara et al. and Beck et al. published meta-analyses involving broad perspectives on risk factors for postpartum depression (11, 12). Factors like history of depression, prenatal depression, lack of social support, and life stress consistently emerged as contributors to the risk of postpartum depression. However, for several other factors effect sizes and associations varied substantially, probably due to methodological differences (e.g. instrument and way of assessment, and interval between birth and assessment). Since then, many articles and several systematic meta-analyses on risk factors for postpartum depression have been published, but with a shift of focus from the broader perspective to specific risk factors (13). Comparing results across articles has been complicated by the variety of risk factor definitions and statistical methods, and the different sets of variables included (Hutchens and Kearney, 2020). Ideally, a comprehensive approach would include in the same study factors from before, during and after pregnancy. However, factors from the postpartum period received little attention in many studies.

Regarding anxiety, the body of literature on risk factors is far more limited (8), with findings limited mainly to single studies (14). Also, some studies reported findings based on univariate analyses only (15, 16). Factors for which associations with anxiety are reported by more than one study, and by studies using multivariate analyses, were: ethnicity (2, 17), partner support (15, 18, 19), (maternal) self-efficacy (15, 20) and history of depression (17, 18). The aim of this study was therefore to identify risk factors for developing postpartum depression as well as anxiety, that occur before, during, and after pregnancy in the general population.

METHODS

Study design

Data used for this study were collected as part of the Post-Up study (21), a prospective, quasi-experimental, comparative study on the effectiveness of screening for postpartum depression in well-child care. Data on potential risk factors (except life events) and on anxiety symptoms were assessed at baseline measurement 3 weeks postpartum, using an online questionnaire. Data on depression symptoms were collected at the well-baby visit one month postpartum. Finally, data on life events (including relationship problems and serious illness) were collected with an online questionnaire 12 months postpartum.

Sample

The sample consisted of mothers of children born between December 1, 2012 and April 1, 2014. Participants had adequate mastery of the Dutch language and used the services of well-child care in the eastern part of the Netherlands. Enrollment and exclusion criteria are described in detail elsewhere (21). For the current study, data of 1406 mothers from the intervention arm of the comparative study were used.

Risk factor measures

We collected data on risk factors before, during and after pregnancy, as shown in Table 1. To measure most factors, including depression during pregnancy, we used single questions. To measure social support we used the SSL12-I (22), a shortened version of the Social Support List-Interactions developed by Van Sonderen (23) (Cronbach's Alpha 0.87) (24). To assess maternal self-efficacy we used the Maternal Self-Efficacy in the nurturing role questionnaire (SENR) (25), a 16 item questionnaire regarding the mother's perceptions of her competence in caring for her infant. The Cronbach's Alpha for the Dutch version ranged from .78 to .89 (26, 27). Excessive crying, as defined by the Wessel criteria, implied an infant crying for > 3 hours per day, ≥ 3 days per week, for ≥3 weeks (28). We assessed life events using a list of 21 items, covering the most important life events (including illness, loss of close relatives, loss of a job, financial problems, experienced violence). All risk factors were dichotomized to yes/no categories.

Outcome measures

Outcome measures regarded depression and anxiety symptoms. We measured *depression symptoms* using the Edinburg Postnatal Depression Scale (EPDS), a 10-item self-report measure, developed specifically for use in community samples of postpartum mothers (29). The Dutch version was validated in 1992 (30), showing adequate concurrent validity and a standardized Cronbach's alpha of .82. Presence of depression symptoms was defined by an EPDS score ≥ 9, expected to imply a sensitivity of 85% and a specificity of 82% (minor and major depression) based on the pooled data of Hewitt et al (31).

We measured *anxiety symptoms* using the 6-item short form State-Trait Anxiety Inventory (STAI-6) at 3 weeks postpartum (32). Validity and reliability of the Dutch version were good, with a correlation with the STAI full version of .95 and a Cronbach's alpha of .83 (33). Presence of anxiety symptoms was defined as a score ≥ 42 (34, 35).

Statistical analysis

First, we assessed the presence of depression symptoms (EPDS ≥ 9) and anxiety (STAI ≥ 42) symptoms and calculated the frequencies of each risk factor in the total sample.

Table 1 Measured maternal risk factors in the periods before, during and after pregnancy

Before pregnancy	During pregnancy	After pregnancy
Age related factors:	Unplanned pregnancy	Child's gender (male)
- being a young mother (<25 years)	Unwanted pregnancy	Child's health problems
- being an older mother (>36 years)	Smoking/Alcohol/	Negative experience of the first week
Ethnicity related factors:	Substance use	postpartum
- born non-Dutch	Life events related	Feeding related factors:
- foreign language spoken at home	factors:	- no initiation of breastfeeding
Education level low*	- experienced ≥1 life	- no breastfeeding at 3 weeks
Employment related factor:	event	postpartum
- work <12 hours/week	- experienced violence[a]	- low satisfaction with feeding
Life events related factors:	Relationship related	Crying related factors:
- experienced ≥3 life events **	factor:	- crying meets Wessel criteria
- experienced violence **[a]	- experienced	- experiencing crying as excessive
Relationship related factors:	relationship problems	- experiencing difficulties in
- experienced relationship problems **	Depression during	soothing
- being a single mother	pregnancy	Sleep related factor:
Lifetime history of depression	Medical complications	- sleep of mother disturbed
First parity	Negative pregnancy	Maternal self-efficacy in parenting
Health related factors:	experience	- low SENR-score
- having been seriously ill **	Preterm birth	Social support related factors:
- poor general health before getting	Delivery related factors:	- low support partner
pregnant	- complications during	- low support network
- poor physical condition before	delivery	- low SSL12-I score
getting pregnant	- negative delivery	Health related factors:
	experience	- poor current health of the
	- delivery at home	mother

* comparable with level 2 or lower of the ISCED classification (International Standard Classification of Education) ** occurring in the two years before getting pregnant [a] faced aggression, threat or violence, or fell victim to a crime

SENR, Maternal Self-Efficacy in the nurturing role questionnaire; SSL12-I, Social Support List - Interactions

Second, we assessed risk factors for developing postpartum symptoms of either depression or anxiety, occurring before, during, and after pregnancy; we used univariable logistic regression analyses for all variables. We included all variables (from the periods before, during and after pregnancy) with *p*-values <.25 (in univariable analyses) in the same multiple logistic regression analysis using stepwise backward selection, for the presence of depression symptoms and anxiety symptoms. The *p*-value for removal was set at .15. These multivariable analyses were performed on the cases with no missing values in the included variables. Finally, we performed sensitivity analyses by repeating the analyses with different cut-off values for the *p*-value ranging from 0.05 to 0.50 and backward, and backward selection based on the *Akaike information criterion (AIC).* Moreover, we used bootstrapping to check the stability of the final models. We performed data analyses using SPSS 24 and R (version 3.6.3).

Ethical approval

The Medical Ethics Committee Twente assessed the study protocol and concluded that the measures pertaining to confidentiality and informed consent were appropriate, and that the study was beyond the remit of the Medical Sciences Research with Human Subjects Act.

RESULTS

The participating women (N=1406) had a mean age of 30.6 years; 96.2% were Dutch born; 0.9% were single mothers; 10.7% were living in an urban area; 89.6% had a medium to high education; and 83.6% were employed (>12hours/week). Of the 1406 included mothers, 113 (8.0%) had an EPDS≥9, and 207 (14.7%) had a STAI ≥42.

Univariable and multivariable associations

Univariable analyses showed many factors to have a significant association with depression symptoms; the same was true of anxiety symptoms (Table 2). For depression, multivariable analyses (Table 2) indicated several factors that were associated with a higher risk: foreign language spoken at home, lifetime history of depression, low score on the SENR, and poor

current health of the mother. No initiation of breastfeeding was associated with lower risk of depression, whereas no breastfeeding at 3 weeks postpartum was associated with a higher risk.

For anxiety, factors associated with higher risk in the multivariable analyses were lower education, lifetime history of depression, preterm birth, delivery experienced negatively, first week postpartum experienced negatively, crying experienced as excessive, low score on SENR, low support of partner, and poor current health of mother. For both depression and anxiety, a low SENR-score had the highest OR: 5.84 (CI 3.59-9.49) and 10.01 (CI 6.21-16.15) respectively.

Table 2 Risk factors of postpartum depression and anxiety that occur before/during/after pregnancy: results of univariable and multivariable logistic regression with stepwise backward selection

Variables *before* pregnancy	% of total sample N=1406	Depression				Anxiety			
		Univariable analyses		Multivariable analyses		Univariable analyses		Multivariable analyses	
		OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*
Age mother < 25	9.0%	1.49 (0.83-2.70)	**.186**			1.25 (0.77-2.04)	.364		
Age mother > 36	10.7%	0.79 (0.41-1.55)	.500			1.44 (0.93-2.22)	**.101**	1.69 (0.92-3.12)	.093
Born non-Dutch	3.8%	2.11 (0.97-4.60)	**.059**			3.78 (2.12-6.73)	**<.001**	2.41 (0.95-6.12)	.064
Foreign language spoken at home	2.1%	3.82 (1.59-9.14)	**.003**	**4.21 (1.25-14.2)**	**.020**	4.28 (2.01-9.10)	**<.001**	3.01 (0.87-10.4)	.081
Education level low	10.4%	1.13 (0.62-2.08)	.684			1.43 (0.92-2.23)	**.110**	**2.04 (1.05-3.96)**	**.036**
Mother not employed (<12 hours/ week)	16.4%	1.42 (0.89-2.29)	**.145**			1.74 (1.22-2.49)	**.002**		
Experienced >=3 life-events*	8.3%	2.38 (1.31-4.32)	**.004**			2.18 (1.33-3.57)	**.002**		
Experienced violence*	1.9%	3.48 (1.26-9.60)	**.016**			2.82 (1.14-6.97)	**.024**		
Experienced relationship problems*	3.6%	1.62 (0.62-4.22)	.325			1.46 (0.66-3.20)	.348		
Single mother	0.9%	2.31 (0.50-10.68)	.283			2.93 (0.88-9.83)	**.081**		
Lifetime history of depression	17.4%	3.77 (2.52-5.66)	**<.001**	**2.10 (1.22-3.63)**	**.008**	3.16 (2.28-4.39)	**<.001**	**2.19 (1.31-3.65)**	**.003**
First parity	44.8%	1.75 (1.18-2.57)	**.005**			1.08 (0.80-1.45)	.623		
Having been seriously ill*	2.6%	0.83 (0.19-3.52)	.796			1.21 (0.46-3.21)	.696		
Poor general health before pregnancy	2.4%	2.53 (1.03-6.25)	**.044**			1.81 (0.81-4.06)	**.148**		
Poor physical condition before pregnancy	0.6%	1.64 (0.20-13.45)	.645			0.83 (0.10-6.75)	.859		

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Table 2 *Continued*

Variables *during* pregnancy	% of total sample N=1406	Depression				Anxiety			
		Univariable analyses		Multivariable analyses		Univariable analyses		Multivariable analyses	
		OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*
Unplanned pregnancy	17.4%	1.63 (1.04-2.57)	**.033**			1.54 (1.07-2.19)	**.019**		
Unwanted pregnancy	1.0%	1.92 (0.43-8.70)	.396			2.34 (0.73-7.54)	**.153**		
Smoking during pregnancy	16.1%	1.63 (1.03-2.60)	**.038**			1.26 (0.86-1.84)	**.241**		
Alcohol use during pregnancy	21.0%	0.85 (0.52-1.39)	.514			0.68 (0.46-1.01)	**.055**	**0.54 (0.31-0.96)**	**.037**
Substance use during pregnancy	0.1%	- ***	.999			- ***	.999		
Life Events during pregnancy >=1*	28.9%	1.37 (0.87-2.14)	**.173**			1.52 (1.08-2.15)	**.017**		
Experience of violence during pregnancy*	0.9%	1.21 (0.15-9.52)	.859			0.63 (0.08-4.92)	.655		
Relationship problems during pregnancy*	2.7%	1.75 (0.60-5.11)	.304			1.47 (0.59-3.62)	.407		
Depression during pregnancy	1.6%	6.96 (2.86-17.0)	**<.001**	**2.83 (0.91-8.79)**	**.072**	7.32 (3.12-17.17)	**<.001**	2.87 (0.92-8.94)	.069
Complications during pregnancy	23.6%	1.96 (1.31-2.94)	**<.001**			1.39 (1.00-1.93)	**.049**		
Pregnancy experienced negatively	5.5%	3.28 (1.82-5.89)	**<.001**			1.81 (1.04-3.13)	**.034**		
Preterm birth**	3.4%	1.14 (0.40-3.26)	.801			1.97 (0.98-3.96)	**.058**	**3.39 (1.32-8.70)**	**.011**
Complications during delivery	26.6%	0.86 (0.55-1.34)	.498			1.00 (0.72-1.40)	.991		
Delivery experienced negatively	12.2%	2.65 (1.67-4.20)	**<.001**			3.15 (2.19-4.54)	**<.001**	**1.94 (1.11-3.39)**	**.021**
Delivery at home	24.3%	0.74 (0.45-1.19)	**.211**			0.79 (0.55-1.13)	**.198**		

continued on the next page

Table 2 *Continued*

Variables *after* pregnancy	% of total sample N=1406	Depression				Anxiety			
		Univariable analyses		Multivariable analyses		Univariable analyses		Multivariable analyses	
		OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*	OR (CI)	*p*
Child's gender (male)	50.9%	1.50 (1.02-2.22)	**.041**			1.10 (0.82-1.48)	.521		
Child health problems after birth	14.0%	1.36 (0.82-2.26)	**.241**			1.10 (0.72-1.66)	.665		
Negative experience of first week postpartum	6.0%	3.19 (1.80-5.64)	**<.001**	**1.90 (.91-3.98)**	**.087**	4.68 (2.95-7.41)	**<.001**	**2.73 (1.31-5.70)**	**.008**
No initiation of breastfeeding	25.0%	0.59 (0.35-0.97)	**.039**	**0.45 (0.23-0.88)**	**.020**	0.76 (0.53-1.09)	**.132**		
No breastfeeding at 3 weeks postpartum	50.3%	1.32 (0.90-1.95)	**.160**	**1.95 (1.12-3.23)**	**.012**	1.14 (0.85-1.53)	.374		
Low satisfaction with feeding	1.3%	1.44 (0.33-6.33)	.631			3.78 (1.45-9.87)	**.007**		
Crying meets Wessel criteria	4.1%	1.93 (0.89-4.19)	**.095**			3.96 (2.27-6.89)	**<.001**		
Experiencing crying as excessive	8.4%	2.81 (1.68-4.72)	**<.001**			5.76 (3.86-8.59)	**<.001**	**3.48 (1.90-6.23)**	**<.001**
Experiencing difficulties in soothing	1.4%	3.13 (1.02-9.58)	**.046**			10.48 (4.08-27.0)	**<.001**		
Sleep mother disturbed	4.3%	3.45 (1.80-6.58)	**<.001**			5.40 (3.11-9.03)	**<.001**		
Low SENR-score	14.1%	6.70 (4.45-10.1)	**<.001**	**5.84 (3.59-9.49)**	**.001**	9.59 (6.82-13.48)	**<.001**	**10.0 (6.21 -16.2)**	**<.001**
Low support partner	8.3%	2.49 (1.46-4.25)	**<.001**			7.04 (4.71-10.52)	**<.001**	**4.17 (2.38-7.33)**	**<.001**
Low support network	15.1%	0.71 (0.39-1.29)	.262			1.03 (0.68-1.55)	.893		
Low SSL12-I score	19.3%	0.84 (0.50-1.39)	.490			0.64 (0.43-0.98)	.664		
Poor current health mother	6.7%	5.75 (3.49-9.45)	**<.001**	**2.47 (1.29-4.71)**	**.006**	5.08 (3.27-7.89)	**<.001**	**2.09 (1.07-4.10)**	**.031**

* N = 1186, ** N = 1313, *** due to low prevalence of this risk factor, OR could not be calculated. OR, Odds Ratio; CI, Confidence Interval; SSL12-I, 12 item Social Support List-Interactions; SENR, Maternal Self-Efficacy in nurturing role questionnaire

Sensitivity analyses

Sensitivity analyses, using different cut-off values for the *p*-value and backward selection based on the AIC criterion, indicated the same factors as having the strongest associations.

DISCUSSION

We found several factors from the time periods before, during, and after pregnancy to be associated with an increased risk of developing postpartum depression and anxiety. Some factors were associated specifically with a higher risk of either depression or anxiety, whereas others were associated with a higher risk of both. Findings were generally robust, independent of choice of cut-offs or analytic method. To increase our understanding of the discovered associations and the potential role of risk factors in early identification, we will discuss the factors found per period of depression or anxiety, and discuss their differences.

Risk factors before, during and after pregnancy for depression

Two factors from the pre-pregnancy period were found to increase the risk of depression. The first factor, a foreign language spoken at home, was the only demographic factor resulting in a higher risk. This corresponds with previous research which showed few associations between demographic factors and depression (11, 36, 37), except for ethnicity-related factors. Reported associations with ethnicity are, however, complicated by the use of different definitions, e.g. comparing groups based on history of immigration or other aspects of ethnicity (38). Nevertheless, the language spoken at home may best reflect a person's integration into society, with poor integration most likely to increase the risk of depression. The second pre-pregnancy risk factor was a lifetime history of depression, a factor also consistently found in many other studies. Our findings suggest that these two pre-pregnancy factors indeed increase risks, independent of risks due to other factors.

Our study found that experiencing life events in the two years before pregnancy did not increase the risk of depression. Although previous meta-analyses indicated life events to be an important risk factor, these analyses were based on inconclusive findings (11, 39). Recent studies reporting positive associations (18, 36, 37) focused on life events experienced in the recent past (e.g. the past year). Our findings thus suggest that experiencing life events in the period before pregnancy does not independently indicate an increased risk of depression.

Regarding the pregnancy period, we found no factors that increased risks of depression independently. Regarding complications during pregnancy previous findings were inconclusive; some studies showed associations (40, 41), but others did not (2, 36). This was also the case for preterm birth (42). In contrast, depression during pregnancy was shown to be a more consistent risk factor (18, 39, 43-45), whereas in our study the association bordered on non-significant. The low prevalence of depression during pregnancy in our sample compared to other studies

(46) may play a role here. This may be related to the community nature of our sample, and measurement by a retrospective one-item question, i.e. 'did you experience a depression during pregnancy'. Our outcomes do not indicate pregnancy as a period specifically contributing to greater risk of developing postpartum depression.

We found four factors from the postpartum period associated with a higher risk of depression; two were related to breastfeeding and the other two to maternal self-efficacy and current health of the mother. With regards to breastfeeding, in general this is considered to be a potential protective factor (47), whilst in our study not initiating breastfeeding lowered the risk for depression. An explanation for this might be confounding by underlying factors like background characteristics of the mother. However, this seems unlikely as we already included many of these variables in our analyses. Another explanation for our findings on breastfeeding, with still breastfeeding at 3 weeks postpartum being associated with a lower risk of depression, may be found in early cessation of breastfeeding. Other studies also found breastfeeding duration and breastfeeding self-efficacy to be associated with depression (48, 49). In our study one third of the mothers who reported initiating breastfeeding after birth, no longer reported breastfeeding at 3 weeks postpartum. This could imply that breastfeeding difficulties may have overruled the positive effects of initiating breastfeeding. Early cessation may lead to negative cognitions of guilt and failure, and conversely, depression may contribute to early cessation. Further research is needed to clarify the association that we found between breastfeeding and postpartum depression.

In our study, low maternal self-efficacy was strongly associated with a higher risk of depression, whereas low level of social support was not. Based on the literature previously mentioned (11, 12) and more recent studies (18, 19), social support could be considered to be a protective factor. However, a few recent studies which included also maternal self-efficacy (36, 50) found less strong associations. In the association of social support with depression, maternal self-efficacy may function as a mediator (51); social support may reduce depressive symptoms through enhancing maternal self-efficacy. Adding low maternal self-efficacy as a potential risk factor could, therefore, lower the associations between social support and depression.

Finally, regarding post-pregnancy factors we found an association between poor current health of the mother and an increased risk of depression. To our knowledge, previous evidence on this topic is lacking, making comparisons impossible. This lack of evidence on the association between physical health and postpartum depression is remarkable, considering its potential relevance; many women experience physical complaints after birth, and it is generally accepted that a link exists between physical health and mental health (52). Our study shows that this also applies to the period after giving birth. Finally, we could not confirm evidence from other studies that showed crying (53) or quality of sleep of the mother (54) to be risk factors. Those associations may in fact reflect risks related to poor maternal self-efficacy.

Risk factors before, during and after pregnancy for anxiety

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Differences and similarities between risk factors for depression and anxiety

Understanding the associations between risk factors of depression and anxiety will support professionals in early detection. As depression and anxiety are interrelated, both being characterized by negative affectivity upon experiencing distress, it is plausible that they share risk factors. One explanation for depression and anxiety is that they are caused by maladaptive cognitive schemas formed during childhood and adolescence and elaborated over time, with the result that normal adaptive responses to stressors are activated by specific triggers in a disproportionate way (55). Our shared risk factors may contribute to (activation of) shared maladaptive schemas leading to negative affect, which connects to a history of depression, low maternal self-efficacy, poor integration due to speaking a foreign language, and inadequate mental resilience when experiencing poor physical health.

On the other hand, risk factors for depression and anxiety are likely to differ, as depression is characterized by absence of positive emotion whereas anxiety is characterized by hyper arousal (according to the tripartite theory of Clark and Watson)(56). Factors related only to anxiety were low education, preterm birth, low partner support, negative experience of delivery and of the first week postpartum, and the infant's crying. Except for low education, these aspects all

relate to a current stressful situation, apparently leading mainly to anxiety. However, as anxiety symptoms have also been observed to precede depression symptoms, a depressive response may possibly occur later in time (57).

Our study reported factors related to breastfeeding to be associated only with a higher risk of depression, contrary to some other studies, which reported e.g. early cessation also to form a risk factor for anxiety (58, 59). This difference may be because we included the factor of maternal self-efficacy which formed a strong risk factor. As hormonal changes may also be a specific trigger of depression, future research should disentangle these potential differences found in studies of the relation between breastfeeding and anxiety and depression.

In summary, factors forming a base for a negative response to distress should alert professionals to the possibility of both depression and anxiety. Apart from this, a negative reaction to a current stressful situation should alert them particularly to the possibility of anxiety.

Strengths and limitations

Strengths of this study are its large community sample, and its use of a comprehensive approach, involving inclusion of factors from the periods before, during and after pregnancy.

A limitation when interpreting our outcomes may be our use of self-report instruments instead of diagnostic interviews to measure depression and anxiety. However, we used established validated self-report instruments, which are also sensitive in detecting relatively mild symptoms. Another limitation is the timing of assessment of risk factors at 3 weeks postpartum, possibly enabling bias as a result of subjects' postpartum mood. This may in particular apply to associations found for factors from the postpartum period, making it impossible to determine the direction of causal effects and potentially leading to some overestimation of associations during this period. However, even without knowing the direction, these associations are relevant for use in practice, as these factors can nevertheless be indicators of increased risk. Moreover, the assessment of life events occurred at 12 months postpartum for a period extending to before pregnancy. This will thus have been measured less accurately than the other factors, potentially leading to underestimation of the strengths of associations. A final limitation is that we missed cases of postpartum depression that emerged after one month postpartum. This may have affected associations for factors specifically leading to later emerging cases of postpartum depression. This definitely requires further study.

Implications

Our findings may help health care professionals involved in prenatal and postpartum care, by augmenting early identification of mothers at greater risk of developing postpartum depression or anxiety. Increasing awareness of postpartum anxiety in practice will require more effort, as only since the last decade has anxiety become the object of greater attention.

Recognition that a subject has a lifetime history of psychopathology is important for detecting both depression and anxiety, as well as for assessments during and after pregnancy. Women who speak a foreign language also deserve extra attention; this may present a challenge, as discussing psychological well-being is more complicated when language forms a barrier. Further, professionals should be particularly alert to anxiety when dealing with women who have had negative experiences during pregnancy and the postpartum period, and also alert to depression with women experiencing early cessation of breastfeeding.

The associations we found also provide targets for primary prevention of postpartum depression and anxiety, e.g. by preparing women and their partner for the events to come (delivery, becoming a parent or having an additional child, initiating breastfeeding, finding a new balance as a couple), and developing interventions to strengthen maternal self-efficacy in the first weeks postpartum. The strong association with maternal self-efficacy also has implications for treatment, requiring a specific approach that differs from treatment of depression and anxiety in other stages of life.

Future research should focus on further establishing the risk factor profile of anxiety, using multivariable analyses to search for evidence. The need for further clarification of the direction of associations between several of our variables calls for additional research assessing anxiety and depression symptoms repeatedly in the periods before, during, and after pregnancy.

CONCLUSION

This study has found both shared and separate risk factors for postpartum depression and anxiety, and suggested the importance of the timing of these factors before, during, and after pregnancy. Our findings thus provide valuable information for development of preventive interventions and treatment to improve the mental well-being of mothers during the postpartum period.

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CHAPTER 6

Impact of postpartum depression on care use and participation in work

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SUMMARY

Objective - To describe the care which women with postpartum depression (PPD) in the Netherlands use for their complaints, and the impact of PPD on the general use of care of themselves and of their child, and on their participation in work.

Design - The data came from the control group of a prospective comparative study on the effectiveness of screening for PPD within the setting of Youth Health Care.

Method - We obtained data by means of two online questionnaires. Three weeks postpartum we examined the background characteristics of the mother. Twelve months postpartum, we inquired about depression since birth, care use for depressive symptoms, general care use since birth for both mother and child, and participation in work up to 12 months postpartum. To test differences, we used chi-square and student t-tests.

Results - Of the 1049 participating women, 99 (9.4%) indicated that they had experienced depression in the year since giving birth. Of the 99 'women with PPD', 71.0% made at least some use of care aimed at their PPD complaints. Of these women with PPD, 31.3% were diagnosed with depression, and 37.7% were actually treated. Mothers with PPD used considerably more care for themselves and their child than mothers without PPD. Absenteeism from work was significantly higher among women with PPD.

Conclusion - The limited number of women with PPD receiving care and the social costs entailed by PPD justify investment in routine screening and customized care pathways for these women.

INTRODUCTION

A depression after giving birth, also known as postpartum depression (PPD), is very common. For PPD the Diagnostic and Statistical Manual of Mental Disorders (DSM–5) retains the diagnosis of depression, and adds "begin peripartum", defined as the period beginning during pregnancy and up to 4 weeks postpartum (1). In health care and research, the criterion for the onset of PPD symptoms is often extended, from 6 months to one year postpartum (2). Depending on the severity of the symptoms, the period prevalence (from 0-3 months) in industrialized countries is 7.1% (major depression) to 19.2% (minor depression) (3). In the Netherlands, point prevalences of 8.0% at 2 months (4) and 8.5% at 6 months (5) postpartum have been reported. PPD can have negative effects on the child, such as extensive crying and sleeping problems in the first year of life, and behavioral problems later in life (6).

Only a limited proportion of women with PPD seek help themselves (7, 8), and healthcare professionals tend to detect PPD inadequately (9). Often, women with PPD do not receive care until long after the first symptoms, and sometimes not at all (10), although timely detection and referral to routine care can lead to earlier recovery from the depressive symptoms (11, 12). Offering care tailored to the specific needs of women with PPD can further improve this effect. In the Netherlands, however, no specific care pathways are available for these women, and little is known about the care received. It is thus likely that the care provision for women with PPD in the Netherlands can also be improved. This requires more insight into the care that women with PPD are currently receiving.

A further reason to improve care is the economic burden associated with PPD. According to research from 2018 (13), the total costs of depression in the Netherlands amount to 3.4 billion: 1.6 billion direct care costs and 1.8 billion work-related costs. The WHO predicts that in the coming years the economic burden of depression will further increase (14). It is likely that PPD contributes to these economic costs through both direct care and work-related expenses (15, 16). Moreover, the limited available research suggests that PPD also entails indirect care costs because women with PPD generally make greater use of care, both for themselves and for their newborn child (17, 18). However, Dutch figures are lacking; this also applies to absenteeism from work. The aim of this article is to describe the care used by women with PPD in the Netherlands for their complaints, and how PPD affects their general use of care for themselves and their child, as well as their participation in work.

METHOD

Setting and research population

The data for this exploratory study come from the Post-Up study, a comparative prospective study of the effectiveness of screening for PPD within the setting of Preventive Child Health

Care (PCHC) (12). The study protocol has been assessed and approved by the Medical Ethics Committee Twente, and registered as a trial ISRCTN42298046. In the intervention region, we used the Edinburgh Postnatal Depression Scale (EPDS) (19) at the PCHC center with mothers at 1, 3, and 6 months postpartum; where necessary, mothers received advice, additional support, or a follow-up referral. In the control region, mothers received standard care. Mothers using PCHC in the first months postpartum were approached to participate, unless they were insufficiently proficient in the Dutch language to complete the questionnaires. For this article, to exclude possible effects of the intervention, we used only data from mothers in the control region. During the inclusion period (1-12-2012 to 31-3-2014), 5274 children were born in the control region; of the 1455 mothers who agreed to participate, 1246 completed the first questionnaire.

Data collection

We collected data by means of two online questionnaires, 3 weeks and 12 months postpartum. During the first measurement we collected demographic characteristics. During the second measurement, we asked the women whether they had experienced an episode of depression in the period since birth. Depression was defined as: 'period of somberness and/or lethargy, lasting longer than 2 weeks, and clearly affecting daily functioning'. We also used self-developed questionnaires to ask about the use of care for depressive complaints, general use of care since birth for both mother and child, and absenteeism from work up to 12 months postpartum. In the second measurement, 1065 women participated (85.5% response rate); we were able to use the data of 1049.

Analyses

First, we described the background characteristics of the women. Second, we assessed the care use of the women who indicated having experienced PPD. Third, we examined the impact of PPD on the general use of care by women and their children, and on participation in work. We compared these outcomes between women with and without PPD. We tested differences using chi-square tests and student t-tests.

RESULTS

Of the 1049 participating women, 99 (9.4%) reported experiencing depression in the 12 months after birth. These women are further referred to as 'women with PPD'.

Background features

Table 1 presents background characteristics; the women with PPD differed significantly ($p<0.05$) in age, work, history of depression, and physical complaints after childbirth.

Table 1 Background features of the participating women

Background features	Women with PPD (N=99)	Women without PPD (N=950)	*p*
Age, mean (SD)	30.0 (4.7)	31.0 (4.3)	.033
Born in the Netherlands	91.9%	95.9%	.069
Being single	2.0%	0.9%	.319
Living in an urban area	38.8%	41.1%	.658
Education level (medium-high)	93.9%	91.3%	.373
Employment >12 hours/week	77.8%	87.5%	.007
Lifetime history of depression	48.5%	20.7%	.000
Poor general health before pregnancy	4.0%	3.4%	.727
First child	55.6%	47.1%	.107
Complications during pregnancy	29.3%	24.3%	.275
Premature birth of the child	1.1%	3.2%	.260
Initiated breastfeeding after birth	86.9%	82.8%	.308
Physical complaints 3 weeks postpartum due to pregnancy/delivery	45.5%	31.2%	.004
Health problems of the child in the first weeks after birth	23.2%	15.7%	.054

Care use needed because of PPD

Of the women with PPD, 71% used some form of care. For example, 33% of the women discussed their complaints at the PCHC center. In addition, 59.6% of the women with PPD went to the family physician for their depressive complaints. In 31.3% of the women with PPD the diagnosis was made during the care process (by a psychologist, psychiatrist or other physician), and in 37.7% treatment was initiated. Treatment was provided by a licensed psychologist/psychiatrist (20%), a family physician (16%), a mental health care provider (10%), a social worker (4%), or a psychiatric outpatient clinic (2%). Treatment consisted for 30% of conversational therapy, 14% medication, 3% online course (offer), and 1% group therapy. None of the women had received counseling focused on mother-child interaction. Of the women with PPD, 29.0% had had no contact at all with a health care provider about their complaints.

General use of care

Table 2 indicates the kind of care used by mothers (with and without PPD) for themselves and for their child in the first year after childbirth. Women with PPD used more care for themselves than women without PPD. This included not only more care from a family physician or social worker, where a part overlapped with counseling for depressive complaints, but also more of most other forms of care, including visits to a general practitioner's office and hospitalization. Mothers with PPD also used more care for the child.

Table 2 General care used by women with PPD and without PPD in the period after delivery to 12 months postpartum, both for themselves and for their child

Care used for the mother herself	With PPD (N=99)		Without PPD (N = 950)		*p*
	N	%	N	%	
Family physician (FP)	84	84.8%	555	58.4%	<.001
Social worker	24	24.2%	24	2.5%	<.001
Physiotherapist [a]	40	40.4%	264	27.8%	.008
Dietitian	7	7.1%	19	2.0%	.002
Homeopath [b]	13	13.1%	61	6.4%	.013
FP urgent care center/ first aid	24	24.2%	72	7.6%	<.001
Appointment outpatient clinic [c]	37	37.4%	271	28.5%	.066
Day treatment in the hospital	4	4.0%	55	5.8%	.472
Admission to the hospital [d]	9	9.1%	21	2.2%	<.001
Help from homecare	1	1.0%	9	0.9%	.952
Additional appointment midwife	9	9.1%	78	8.2%	.765

Care used for the child	With PPD (N=99)		Without PPD (N = 950)		*p*
	N	%	N	%	
Family physician (FP)	78	80.4%	698	74.4%	.194
FP urgent care center/ first aid	45	46.4%	306	32.7%	.007
Physiotherapist	21	21.6%	105	11.2%	.003
Osteopath [e]	35	36.1%	176	18.8%	<.001
Speech and language therapist	1	1.0%	15	1.6%	.666
Homeopath [b]	6	6.2%	38	4.1%	.321
Dietitian	3	3.1%	21	2.2%	.595
Appointment outpatient clinic	44	45.4%	285	30.4%	.003
Day treatment in the hospital	6	6.2%	42	4.5%	.446
Admission to the hospital [f]	15	15.5%	91	9.7%	.075
Diet nutrition for the child	10	10.3%	57	6.1%	.107

[a] including Caesar therapist, Mensendieck therapist, manual therapist or occupational therapist

[b] including acupuncturist, of other alternative practitioner

[c] appointments at the psychiatric outpatient clinic are not included

[d] admission immediately after childbirth or admission to the psychiatric ward not counted

[e] including chiropractor or manual therapist

[f] admission immediately after birth is not included

Table 3 Employment participation prior to and after maternity leave (up to 1 year postpartum) of women with and without PPD

	With PPD (N=99)		Without PPD (N=948)		p
Worked before maternity leave	77.8%		87.5%		.007
Average hours per week	30.3 uur		29.2 uur		
Worked after maternity leave					<.001
Worked fully	45	45.5%	653	68.7%	
Absenteeism 1 day to 2 weeks	19	19.2%	244	25.7%	
Average number of days absent	*9.0*		*4.8*		
Absenteeism 2 weeks or more	21	21.2%	51	5.4%	
Average number of weeks absent	*8.9*		*7.8*		
Did not work after maternity leave	14	14.1%	100	10.5%	

Participation in work

Table 3 shows employment participation prior to and after maternity leave (up to 1 year postpartum) of women with and without PPD. Women with PPD have both more days of short-term absenteeism and more weeks of long-term absenteeism.

DISCUSSION

This study shows that in a limited number of women with PPD, the diagnosis of PPD was actually established and treatment started. In general, women with PPD used considerably more care than other women, and their absenteeism was significantly higher.

Little more than a third of women with PPD were treated for their complaints, and almost a third had no contact at all with health care providers. Treatment was carried out by different professionals and institutions. A Dutch study from 2003 reported that for mothers with PPD care did not usually start until a year after the birth, and in a quarter of the cases only after 2 years (20). Research in America (21) and Australia (22) also indicated that many women with PPD do not receive help, mainly because of lack of knowledge (also among close relatives), perceived stigma, shame, and fear of being considered inadequate parents (21).

Professionals expressed that they need more resources, skills, and confidence to effectively diagnose, refer, and treat PPD (8). Screening programs seem to be most effective when screening, support, and treatment are offered within the same setting (22) , and women with PPD prefer first-line treatment to treatment in mental health care (21, 23). Moreover, especially the mother-child interaction should receive more attention in order to limit the impact of PPD on the child (24). In summary, our outcome confirms the literature that women with PPD receive little care. In addition, this literature provides starting points to bring about change.

In general, use of care for mother and child was found to be higher in women with PPD than in women without PPD. This applied to almost all listed types of care. Some types of care were used twice or three times as much, including physiotherapy, emergency care, hospitalization and alternative therapies. Studies in Great Britain and Australia also show higher overall care consumption by women with PPD (17). This may be partly explained by the physical symptoms frequently associated with depression, often the first reason for women to seek help (25).

The greater use of care because of the child's problems corresponds with findings from abroad (17, 18, 26), where especially an increase in care use outside office hours has been observed. Depression may hinder adequate interpretation of signals from the child, leading to more uncertainty and stress and a greater need to seek medical help. The children of women with depressive symptoms may also be sick more often, possibly because of (intrauterine) exposure to stress (26). It is likely that part of the use of care for both mother and child can be prevented by a more targeted and effective approach to the depressive symptoms.

This study indicated that women with PPD showed more and longer absenteeism than women without PPD, resulting in significant social costs. In the Netherlands, assuming 168,000 births per year, a PPD prevalence of 9.4%, and an average of 44 work weeks per year, just an extra long-term absenteeism of 15.8% (on average 9 weeks) of women with PPD would lead annually to 510 lost years of work. At an average income of 33,000 euros, this represents a cost of over 16 million euros. Added to this are the costs of short-term absenteeism and absenteeism due to mild depressive symptoms, and the costs of treating PPD, as well as additional regular care for mother and child. International research in the general population also shows that healthcare costs create a significant additional economic burden (27).

Methodological considerations

A strength of this study is its large number of participants, including a considerable group of women with PPD, from a general population of screened women. A limitation is possible selection bias because a minority of women in the control region agreed to participate in the study, and furthermore, the study contained relatively few women with low education and non-Dutch origin. Given the vulnerability of these groups, the results may underestimate the occurrence of PPD. Moreover, the data on experiencing PPD are based on self-reporting via an online questionnaire, which may also have resulted in underestimation of the occurrence of PPD. Future research should confirm whether using a diagnostic test for PPD would lead to the same results. Finally, although self-reporting may also have affected the accuracy of data on care use and work participation, this would probably have applied equally to women with and without PPD.

Implications

Women with PPD are seldom treated for their complaints; this offers room for improvement. Even during pregnancy, the midwife or obstetrician can at strategic moments screen women

for depressive symptoms. PCHC can contribute by systematically screening for PPD (12). In the first year postpartum, PCHC has a high outreach because of frequent consultations with 95% of infants. Through screening, the psychological well-being of the mother can become a regular discussion topic of the consultation. Further research is needed into the role of fathers during this period.

Multidisciplinary guidelines and customized care paths can contribute to clear-cut advice, and the actual start of guidance and treatment, including follow-up. This should also include actors such as the Nurse Practitioner-Mental Health Care (POH-GGZ) and the Psychiatric-Obstetric-Pediatric (POP) clinics. Guidance for mothers regarding their interaction with the child should also be included. All this calls for stronger collaboration among the professionals involved. Given the high social costs of PPD, investment in such collaboration is urgently needed, and would be profitable.

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CHAPTER 7

General discussion

Postpartum depression (PPD) and anxiety both occur frequently and call for early detection and treatment to reduce the impact on both mother and child, and society. Systematic screening may be of value but is not part of routine care. Preventive Child Health Care (PCHC) could be a suitable setting to incorporate systematic screening, but only if such a screening in PCHC meets the core criteria for an effective intervention. The general aim of this thesis is to investigate the effectiveness of screening for PPD by PCHC using the Edinburgh Postnatal Depression Scale (EPDS) (1) compared to care as usual (CAU), and explore options to extend screening to anxiety as well. In this general discussion we will summarize and discuss our main findings, address methodological issues and outline the implications of our findings for practice and policy, and for future research.

RESEARCH QUESTIONS AND MAIN FINDINGS

Q1. What is the evidence on the effectiveness of screening for PPD in PCHC compared to no screening, regarding mother and child outcomes?

Our systematic review provided limited yet positive evidence for the value of screening for PPD in a PCHC setting. The small number of available studies showed a need for additional high-quality studies, to strengthen the evidence regarding the potential benefits of screening in a PCHC setting.

Q2. Does repeated screening for PPD in PCHC, followed by routine care for screen-positive mothers, result in improved outcomes at maternal level (state of depression, parenting, health-related quality of life, anxiety symptoms) and at child level (socioemotional problems), at the end of the first year postpartum, compared to care as usual?

In our quasi-experimental study significantly fewer mothers of the intervention group were depressed at 9 months postpartum compared to the CAU group. On most secondary outcomes at maternal level (parenting, anxiety symptoms and mental health functioning), the intervention resulted in small effect sizes. At child level, the effect on socioemotional development was negligible.

Q3. Is the hypothesized EPDS anxiety subscale present in the EPDS data of our intervention sample, and if so, does this subscale enable measurement of anxiety in addition to depression, and is it stable across the first six months postpartum?

An exploratory factor analysis of our EPDS data resulted in both two- and three-factor solutions in a subscale assumed to represent anxiety, and a confirmatory factor analysis confirmed its stability across the first six months postpartum. However, this subscale, as well as the total EPDS, correlated only moderately with anxiety criteria, implying that using the EPDS does not ensure adequate detection of anxiety.

Q4. Which factors increase risks for postpartum depression symptoms and anxiety symptoms, before, during and after pregnancy, in the general population?

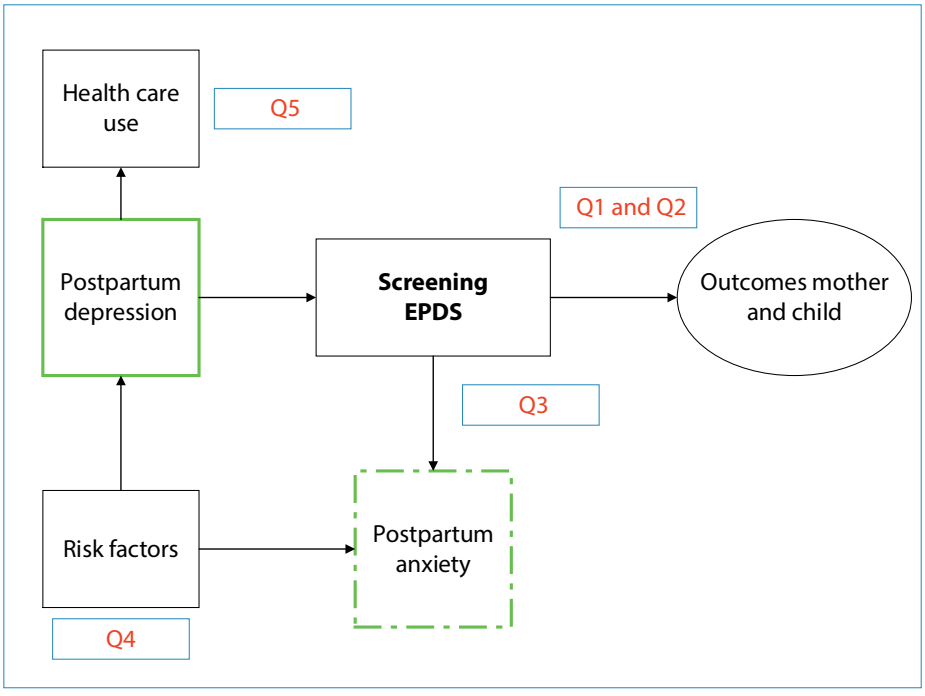
A stepwise logistic regression showed that the risk of postpartum depression was increased in mothers in families where a foreign language was spoken at home, with a history of depression, who gave no breastfeeding 3 weeks postpartum, who had a low maternal self-efficacy score and who had poor current health. No initiation of breastfeeding decreased the risk. Risk of postpartum anxiety was increased for mothers who had higher educational level, a history of depression, a preterm birth, a negative experience of delivery and of the first week postpartum, an excessively infant crying, low self-efficacy, low partner support, and poor current health.

Q5. What is the impact of PPD on use of health care and work participation?

Analyses of control group data showed that 71% of the women reporting to have experienced PPD in the first year (N=99), received some form of care for their PPD symptoms. A diagnosis was made in 31.3% of the women, and 37.7% of the women received treatment. General care use for both woman and child was higher for mothers who had experienced PPD, when compared to their non-PPD counterparts. In addition, work participation was significantly lower for women with PPD.

In figure 1 the research questions are outlined in the research model underlying this thesis.

Figure 1 Overview of the research model underlying this thesis



DISCUSSION OF THE MAIN FINDINGS

Our study provides important knowledge of the value of systematic repeated screening using the EPDS by PCHC. To summarize, we found screening for PPD to reduce depression symptoms and anxiety symptoms, and promote self-efficacy in parenting, and mental health functioning at the end of the first year postpartum. Using the EPDS does not fully cover the detection of anxiety. Risk factors for depression and anxiety partially overlapped but also differed, offering clues for optimizing detection. Absenteeism from work and health care consumption for both mother and child in the first year postpartum were substantially higher among mothers with PPD. We will discuss our findings subsequently in the following sections.

Optimization of early detection of maternal mental health problems

We found that screening for PPD by using the EPDS three times in PCHC during the first six months after giving birth resulted in better maternal outcomes at the end of the first year postpartum, improving not only depression symptoms but also parenting efficacy, anxiety symptoms and general mental health. This confirms the previous indications of an added value of screening in well-child care (2-7) in a much stronger and more extended research design. Several factors may contribute to these positive effects of screening for PPD in well-child care. First, PCHC has been designed for systematic screening, with routine standardized assessments and well-trained professionals. Second, the high coverage and routine nature of this type of care can be expected to make mothers willing to disclose emotional problems. Third, the assessment schedule probably addresses PPD at the really most sensitive period which increases the likelihood of effective screening.

Early detection of maternal mental health problems can be optimized, especially with regard to postpartum anxiety; our findings on the factor structures of the EPDS showed that screening by using the EPDS cannot be expected to fully cover detection of anxiety as well, though this has been suggested in the literature (8, 9). Similarly the risk factors for PPD and for anxiety partially overlapped but also differed. Anxiety thus needs attention in the postpartum period on top of depression, which is even more urgent due to the high rates of anxiety symptoms we found. Until now, anxiety has been somewhat neglected as a distinct aspect to address in the postpartum period. This is also reflected in the criteria of DSM-V in which the specifier 'with peripartum onset' is available only for mood disorders, not for anxiety (10). Research has focused mainly on PPD (11, 12). To address maternal mental health in the postpartum period more comprehensively, other options of systematic screening for anxiety have to be explored.

Also, the risk factors we found for both depression and anxiety can be used to improve detection. We found risk factors occurring in different periods (before, during and after pregnancy) confirming but also extending previous findings on this - in particular in the case of anxiety - relatively scarcely studied topic. The finding that especially factors related to the birth

or postpartum period increased the risk of anxiety, offers additional routes for PCHC to act, e.g by providing accessible support in case of adversities and challenges in the peripartum period. In addition, information on risk factors may support professionals in screening as it enables them to be more alert on women with increased risks, and offers extra clues to be alert on false negative screening result. Finally, as some of the risk factors for both depression and anxiety occur before pregnancy, this offers opportunities to already intervene in the preconception phase and during early pregnancy. In short, our findings provide cues for additional and more targeted screening activities.

Screening and subsequent pathways of care

We found substantial positive effects of screening on maternal mental wellbeing, though only a limited part of mothers reporting PPD confirmed to have received further care or treatment. These low treatment rates may be related to the fact that in the Netherlands no specific pathways have been developed for women with PPD symptoms and also in our study further care paths had not been defined. As literature shows that mothers experience several barriers in receiving treatment for PPD symptoms (13) this is likely to have limited women receiving care after screening in our study as well.

We thus found a significant effect of screening, despite treatment rates after screening that were similar to those in the CAU condition. This seeming discrepancy can be explained in several ways. A first explanation might be that women screened positive may have found their way to treatment in an earlier stage of PPD, being more sensitive to treatment and resulting in a faster recovery. Another explanation could be that the attention for minor symptoms may have raised the awareness of the mother to be alert on her mental wellbeing, stimulating self-management. Having attention for minor symptoms on top of major symptoms, may have prevented part of the women to develop more severe symptoms needing treatment. With (at least) 8% of the women having minor symptoms, this explanation could have contributed significantly to our outcomes. Further study is to needed to clarify the mechanisms leading to the effectiveness of the screening.

Still, the low treatment rates reported by mothers who experienced PPD in our study leave room for improvement. Developing and optimizing specific pathways for postpartum women with mental health problems can substantially increase the benefits of screening for PPD (14, 15). It is known that screening is most effective when screening and the subsequently needed care are offered in the same setting (16). Thus, support offered within the PCHC setting could be the best choice, especially if symptoms are mild to moderate. Also, the very strong association we found at one month postpartum with maternal self-efficacy, shows a need of accessible support by PCHC as parenting self-efficacy may be a mediator between depression and anxiety of the mother and its impact on the child. The effectiveness of such support by PCHC requires further investigation.

The positive effect of screening on maternal mental health did not translate into a positive impact on the child outcome that we measured at the age of 12 months. This finding may be explained by the difficulty of assessing the social-emotional development reliably using a questionnaire at this young age (17), or the relatively short follow-up period, as consequences may reveal themselves more evident at an older age (18). Another explanation could be the limited use of treatment by mothers who reported to have experienced PPD. To reduce the effects of PPD on the child, specific support for the interaction between mother and child is needed (19, 20) must be part of treatment. Further research is needed to disentangle the reasons for the lack of impact of this screening on child outcomes.

The wide range in severity of symptoms we found, combined with the characteristics increasing risk that may or may not be present, makes women with PPD a diverse group. As a result, women may also have different preferences and needs with regard to treatment and follow-up (21). An offer of stepped care, i.e. an intensity of care matched to the complexity of the condition, may help to promote that women receive the treatment for their symptoms that they need. Incorporating not only symptom severity but also risk profiles, as suggested by Olin et al. (22), could lead to an offer of personalized care, strengthening women with PPD to have choice and control and optimizing care to their needs. When working with risk profiles one must remain alert on the risk of stigmatizing. The pros and cons of including specific characteristics in pathways of care need further evaluation.

Our finding that screening for PPD using the EPDS does not guarantee full detection of anxiety in addition to depression, is also relevant for the care process after screening. Addressing anxiety by offering support and treatment begins with adequate detection. In addition, the combination of depression and anxiety symptoms increases the risk of chronic and severe depression (23, 24), which in turn increases the impact of PPD on the child (25, 26). The combined occurrence of depression and anxiety symptoms may therefore demand an adjusted care path with explicit attention to the mother-child interaction. In sum, we need more possibilities to systematically detect anxiety, in order to adequately address both anxiety and depression.

Screening for PPD may reduce work absenteeism and health care costs

We found PPD to be associated with considerable costs for society due to its impact on work participation and health care use for both mother and child. We further found that screening for PPD symptoms by PCHC reduced rates of depression and the duration of symptoms in case of depression. Screening for PPD can thus also reduce the economic burden of PPD regarding productivity in work and health care costs, on top of and as consequence of improved maternal outcomes. This potential profit for society offers a financial perspective to invest in the optimization of early detection of maternal mental health problems, to subsequently obtain large societal returns.

Criteria to decide on implementing screening for PPD

In our general introduction we analyzed which further evidence is needed to meet the criteria as defined by Wilson and Jungner (27) and the WHO (28) for the implementation of screening for PPD in PCHC. We concluded that more evidence was needed on effectiveness, cost-effectiveness, acceptability and potential harms of screening. Our study in a large community based sample adds clear evidence on the effectiveness of screening. Its findings also provide evidence for acceptability as this regards a large study in routine PCHC, which confirms findings of another study that the acceptability of screening was high (29). Our findings on the impact of PPD on health care use and work absenteeism suggest that this screening is a strong business case, i.e. that the costs of screening for PPD not only balance the savings regarding medical care but may even result in positive returns on investment. Further research on the cost-effectiveness of screening could quantify the profits of screening for PPD. Also, as a substantial part of mothers of the target population decided not to participate in our study, acceptability (including evaluation of potential harms) needs to be confirmed by further research.

METHODOLOGICAL CONSIDERATIONS

This thesis is mostly based on data from the PostUp study, which had a prospective, quasi-experimental comparative design in routine community-based PCHC. In addition to this study, we performed a systematic review into the evidence on the effectiveness of screening for PPD in PCHC. The size of the Post-up study, comprising 3089 women, provided a strong base for the various empirical studies as reported on in this thesis. Its embedding in routine care led to outcomes that can be translated directly to implications for practice and policy. The relevance of the outcomes for practice is also strengthened by the setting of performing research within the Academic Collaborative Centre Youth Twente (AWJT), in which research and practice are strongly interrelated. The focus of the study regarded PPD, but its design also enabled to analyze aspects of anxiety. In this section, we will provide methodological considerations with respect to quality of the sample, the information obtained, and causality and confounding.

Quality of sample

Strengths of our sample were the size, the community-based origin and its embedding in routine care. The latter two characteristics promote generalizability, as our screening intervention is intended to be used in community-based care. Also, the low rate of dropout during our study, which was approximately the same for our intervention and control region, strengthen the (internal) validity of our outcomes. Our inclusion criterion of sufficient mastery of the Dutch language to fill in questionnaires may have induced selection bias, by excluding e.g. women with a migration background or low-literate women from participating. This underrepresentation may have affected our outcomes on risk factors for depression and

anxiety. With regards to the effectiveness of screening for PPD, this needs additional research for women with insufficient mastery of the Dutch language. As using a questionnaire to detect PPD may have limitations especially for these women, addressing mental health when language forms a barrier may ask for modifications.

Quality of the information obtained

Strengths of the information as obtained regarded the use of the EPDS, and the use of the Dutch Mini International Neuropsychiatric Interview (30) as golden standard for measuring depression symptoms 9 months postpartum. These regard measures with good psychometric properties, allowing strong conclusions on the effectiveness of screening for PPD.

Next, we identified four potential limitations related to the quality of information. First, regarding outcomes at child level, a limitation may be the sensitivity of measuring social-emotional development by means of a questionnaire at the age of one year. A more sensitive method like observation of the interaction and a longer follow-up might have shown effects at child level, associated with the positive effects on maternal mental wellbeing.

Second, a potential limitation regards the nearly simultaneous measurement of some of our risk factors and our outcome measures of depression and anxiety. We cannot rule out that the state of mental wellbeing has influenced the way women reported certain factors. As risk factors related to the postpartum period received little attention in literature so far, our outcomes as well as the direction of the associations need to be confirmed by studies in the future.

A third potential limitation is that our information on treatment, health care use and absence from work may be incomplete because we collected this information only on women who themselves reported to have experienced PPD at 12 months postpartum. As women with PPD do not always recognize their symptoms as symptoms of depression, it is likely that the data of part of the women who actually experienced PPD is not included in our information. This may have led to an underestimation of health care use and absenteeism.

Finally, our information on health care use and absenteeism, and also on part of the risk factors for depression and anxiety, may have been less accurate due to recall bias, as for some items women had to recall a period of several months (regarding life events mothers had to recall events up to 2 years before pregnancy). The impact of this bias is probably limited though, as it mostly concerned either facts or topics with impact (such as life events).

Causality and confounding

Regarding the interpretation that screening for PPD indeed leads to better outcomes, a potential limitation is that our effectiveness study had a quasi-experimental design in which we compared two regions. Thus, differences in outcomes between the screening and CAU might have been due to differences in population or in routine health care offered. However, differences between the samples from the two regions were small regarding all background

characteristics that we measured, and PCHC is provided nationally in a standardized way. Moreover, regarding subsequent care, general practitioners work with national guidelines which similarly lead to standardization of care. We consider the effect of these potentially confounding factors on effect estimates to be limited.

Another potential limitation regards the overlap between the constructs depression and anxiety, which may result in partly detecting both constructs when using an instrument that is intended to measure either one. Therefore, using the EPDS and the Spielberger State-Trait Anxiety Inventory (STAI) in our risk analysis may have induced confounding in our analyses of risk factors for depression and anxiety. However, as we were interested in the predictive value of risk factors, we do not consider this confounding to be problematic.

IMPLICATIONS

The findings as reported in this thesis have a number of implications for practice and policy, and for research. These will be discussed consecutively.

Implications for practice and policy

Our finding that screening for PPD in well-child care is clearly effective supports the advice of major agencies like the American Academy of Pediatrics in the US (31) and Practice Guidelines Beyond Blues in Australia (32) which recommend to implement screening for PPD as a component of routine preventive care. Such an implementation could best be done taking into account the following considerations.

First, screening for PPD should become a routine component of PCHC given the major benefits of this screening compared to the current care for this highly prevalent disorder. In the Dutch setting this could be realized by adding this screening to the routine PCHC program.

Second, we identified a series of risk factors for both postpartum depression and anxiety which could be incorporated in the routine screening as well. This may reduce the likelihood of false-negatives in an EPDS-only screening. On top, this evidence on risk factors may inform patient interviews during routine well-baby care visits. This may enhance the quality of the professional assessment and may offer clues for personalizing the support to be offered.

Third, we found that a screening based on the EPDS does not provide a full detection of anxiety as well, which implies a need to explore other ways to detect postpartum anxiety more adequately. The specific risk factors for anxiety that we identified could also alert professionals regarding symptoms of anxiety.

Fourth, we found a clear effect of screening while only the usual care path was available which suggests that health gains may even be larger if that path is also improved. An optimized pathway should start with care provided by PCHC especially for the less severe cases of PPD as other studies have shown care within the setting of screening to increase the effectiveness

(16). Care provided by PCHC could comprise education, support in self-management, and extra consultations to support mothers in e.g. parental self-efficacy, and solving feelings of uncertainty in taking care of the infant. PCHC can offer home visits, an accessible type of care which appears to fit very well with the needs of women with PPD (33, 34). These elements all are already part of routine PCHC, but should be specified regarding PPD and anxiety. On top, PCHC could offer preventive interventions for high risk women, still to be developed.

Fifth, the variation we found in the group of women with depression symptoms, both in severity of symptoms and presence or absence of characteristics, implies a need of a stepped care model for PPD. Creating several pathways of care would facilitate a personalized care offer for women with PPD. Having specified these pathways would support professionals in their confidence to address symptoms of PPD adequately. It would also stimulate shared decision making, and could, highly important, result in women with PPD receiving treatment that meets their needs. A stepped care model preferably will be a co-creation from the various types of involved health care professionals. Relatively new actors in the medical domain, like the practice assistant for mental healthcare ('POH-GGZ'), and the POP-clinic (collaboration between the departments of Psychiatrists, Obstetricians and Pediatricians to guide women with (known) psychiatric disorders during pregnancy and the postpartum period) should also be involved.

Sixth, we found part of the risk factors for PPD and anxiety to be already present during pregnancy implying that the focus for maternal mental health care could be extended to pregnancy. Adding screening and risk assessments to healthcare during pregnancy seems an obvious step as depression symptoms for a substantial part of women already start during pregnancy (9). An option to screen for depression during pregnancy is the EPDS, as it has been proven to be suitable for measuring depression during pregnancy as well (35). The EPDS is also incorporated in the Mind2Care (36), a newly developed Dutch questionnaire gaining ground among midwifery practices in the Netherlands, which is intended to explore both physical and mental wellbeing of the pregnant woman.

Realization of the above listed implications requires action on the level of national policies, with a need for a coherent management by incorporating depression prevention in perinatal care, and adequate financial resources. In the Netherlands prevention of depression prevention is a top priority of the current political agenda. A long-term program initiated by Dutch ministry of Health, Welfare and Sport (VWS) is running with the intention to reduce depression prevalence in 2030 with 30%. For six high-risk groups, a plan of action has been elaborated. Concerning pregnant women and new mothers, one of the six high-risk groups, a key element of the plan regards the implementation of screening in PCHC (37) based on the findings of our effectiveness study (38). The screening is implemented in pilot regions, combined with a reinforced collaboration between involved health care professionals. Results are expected in the fall of 2021.

Another program of VWS called "Kansrijke Start" ("Promising Start") addresses parental wellbeing and collaboration between healthcare professionals in the perinatal period as major

targets. The program, launched in 2018, aims to maximize health in the first 1000 days of the life of a child, by reaching vulnerable parents in an early stage and optimizing care and support for these parents during pregnancy and after birth. Professionals from the social domain (including PCHC) and the medical domain should join forces in local partnerships to achieve these goals. It would be very suitable to work out the offer and pathways for women with mental health problems in these partnerships.

One of the pillars of the program "Kansrijke Start" is to extend PCHC to the period before the child is born, e.g. by providing prenatal home visits to vulnerable pregnant women. This pillar is planned to be included in the Public Health Act, in 2021. Extending PCHC to the period before birth can promote continuity of care in the perinatal period. In the current system, a transfer is required from obstetric care in which the mother is the client and care is provided by several types of professionals in different settings (midwifes in private practices and gynecologists in the hospital setting), to PCHC in which care is child-centered and provided by one type of professionals.

Ideally, the outcomes of the long-term program on depression and the program "Kansrijke Start" should be integrated into one policy plan on promoting parental mental health, including a national multidisciplinary guideline, similar to the Australian Perinatal Mental Health Guideline (32).

With regard to financing we found large health gains of an intervention of limited intensity, i.e. spending some minutes to PPD screening during three routine visits with some additional time for advice and referral in case of detected PPD. Realization of screening by PCHC on a national level could thus be reached with relatively small investments. Next, with some additional investment, care can be extended to mothers with mild symptoms of PPD receiving support, by developing a low-threshold offer of care within the PCHC setting, extending the profits of such a system too. Finally, maximum gains could be realized by developing a trajectory of stepped care, and extending care from maternal mental health to pregnancy and the preconception period.

An important consideration for politicians and policymakers will be the return on investments. This is likely to be high for investments in the early detection of PPD. In the short term, early detection will reduce the impact of PPD on work productivity and health care use, implying major profits. In the longer term, investing in secondary prevention of PPD may also yield profits regarding the health and potential of offspring. This may result in profits for society by reducing the need for social care related to behavioral problems, and better perspectives on education and employment status. It should be noted that investments for early detection of PPD will be made mostly by local governments, whereas benefits will end up with several parties, in particular with health insurers by reducing health care use expenses. To have sufficient financial incentive to invest in prevention, new financing models are needed. These models should reform the current system by creating shared responsibility on investments, or transferring the benefits of investing in prevention to local governments (39).

Implications for research

Our findings call for further research to strengthen the evidence on components of the screening for PPD in PCHC and its effects on mothers, children and society. First, as we found screening for PPD improving maternal mental health despite treatment rates comparable to the CAU region, further research is needed to clarify which elements make screening most effective, e.g. by distinguishing the added value of addressing minor and major symptoms. In addition, the suitability of the use of a questionnaire for early detection in women with a migration background or low-literate women needs to be evaluated with research as well.

Second, we identified a series a risk factors for both PPD and postpartum anxiety that could improve early identification. These partially novel findings should be confirmed in other studies. In particular the predictive value of factors from the postpartum period and on top the direction of the association with PPD could be strengthened by further research. Also, the benefits and disadvantages of including specific characteristics of women in pathways of care should be examined.

Third, research should clarify the acceptability of screening for PPD in a PCHC setting, including the whole population of women in their postpartum period, as in our study a part of the mothers decided not to participate.

Fourth, we found anxiety to affect postpartum maternal mental health for a substantial part of mothers. Anxiety overlapped only partly with PPD and therefore deserves specific attention, which should be accounted for in future research from now on. Additional research is needed to explore other options of early detection of both PPD and anxiety – e.g. by assessing validity in the postpartum period of an instrument like the Depression, Anxiety and Stress Scale (DASS-21) (40) – and investigate the effectiveness of screening for anxiety on top of depression.

Fifth, our findings suggest that care for PPD may be improved largely by a stepped care approach, including subsequent support by PCHC, and extending care to the prenatal period. This definitely requires further research on the effectiveness of screening in combination with stepped care, and on the facilitators and barriers in the process. Future research should also quantify economic benefits of screening combined with stepped care, and evaluate the use of new models to finance preventive interventions.

Finally, we found no effects of screening for PPD on the child's socioemotional development. Future research should explore if these effects in fact are present when assessed in a different way, e.g. with a more sensitive method or after a longer follow-up period, or whether an adjusted, e.g. extended intervention is necessary. Regarding the latter, adding structural support for the mother-baby interaction in the process after screening is likely to increase the benefits of screening for the child, and this definitely deserves further study.

The feasibility of improving maternal mental health asks for the utmost attention in practice, policy and research, to realize this 'investment in our generation to come' now.

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SUMMARY

SUMMARY

Postpartum depression (PPD) affects mothers frequently in the neonatal period. At least one out of ten postpartum women experiences depression symptoms to a greater or lesser extent. Symptoms of PPD may resolve within 3 to 6 months, but may also last for years, especially when left untreated. PPD puts stress on the relationship with the partner, and the family system. PPD may hinder daily life functioning, and may cause a woman to be unable to return to work after maternity leave. PPD may lead to suicidal thoughts and in extreme cases even to suicide attempts.

For the child of a mother with PPD, PPD may also have important consequences on the short term and on the long term. Negative consequences in children of PPD mothers regard a disturbed emotional regulation in the first year after birth, internalizing and externalizing behavioral difficulties, attention deficit and less developed social competences in (pre)school age, and depression in adolescence. Because of the impact of PPD on both mother and child, PPD also burdens society. Formal estimates of the impact of PPD are lacking for the Netherlands, but costs are likely to be substantial given the frequent occurrence of PPD, and the economic impact of depression in general (estimated at 1.8 billion euro per year for work-related costs and 1.6 billion euro per year for costs related treatment of the depression).

PPD occurs frequently but its symptoms are often missed by professionals who encounter the women in the postpartum period. As a consequence, mothers receive treatment with delay or not at all. Investing in early detection therefore is likely to be beneficial for both mothers, their children and families, and for society as a whole, but screening for PPD is not part of routine care in most countries. In the Dutch setting the availability of Preventive Child Health Care (PCHC) offers an excellent opportunity to screen repeatedly for PPD, as PCHC professionals have frequent contact with the majority of mothers in the first year after birth. Moreover, the Edinburg Postnatal Depression Scale (EPDS) is a likely candidate to perform such a screening.

To substantiate the decision to implement a routine screening for PPD in PCHC, the core criteria for screening should be met, as defined by Wilson and Jungner. Regarding these criteria, evidence in particular lacks regarding the effectiveness of screening in a PCHC setting, its cost-effectiveness, and its acceptability to the target group. Moreover, it could be considered to also include postpartum anxiety as this is at least as common as PPD. A screening of mothers in PCHC could have even more added value if anxiety is addressed as well. Against this background, the general aim of this thesis is to investigate the effectiveness of screening for PPD by PCHC using the EPDS compared to care as usual (CAU), and explore options to extend screening to anxiety as well. This aim has several aspects which are addressed in five chapters of this thesis.

Chapter 2 describes the results of a systematic review of the evidence on the effectiveness of screening for PPD in PCHC, regarding mother and child outcomes. Three electronic databases (SCOPUS, PsychINFO and CINAHL) were searched for publications up to May 2014. Six studies

were included ultimately; a quality assessment rated two studies as strong and four as weak. Their findings provided limited yet positive evidence for the value of screening for PPD in a PCHC setting. The small number of available studies showed a need for additional high-quality studies, to strengthen the evidence regarding the potential benefits of screening in a PCHC setting.

Chapter 3 describes the outcomes of a study on the effectiveness of repeated screening for PPD in PCHC, followed by advice and referral to routine care for screen-positive mothers, in a prospective, quasi-experimental comparative design in which two regions were compared. Mothers visiting Dutch well-child care centers were exposed to screening at 1, 3 and 6 months postpartum (n=1843) in the intervention region, and to care as usual (CAU) (n=1246) in the control region. Significantly fewer mothers of the intervention group were depressed at 9 months postpartum compared to the CAU group; 0.6% versus 2.5% for major depression (aOR 0.30 (95% confidence interval 0.13 - 0.66; Cohen's d 0.66), and 3.0% versus 8.4% (aOR 0.38 (0.24 - 0.61); Cohen's d 0.53) for minor plus major depression. On most secondary outcomes at maternal level 12 months postpartum (anxiety symptoms and mental health functioning and parental self-efficacy), the intervention resulted in effect of small size. At child level, the effect on socioemotional development was negligible.

In **chapter 4** we explored whether the EPDS contains a separate anxiety subscale, and assessed the validity and stability of this subscale during the first six months postpartum, using the sample of the aforementioned intervention region. An exploratory factor analysis of the EPDS data yielded a subscale assumed to represent anxiety in both two- and three-factor solutions. A confirmatory factor analysis showed it to be stable across the first six months postpartum. However, the subscale correlated only moderately with anxiety criteria, and the same held for the full EPDS. This implies that using the EPDS does not ensure adequate detection of anxiety.

In **chapter 5** we analyzed which factors in the same population sample as in chapter 4 increased risks of postpartum depression and anxiety symptoms, before, during and after pregnancy. Factors associated with higher risk for PPD were: foreign language spoken at home; history of depression; low maternal self-efficacy; and poor current health of the mother. No initiation of breastfeeding was associated with lower risk of depression, no breastfeeding at 3 weeks postpartum with higher risk. Factors associated with higher risk of anxiety were: higher educational level, history of depression; preterm birth of the child; negative experience of the delivery and of the first week postpartum; excessive infant crying; low maternal self-efficacy; low partner support; and poor current health of the mother.

Chapter 6 addresses the health care use when having PPD symptoms, the impact of PPD on use of general health care for both woman and child, and on work participation. Analyses of

data from the control group as described in chapter 3 showed that 71% of the women who reported to have experienced PPD in the first year post-partum (N=99) received some form of care for their PPD symptoms. A diagnosis was made in 31.3% of these women, and 37.7% of them received treatment. General care use for both woman and child was higher for mothers who had experienced PPD, when compared to their non-PPD counterparts. In addition, work participation was significantly lower for women with PPD.

In **chapter 7,** the implications of the main findings of this thesis are discussed. These findings confirm the limited previous evidence of an added value of screening in PCHC in a much stronger and more extended research design. The added value of screening in this setting may be enforced by PCHC being particularly suitable for systematic and repeated screening in the postpartum period. In addition, the nature of PCHC with a high coverage and frequent contacts, can make it easier for mothers to disclose their emotional problems.

Detection of maternal mental health problems can be optimized, especially with regard to postpartum anxiety. Our findings on the factor structures of the EPDS showed that screening by using the EPDS cannot be expected to fully cover detection of anxiety on top of depression, though this has been suggested before. Similarly, the risk factors for PPD and for anxiety partially overlapped but also partially differed. Anxiety thus needs attention in the postpartum period on top of depression. The high rates of anxiety symptoms that we found suggest such an additional screening to be urgent. The finding that especially factors related to the birth or postpartum period increased the risk for anxiety, offers additional routes for PCHC to act.

Information on risk factors may also support professionals in screening as it enables them to be more alert on women with increased risk for depression or anxiety, and improve their ability to detect false negative screening results. As several of the risk factors for both depression and anxiety are already present before pregnancy, this offers opportunities to start with interventions in the preconception phase and during early pregnancy.

We found only a limited part of mothers reporting PPD confirmed to have received further care or treatment. The low treatment rates may be related to the fact that in the Netherlands no specific pathways have been developed for women with PPD symptoms and neither had been so in our study. Presumably, the significant effect of screening that we found is to be explained by women screened positive for major depression finding their way to treatment in an earlier stage of PPD, and by the attention for minor symptoms of PPD which may stimulate self-management and may prevent symptoms to become more severe. Still, the low treatment rates leave room for improvement.

The effects of screening for PPD we found on the child's socioemotional development were negligible. It is possible that these effects in fact were present, but had to be assessed in a different way. Another option is that, to reach significant benefits for the child as well, adjustment in the intervention is necessary, e.g. by adding structural support for the mother-baby interaction in the process after screening.

Our findings result in the following recommendations for practice and policy:

1. Make screening a routine component of the PCHC by adding screening to the standard PCHC program.
2. Incorporate the various risk factors for both depression and anxiety that we identified in the process of screening.
3. Explore other ways to detect postpartum anxiety more adequately.
4. Improve the pathway of care after screening, e.g. by providing care by PCHC for especially the less severe cases of PPD and specific attention for the mother-child interaction
5. Create a model of a stepped care to address the diversity of women with PPD in co-creation with the various types of involved health care professionals.
6. Extend the focus for maternal mental health care to pregnancy by adding screening and risk assessments regarding that to healthcare during pregnancy.

The realization of these implications requires action from national policy makers, a coherent provision of care incorporating depression prevention in the full chain of perinatal care, and adequate financial resources. A national multidisciplinary guideline on parental mental health could strongly support the realization of such an integrated approach.

Implementing screening for PPD by PCHC on a national level could be reached with relatively small investments. Next, with some extra resources also the numbers of mothers with mild symptoms of PPD receiving support can be improved by developing a low-threshold offer of care within the PCHC setting. Finally, maximal gains could be realized by developing a trajectory of stepped care, and extending attention for maternal mental health to pregnancy and the preconception phase.

In the case of early detection of PPD, return on investments is highly likely. On the short term, early detection will reduce the economic impact of PPD on work productivity and health care use. On the long term, investing in preventing PPD also implies an investment in offspring. The agenda for better prevention of PPD and anxiety should entail research focussing on the optimization of the process of screening and subsequent pathways of care, and on routes to improve screening for anxiety as well. The feasibility of improving maternal mental health asks for the utmost attention in practice, policy and research to realize this 'investment in our generation to come' now.

SAMENVATTING

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Veel vrouwen krijgen te maken met een postpartum depressie (PPD) in de periode na de bevalling: minstens één op de tien pas bevallen vrouwen krijgt in meer of mindere mate last van depressieve symptomen. PPD symptomen kunnen binnen 3 tot 6 maanden verdwijnen, maar kunnen ook jaren duren, vooral als deze niet behandeld worden. PPD legt druk op de relatie met de partner en het gezinssysteem. PPD kan het dagelijks functioneren van vrouwen belemmeren en er ook toe leiden dat zij na hun verlof minder of niet in staat zijn om weer te werken. PPD kan verder leiden tot gedachten over suïcide en in extreme gevallen zelfs tot suïcidepogingen.

Voor het kind van een moeder met PPD kan PPD ook belangrijke gevolgen hebben, zowel op de korte termijn als op de lange termijn. Negatieve gevolgen die voorkomen bij kinderen van moeders met PPD zijn: een verstoorde emotionele regulatie in het eerste jaar na de geboorte, internaliserende en externaliserende gedragsproblemen, aandachtsproblemen en minder ontwikkelde sociale competenties in de (pre)schooltijd, en depressie in de adolescentie. Door de impact van PPD op zowel moeder als kind, belast PPD ook de maatschappij. Formele schattingen van de impact van PPD ontbreken voor Nederland, maar de kosten zijn waarschijnlijk aanzienlijk gezien het veelvuldig voorkomen van PPD, en de economische impact van depressie in het algemeen. Deze laatste impact wordt geschat op 1,8 miljard euro per jaar voor werk gerelateerde kosten en 1,6 miljard euro per jaar voor kosten gerelateerd aan de behandeling van de depressie.

PPD komt veel voor, maar de symptomen worden vaak gemist door zorgprofessionals die vrouwen in de postpartum periode zien. Dit kan tot gevolg hebben dat vrouwen met PPD pas maanden later of helemaal geen behandeling krijgen. Investeren in vroegtijdige opsporing van PPD is daarom van belang voor zowel de moeders, hun kinderen en familie, als voor de samenleving als geheel. Screening op PPD maakt in de meeste landen echter geen deel uit van de standaardzorg. In Nederland biedt de Jeugdgezondheidszorg (JGZ) een uitstekende setting om herhaaldelijk te screenen op PPD, omdat JGZ-professionals in het eerste jaar na de geboorte veelvuldig contact hebben met het merendeel van de moeders. Bovendien is met de Edinburg Postnatal Depression Scale (EPDS) een geschikt instrument beschikbaar om een dergelijke screening uit te voeren.

Om een besluit tot standaard screening op PPD in de JGZ te kunnen onderbouwen, moet worden voldaan aan de kerncriteria voor screening, zoals gedefinieerd door Wilson en Jungner. Als deze criteria worden toegepast op screening voor PPD, blijkt dat vooral bewijsmateriaal ontbreekt over de effectiviteit van de screening in een setting als JGZ, de kosteneffectiviteit, en de aanvaardbaarheid voor de doelgroep. Aangezien angst in de postpartum periode minstens even vaak voorkomt als PPD, is het een overweging om ook angstklachten in het screeningsproces op te nemen. Hierdoor zou de screening nog meer toegevoegde waarde kunnen hebben. Tegen deze achtergrond is het algemene doel van dit proefschrift het

onderzoeken van de effectiviteit van screening op PPD met behulp van de EPDS ten opzichte van de gebruikelijke zorg (care as usual (CAU)) in de setting van de JGZ, en het verkennen van de mogelijkheden om de screening ook te richten op angstklachten. Dit doel heeft verschillende aspecten die in vijf hoofdstukken van dit proefschrift aan bod komen.

Hoofdstuk 2 beschrijft de resultaten van een systematische review naar bewijs voor de effectiviteit van de screening op PPD in de JGZ, op uitkomstniveau van moeder en kind. Drie elektronische databanken (SCOPUS, PsychINFO en CINAHL) zijn doorzocht op publicaties tot mei 2014. Uiteindelijk werden zes studies geïncludeerd; twee van deze studies werden na beoordeling als sterk beoordeeld en vier als zwak. De uitkomsten leverden beperkt maar positief bewijs voor de waarde van screening voor PPD in een JGZ-setting. Het kleine aantal beschikbare studies maakt dat er behoefte is aan aanvullende studies van hoge kwaliteit om het bewijs voor de potentiële voordelen van screening in een JGZ-setting te versterken.

Hoofdstuk 3 beschrijft de resultaten van een onderzoek naar de effectiviteit van herhaalde screening op PPD in de JGZ, gevolgd door advisering en doorverwijzing naar de reguliere zorg voor screen-positieve moeders, in een prospectieve, vergelijkende opzet waarbij twee regio's werden vergeleken. Moeders die het consultatiebureau bezochten, werden in de interventieregio op 1, 3 en 6 maanden na de bevalling gescreend op PPD (n=1843), en kregen in de controleregio zorg zoals gebruikelijk (CAU) (n=1246). Aanzienlijk minder moeders van de interventiegroep waren op 9 maanden na de bevalling depressief in vergelijking met de CAU-groep; 0,6% versus 2,5% had een ernstige depressie (aOR 0,30 (95% betrouwbaarheidsinterval 0,13 - 0,66; Cohen's d 0,66), en 3,0% versus 8,4% (aOR 0,38 (0,24 - 0,61); Cohen's d 0,53) had een milde tot ernstige depressie. De interventie had op de meeste secundaire uitkomsten op moederniveau 12 maanden na de bevalling (angstklachten, mentaal functioneren en zelfeffectiviteit met betrekking tot opvoeding) een klein effect. Op kindniveau werd een verwaarloosbaar effect op de sociaal-emotionele ontwikkeling gevonden.

In **hoofdstuk 4** is onderzocht of de EPDS een aparte angst subschaal bevat. Vervolgens is de validiteit en stabiliteit van de subschaal gedurende de eerste zes maanden na de bevalling onderzocht met de data van de onderzoekspopulatie van de eerdergenoemde interventieregio. Een verkennende factoranalyse van de EPDS-gegevens leverde in zowel de twee- als driefactor oplossingen een subschaal op waarvan verondersteld wordt dat deze angst weergeeft. Een bevestigende factoranalyse toonde aan dat de subschaal stabiel was gedurende de eerste zes maanden na de bevalling. De gevonden subschaal correleerde echter slechts matig met de angst criteria, en hetzelfde gold voor de volledige EPDS. Dit impliceert dat het gebruik van de EPDS niet resulteert in een adequate detectie van angst.

Hoofdstuk 5 beschrijft welke factoren voor, tijdens en na de zwangerschap de risico's op symptomen van PPD en angst verhoogden, in dezelfde populatie als in hoofdstuk 4. De volgende factoren hingen samen met een verhoogd risico op PPD: het thuis spreken van een andere taal; een voorgeschiedenis van depressie; een lage ervaren zelfeffectiviteit met betrekking tot opvoeden; en een slechte gezondheid van de moeder. Het niet starten van borstvoeding hing samen met een lager risico op depressie, geen borstvoeding geven 3 weken postpartum verhoogde het risico. De volgende factoren hingen samen met een verhoogd risico op postpartum angst: een hoger opleidingsniveau; een voorgeschiedenis van depressie; vroeggeboorte van het kind; een negatieve ervaring met de bevalling of de eerste week postpartum; overmatig huilen van de pasgeborene; een lage ervaren zelfeffectiviteit met betrekking tot opvoeden; weinig steun van de partner; en een slechte gezondheid van de moeder.

Hoofdstuk 6 gaat in op het gebruik van zorg bij klachten van PPD, en op de impact van PPD op het gebruik maken van gezondheidszorg in algemene zin voor zowel moeder als kind, en op arbeidsparticipatie. Analyse van de gegevens van de controlegroep zoals beschreven in hoofdstuk 3 liet zien aan dat 71% van de 99 vrouwen die meldden PPD te hebben ervaren in het eerste jaar na de bevalling enige vorm van zorg had ontvangen voor hun PPD klachten. Bij 31,3% werd de diagnose gesteld en 37,7% werd behandeld. Zowel het algemeen zorggebruik voor de moeder als voor het kind was hoger in de groep moeders die PPD hadden ervaren, in vergelijking met de groep moeders zonder klachten. Daarnaast was de arbeidsparticipatie van vrouwen met PPD klachten aanzienlijk lager.

In **hoofdstuk 7** worden de implicaties van de belangrijkste bevindingen van dit proefschrift besproken. De bevindingen laten zien dat screening op PPD in de JGZ een toegevoegde waarde heeft, in onderzoek met een veel sterker onderzoeksdesign dan eerdere studies. De duidelijke meerwaarde van screening in de setting van de JGZ is mogelijk te verklaren uit het feit dat deze setting zich bij uitstek leent voor systematische en herhaalde screening in de postpartum periode. Bovendien kan de laagdrempeligheid van de JGZ met een hoog bereik en frequente contacten het voor moeders makkelijker maken om hun emotionele problemen ter sprake te brengen.

De opsporing van psychische problemen van moeders kan verder worden geoptimaliseerd, vooral als het gaat om postpartum angst. Onze bevindingen over de factorstructuur van de EPDS laten zien dat niet verwacht kan worden dat screenen met de EPDS ook leidt tot goede opsporing van angst, terwijl dit in de literatuur wel is gesuggereerd. De gevonden risicofactoren voor PPD en voor angst overlappen elkaar gedeeltelijk, maar verschillen ook gedeeltelijk. Angst in de postpartum periode heeft dus, los van depressie, aandacht nodig. De hoge percentages die we vonden voor moeders met symptomen van angst suggereren dat het uitbreiden van de screening met angst urgent is. Onze bevinding dat vooral factoren in relatie tot de geboorte en de postpartum periode het risico op angst verhogen, biedt extra mogelijkheden voor de JGZ om te interveniëren.

Kennis over risicofactoren kan professionals helpen bij het screenen, doordat ze meer alert kunnen zijn op vrouwen met een verhoogd risico op depressie of angst, en zo ook beter een vals-negatieve screeningsuitkomst kunnen opmerken. Dat verschillende risicofactoren voor zowel depressie als angst ook al voor de zwangerschap aanwezig zijn, biedt mogelijkheden om met interventies te beginnen in de preconceptiefase en tijdens de vroege zwangerschap.

Uit onze bevindingen blijkt dat slechts een beperkt deel van de moeders die rapporteerden PPD te hebben ervaren, verdere zorg of behandeling voor hun klachten heeft ontvangen. De lage behandelcijfers kunnen ermee te maken hebben dat er in Nederland geen specifieke zorgpaden zijn ontwikkeld voor vrouwen met PPD-symptomen. Dit was in onze onderzoeksopzet ook niet het geval. Een verklaring voor het significante effect van screening dat we desondanks vonden kan zijn dat vrouwen met klachten van een ernstige depressie na een positieve screening in een eerder stadium hun weg naar behandeling vonden. Ook kan de aandacht voor mildere symptomen PPD het makkelijker hebben gemaakt voor moeders om hun klachten zelf te managen, waardoor verergering voorkomen is. Desalniettemin laten de lage behandelingspercentages ruimte zien voor verbetering.

De effecten van screening op PPD die we vonden op de sociaal-emotionele ontwikkeling van het kind waren te verwaarlozen. Mogelijk waren effecten wel aanwezig, maar hadden we ze op een andere manier, bijvoorbeeld met een ander instrument, moeten meten. Een andere optie is dat de interventie moet worden aangepast om ook voor het kind significante voordelen te bereiken, bijvoorbeeld door het toevoegen van structurele ondersteuning voor de moeder-baby interactie in het proces na screening.

Bovenstaande bevindingen resulteren in de volgende aanbevelingen voor de praktijk en het beleid:

1. Maak van screening op PPD een standaardonderdeel van de JGZ door deze screening toe te voegen aan het reguliere JGZ-programma.
2. Neem de verschillende risicofactoren voor zowel depressie als angst die we vonden op in het screeningsproces.
3. Verken andere manieren om postpartum angst beter te detecteren.
4. Verbeter het zorgpad na screening, bijvoorbeeld door binnen de JGZ een aanbod van zorg te creëren voor met name de minder ernstige gevallen van PPD, en ook zorg met specifieke aandacht voor de interactie tussen moeder en kind.
5. Creëer in co-creatie met de verschillende groepen van betrokken zorgprofessionals een model van stapsgewijs opgebouwde zorg (‘stepped care’) dat aansluit bij de diversiteit van vrouwen met PPD.
6. Breid de aandacht voor het psychisch welzijn van moeders uit naar de zwangerschap door daarop gerichte screening en risicobeoordeling toe te voegen aan de zorg tijdens de zwangerschap.

Het realiseren van deze aanbevelingen vraagt om actie van nationale beleidsmakers zodat depressiepreventie in de hele keten van perinatale zorg geïntegreerd wordt, er een samenhangend zorgaanbod is en er voldoende financiële middelen zijn. Een landelijke multidisciplinaire richtlijn gericht op het psychisch welzijn van ouders zou de realisatie van een dergelijke integrale aanpak goed kunnen ondersteunen.

De landelijke implementatie van screening voor PPD door de JGZ zou met relatief kleine investeringen kunnen worden gerealiseerd. Met wat extra middelen kan vervolgens ook het aantal moeders met milde PPD-symptomen dat ondersteuning krijgt worden verbeterd door een laagdrempelig zorgaanbod binnen de JGZ-setting te ontwikkelen. Ten slotte kan maximale winst worden behaald door een traject van stepped care te ontwikkelen en de aandacht voor het psychisch welzijn van moeders uit te breiden naar de zwangerschap en de preconceptiefase.

Bij het verbeteren van de vroegtijdige opsporing en behandeling van PPD is de kans groot dat de investeringen zich terugverdienen. Op korte termijn zal vroegtijdige opsporing de negatieve economische impact van PPD op de arbeidsproductiviteit en het gebruik van de gezondheidszorg verminderen. Op de lange termijn betekent investeren in preventie van PPD ook een investering in de kinderen van de moeders met PPD. De agenda voor een betere preventie van PPD en angst zou moeten leiden tot onderzoek dat zich richt op de optimalisatie van het screeningsproces en de daaropvolgende zorgpaden, en op mogelijkheden om de screening op angst te verbeteren. Het streven om het psychisch welzijn van moeders te verbeteren vraagt om een maximale inzet van praktijk, beleid en onderzoek gericht op de huidige generatie moeders. Het is daarmee tevens een waardevolle 'investering in de volgende generatie'.

DANKWOORD

(ACKNOWLEDGEMENTS)

DANKWOORD

Het leukste hoofdstuk om te lezen in een proefschrift vind ik het dankwoord. Daar krijg je een stukje van de persoon achter het proefschrift te zien en ook van de weg die bewandeld moest worden om te komen tot het eindresultaat. Ik heb tijdens mijn weg vaak vooruit gedacht aan het moment dat voor mij de tijd daar zou zijn om mijn dankwoord te schrijven, en er zijn ook zeker momenten geweest dat ik er aan twijfelde of het er wel van zou komen. Maar ik keek er vooral naar uit om de mensen te mogen en kunnen bedanken, om de kans te hebben mijn dankbaarheid te uiten voor alle steun en hulp. Als ik mensen vertel over het onderwerp van mijn promotie volgt er vaak meteen een positieve reactie over de relevantie en zie ik dat het herkenning oproept. Veel mensen kennen wel een moeder in hun omgeving die te maken kreeg met een depressie na de bevalling. Het belang om voor deze moeders en hun kind meer te kunnen betekenen is groot. Alle mensen die ik hierna graag wil noemen hebben er direct en indirect voor gezorgd dat dit onderzoek daaraan kan bijdragen.

De start van het traject is echt al even wat tijd terug; begin 2011 solliciteerde ik op de functie "medewerker onderzoek" voor een promotietraject met als thema postpartum depressie, uitgezet door de Academische Werkplaats Jeugd in Twente. Ik was toe aan een volgende stap, maar ook net zwanger van onze eerste dochter, en herinner mij nog goed dat ik dat tijdens het tweede gesprek, met Maarten IJzerman, spannend vond om te melden. Ik was dan ook dankbaar met de ontspannen reactie van Maarten - dat dat vooral om wat aanpassing in de startdatum vroeg, maar verder toch geen probleem hoefde te zijn. De eerste dag na mijn verlof op de vakgroep HTSR was er een hartelijk welkom en zelfs een bos bloemen! Een fijne start, en ik heb de sfeer binnen de vakgroep ook altijd als prettig ervaren. Al was de tak Jeugdgezondheidszorg binnen HTSR misschien een wat vreemde eend in de bijt, dat maakte voor het contact met collega's niet uit.

In het eerste jaar was het zaak om te komen tot een goede uitvoering van het onderzoek. In de opzet beoogden we een deelname van zo'n 3.000 moeders, dus dat had nogal wat voeten in de aarde. En daarbij heb ik ook hulp van veel mensen gehad. Bijzonder blij was ik met de aanstelling van Hilde Peters, die een bijzonder grote hulp is geweest bij het online en printklaar krijgen van de vragenlijsten, het bijhouden van de database van de moeders die deelnamen, en heel belangrijk voor het onderzoek, moeders te benaderen met het verzoek om alsnog de vragenlijsten in te vullen, (wat zeker heeft geresulteerd in een hoger deelname percentage). In een latere fase heeft Eline van der Berg deze taak op zich genomen, ik ben beiden heel dankbaar voor deze cruciale ondersteuning. Ook Sharda Bachoe en Janneke Kobus die het bellen van alle moeders 9 maanden na de bevalling op zorgvuldige wijze hebben uitgevoerd, een flinke klus, wil ik daarvoor graag bedanken.

Bij GGD Twente en de afdeling JGZ hebben in die periode veel mensen bijgedragen aan het onderzoek. Allereerst Paulien van der Heide en Brigitte Leferink, die heel wat werk hebben gehad aan het project, b.v. met de logistiek van de verspreiding van de pakketten en het verwerken van alle retour gekomen aanmeldformulieren. Ook de afdeling administratie JGZ ondersteunde waar nodig om opnieuw aanmeldpakketten bij de juiste verpleegkundigen te doen komen, en teamleiders faciliteerden het afstemmen met de teams. Heel belangrijk voor de uitvoering van het onderzoek waren de JGZ collega's werkzaam op de consultatiebureaus. Ik denk dan aan de jeugdverpleegkundigen die tijdens het huisbezoek moeders uitleg gaven en om toestemming voor deelname vroegen, de cb-assistenten die op het bureau zorgden dat moeders de EPDS invulden, en de jeugdartsen die de EPDS bespraken en zorgden dat deze weer retour kwamen. Ook Kees Smit, epidemioloog bij GGD Twente, heeft een aantal keren meegedacht in het traject als we lokale data nodig hadden. Dank aan jullie allen!

Ook wil ik de mensen uit werkgebied Deventer van GGD IJsselland, en regio Apeldoorn van Vérian bedanken. Allereerst Maria Schutte die het belang van het onderzoek onderschreef en daarmee ook bereid was om het werkgebied van Vérian als controleregio te laten fungeren. Dank ook voor je altijd prettige en snelle communicatie. En ook Mien-Jet Kersemaekers die zorgde dat we ook Deventer konden toevoegen als controleregio. Zonder een goede vergelijkbare controleregio, was dit onderzoek niet geslaagd. Dank ook aan alle screeners van Verian en Naviva voor het meenemen en uitdelen van de informatiepakketten tijdens de gehoorscreening aan vele ouders gedurende bijna 1,5 jaar!

Graag bedank ik ook alle moeders die deel hebben genomen aan het onderzoek. Ik ben heel dankbaar dat jullie bereid waren om in een jaar waarin al veel op je afkomt als ouder, de best lange vragenlijsten in te vullen. Dankzij jullie hebben de uitkomsten van dit onderzoek veel zeggingskracht gekregen.

De AWJT en ook ik hebben bijzonder veel te danken aan Marlie Cerneus, lange tijd coördinator van de AWJT. Als er bepaalde zaken geregeld moesten worden, dan kwam het met Marlie voor elkaar. Met haar ontwapenende, open, betrokken, maar toch nuchtere instelling, en haar slimme kijk op het geheel, was het bespreken van zaken altijd verhelderend en een stap voorwaarts. In de loop van de jaren zijn we elkaar ook beter gaan leren kennen, en is mijn waardering voor jou als persoon (en ook je visie op de toekomst van de JGZ) alleen maar groter geworden. Ik wens je toe je dat je nog veel mag gaan oogsten van wat je gezaaid hebt.

Sandra Gijzen, jij attendeerde mij op de aankomende promotieplek, waardoor ik tijd had om het zetten van deze stap voor te bereiden. We hebben allebei ervaren dat het combineren van een promotietraject, werk in de uitvoering en het er zijn voor je thuisfront vaak behoorlijk jongleren is. Het was fijn om daar af en toe samen over te kunnen spuien en ons hart te kunnen

luchten. Dat jij het voor elkaar kreeg om je onderzoek (waarbij je ook nog veel meer zelf de paden moest creëren) in roerige tijden tot een goed einde te brengen, zorgde dat ik er ook in bleef geloven dat het kon. Dank ook voor je rol als coördinator van de AWJT in de laatste fase.

Riet Haasnoot, samen met Magda stond je aan de wieg van de AWJT. Jouw motivatie om de JGZ verder te professionaliseren en academiseren is groot. Het was altijd waardevol als jij meedacht in stappen van het onderzoek of over de implicaties van de gevonden uitkomsten. Je gedachten volgen een heel heldere logica, maar wel met een originele kijk op de zaak, en een heel goed beeld van waar de praktijk nu staat. Ik heb veel van je mogen leren, ook in de laatste jaren waarin ik met je mocht samenwerken als stafarts. Ook als persoon waardeer ik je erg, je bent betrokken, wilt graag weten hoe het echt met de ander gaat. Je hebt mij ook echt gesteund om hetgeen ik meenam uit het promotietraject ook een plek binnen mijn werk voor de GGD te geven. Dank voor dit alles.

Dank ook aan alle anderen die hebben bijgedragen aan bij het opzetten, succesvol maken en voortzetten van de Academische Werkplaats Jeugd Twente (AWJT). Ik denk dan ook aan de mensen bij ZonMw die het tot stand komen van Academische Werkplaatsen Jeugd hebben gefaciliteerd, en aan de leden van de bestuurscommissie van de AWJT.

Na het verzamelen van de data kwam de stap van het analyseren. Ik zal het moment niet vergeten dat ik na het hele traject van de uitvoering van het onderzoek, en vervolgens het vele werk van opschonen, databestanden koppelen en syntaxen schrijven, de belangrijkste analyse in SPSS gereed had staan die in enkele seconden gerund zou zijn. Een vreemde gewaarwording in de tijd. Het was erg fijn om bij ingewikkelder statistieken Karin Groothuis om advies te kunnen vragen, daardoor kon ik er vertrouwen in hebben dat ook dat gedeelte van het onderzoek goed in elkaar zat. Bij 3 van de 5 artikelen vormde die ondersteuning ook een belangrijke bijdrage aan de publicatie van het artikel. Annemieke Konijnendijk was net iets eerder gestart met haar promotietraject binnen de AWJT, en ik heb haar regelmatig om hulp en advies kunnen vragen. Met de manier waarop jij alles op orde had was je voor mij altijd een voorbeeld, en het heeft me regelmatig verder zoekwerk gescheeld, dankjewel daarvoor. Graag wil ik ook de (destijds) studenten noemen die hun bachelor en master onderzoek hebben gedaan in het verlengde van de Post-Up studie; Vera van de Beek, Marloes van der Maas, Karlijn Gabriels, en Hannah Kaya. Met jullie onderzoek zijn nog meer aspecten van het screenen op PPD verkend en de data van het onderzoek beter benut. Ook wil ik de HTSR secretaresses Annelies Veldman-Klos en Ingrid de Kaste-Krisman bedanken voor hun altijd vlotte ondersteuning waar nodig, en Janneke Vos - de Vries (UMCG) voor het plannen van de vele afspraken met Menno.

Om het promotietraject goed te kunnen blijven combineren met het werk in de JGZ bij GGD Twente heb ik de overstap gemaakt van team Hengelo naar team Rijssen-Holten. Het was

een heel fijn team om in terecht te komen. Ik wil alle collega's daar hartelijk danken voor het begrip en de medewerking om het werk binnen het team te kunnen combineren met het werk voor het onderzoek, en ook Maureen Viet voor het blijven meedenken hoe alles werkbaar te houden. Carolien, jij bijzonder bedankt voor je luisterend oor op vele momenten, het gaf mij vaak weer betere inzichten. Daarnaast was de manier waarop jij moeders ondersteunde en begeleidde voor mij het voorbeeld van wat veel moeders in de eerste maanden na de bevalling nodig hebben. Ook het team van de staf van de JGZ, waar ik vanaf 2017 deel uitmaakte, wil ik bedanken voor de bijzonder prettige samenwerking in die periode.

JoAnn van Seventer wil ik graag bedanken voor de wijze waarop ze het Engels van een aantal artikelen gecorrigeerd heeft. Jij verstaat de kunst om de tekst te corrigeren, maar de boodschap niet te wijzigen, waardoor het optimaliseren van de tekst heel efficiënt kon verlopen.

Gedurende de jaren kwam ik ook regelmatig nieuwe inspirerende mensen tegen, wat bijzonder stimulerend is voor de drive om zoveel mogelijk uit je onderzoek te willen halen. Graag wil ik noemen: Karin van Doesum (moeder-baby interventie, en online behandeling voor een depressie na de bevalling), Monique l'Hoir (altijd vol positieve energie, ik heb vaak teruggedacht aan ons gesprek op de eerste avond van het EUSUHM in hartje Londen in het 'House of Commons' over het goed combineren van een promotietraject en een gezin), Peter Tamas (die op inspirerende wijze de cursus methodology gaf aan de Universiteit Wageningen), Renske Rijlaarsdam (kinderarts in het ZGT en de POP-poli, altijd geïnteresseerd in de vorderingen van het onderzoek, en de JGZ duidelijk op het netvlies), Liesbeth Meeuwissen (die ik o.a. meemaakte als inspirerend voorzitter van de wetenschappelijk commissie van de AJN en zeer gedreven is om de JGZ verder door te ontwikkelen), Madeleine de Vilder (ontwikkelde "Mamakits", een laagdrempelige preventieve begeleiding voor moeders met psychische klachten tijdens en na de zwangerschap), Anne-Marieke Graafmans (die de indrukwekkende documentaire 'Roze wolk' maakte over vrouwen met PPD). Als laatste wil ik graag noemen Diana Kosters, verloskundige en 'vrouwencoach' zoals ze zichzelf noemde, die ik ook een aantal keren heb ontmoet. De bevlogenheid en energie waarmee zij meer wilde betekenen voor vrouwen die het psychisch moeilijk hadden na de bevalling was buitengewoon. Helaas overleed zij zeer onverwachts in 2016 op 50-jarige leeftijd. Gelukkig is haar kennis en ervaring nog steeds beschikbaar via de boeken die ze schreef, waaronder 'perfecte moeders bestaan niet'.

Dank ook aan de verschillende mensen van Trimbos voor de prettige samenwerking rondom het tot stand komen van de e-learning 'signaleren van PPD' voor verschillende doelgroepen, en tevens dank aan alle mensen betrokken bij het doorbraakproject depressie preventie voor zwangere en pas bevallen moeders, geleid door GGD-GHOR. Het is heel fijn dat er via deze wegen kennis van dit promotietraject geïmplementeerd kan worden in de praktijk.

De leden van de promotiecommissie wil ik ook hartelijk danken voor hun bereidheid dit proefschrift te beoordelen op de wetenschappelijke waarde, en hun aanwezigheid (live of online) bij de verdediging.

Een proefschrift in je laptop is nog geen proefschrift op papier. Ik ben Elisa Calamita bijzonder dankbaar voor het uitwerken van de vormgeving van dit proefschrift. Ik vond het bijzonder hoe je echt alles wat ik aangaf meteen oppikte en zorgvuldig verwerkte. Dank voor deze heel plezierige finishing touch! Dank ook aan de medewerkers van Ipskamp Printing voor het realiseren van deze mooie druk!

Degenen zonder wie dit proefschrift er echt niet zou zijn geweest, zijn Magda en Menno. Ik ben jullie ongelooflijk dankbaar voor alle jaren van input, hoeveel mailtjes zullen dat geweest zijn. Ik had mij echt geen betere begeleiders kunnen wensen. Jullie begeleiding heeft ook echt gemaakt dat ik dit traject tot de promotie heb weten af te ronden. Altijd ontving ik van jullie tijdig en inhoudelijk "to the point" reacties op mijn vragen en aangeleverde stukken, daar zijn door jullie ook heel wat uren in de avond en vroege ochtend aan besteed. Daarnaast waardeer ik jullie ook heel erg als persoon, en was het niet alleen altijd interessant om van gedachten te wisselen over het onderzoek, maar ook over andere zaken. Er zijn voor mij ook best wat moeilijke fases geweest, waarin jullie beiden altijd zowel begripvol als richtinggevend waren, zodat ik de koers wel kon vasthouden. Wat fijn was het dat we zo goed gebruik konden maken van Skype. De keren dat we met zijn allen fysiek bij elkaar zaten zijn op 1 hand te tellen, maar toch ging de communicatie prima en zijn we het zo gewend dat het voor ons ook niet echt verschil maakte. Ik zal het tijdstip van 10.00 uur op vrijdag ook best een beetje missen. Magda, ik heb je persoonlijke begeleiding altijd zeer gewaardeerd. Je uitgebreide ervaring zowel in de praktijk, als ook in onderzoek was voor mij van grote waarde. Daarnaast ben je nuchter, vooruitziend, en heb je zowel een goed oog voor detail als de grote lijnen. Met dit alles vormde je een hele continue factor, en dat was voor mij denk ik heel belangrijk. Ik heb bijzonder veel respect voor wat je allemaal hebt gedaan in je loopbaan, niet voor niets kreeg jij afgelopen jaar de dr. Swaakprijs, al zul je over jezelf altijd bescheiden blijven. Zelfs in een heel verdrietige periode in je leven was je toch ook nog bereikbaar. Mijn dank daarvoor is groot. Menno, aan het begin van het traject zei een andere promovendus mij al dat ik heel blij mocht zijn met jou als promotor, zoals jij zijn er maar weinig. Ik heb in al die jaren veel van je geleerd, over structuur in het wetenschappelijk schrijven, zuinig zijn met woorden (het kon meestal nog wel korter ☺), het spel van revisie (hoe geef je gelijk, maar houd je toch ook je eigen lijn aan) maar ook van je rijke ervaring met onderzoek (altijd had je wel voorbeelden die konden helpen), het werkveld, als ook met de processen en actoren die deel uitmaken van het krachtenveld dat de sociale geneeskunde vormt. Ik prijs mij echt gelukkig, dat je bereid was mij tot de laatste punten op de i van het proefschrift te begeleiden.

Op een heel andere manier onmisbaar geweest zijn jullie, lieve pap en mam. Het was natuurlijk best een uitdaging om een promotietraject aan te gaan met eerst 1, en vervolgens 2 jonge kinderen. Zonder focus is het moeilijk schrijven. Vele keren ben ik met Evere en Lenine in vakanties en andere periodes een paar dagen bij jullie geweest. Zodra ik op de zolder bij jullie achter mijn laptop zat, kwam ik in de modus om bezig te gaan met analyseren en schrijven. Een "writersblock" heb ik mede daardoor nooit gehad. Wat zorgden jullie altijd goed voor alles, en wat hadden we vaak samen gezellige momenten aan tafel. Ook hebben jullie altijd erg meegeleefd met waar ik zat in het proces, en daarmee is het ook voor jullie fijn dat het promotietraject straks echt afgerond is. Ik hoop dat we nog veel fijne momenten in ontspanning mogen hebben samen de komende jaren.

Lieve zussen, fijn dat we altijd nog goed contact hebben, al is het niet altijd even vaak. Maar het waren voor ons allemaal drukke tijden met gezin en werk. Lisanne, jij bent altijd degene geweest die uitsprak hoe trots je was op waar ik mee bezig was en de mijlpalen die ik haalde. Het is heel fijn om dat te horen en te ervaren, want zelf sta je er soms niet voldoende bij stil. En om dat te horen van iemand die dicht bij je staat doet je echt wat. Victorique, we zeggen vaak dat we dezelfde harde schijf hebben, toch is het altijd verrassend en verbindend als we dat weer ervaren. Het helpt om elkaar te begrijpen en in moeilijke tijden te steunen, maar vooral ook om veel te genieten van de grappige en leuke kanten van het leven. Het is heel fijn dat we op deze manier altijd bij elkaar terecht kunnen en betekent voor mij in ieder geval heel veel.

Lieve Lucia en Jochem, wat is het fijn om jullie als familie te mogen hebben. Als we elkaar zien is het altijd een feestje. Er zijn weinig mensen die zo enthousiast kunnen zijn en voluit kunnen lachen. En het is heel gezond om die positiviteit te ervaren tussen alle serieuze zaken door. De kinderen zijn intussen ook al heel wat weekendjes bij jullie geweest, een win-win situatie, want jullie en de kinderen genieten ervan, en Michael en mij geeft het net even wat extra ruimte. Veel dank daarvoor!

Lieve Thesja, dank je voor al je steunende en lieve gedachten, heel vaak ook in de vorm van met aandacht gekozen kaartjes. We communiceren het beste via de mail, en dat werkt voor ons heel goed, zo kunnen we elkaar toch goed op de hoogte houden van het wel en wee. Ook al zijn we door alle drukte heel wat keren minder bij je geweest dan we zouden willen, toch sta je altijd met open armen klaar!

Lieve tante Diny, je bent altijd heel begripvol voor alle drukke levens, en ook op afstand leef je toch met ons mee. En als het leven ingewikkeld is, heb je altijd een luisterend oor en levenswijze raad. En ook al heb ik je de afgelopen jaren niet vaak kunnen bezoeken, je bent voor mij een heel belangrijke tante!

Lieve Elles en Tanja, jullie zijn op de dag van de promotie mijn paranimfen. Toen ik jullie vroeg, merkte ik hoe fijn het voelde om te weten dat ik er op 'de dag' zou staan met 2 vriendinnen die me na staan en ik al heel lang ken. Tanja, onze geschiedenis telt inmiddels al meer dan 30 jaar, in onze jonge jaren hebben we wat af gemusiceerd, veel samen gedaan en een goede band gesmeed. Ondanks dat samen muziek maken er al jaren niet meer van komt, is het altijd fijn om elkaar weer te zien, en bij te praten. Jij hebt al heel wat jaren terug je promotie weten af te ronden, en dat allemaal in eigen tijd. Dus mocht ik onverhoopt niet kunnen 9 april, dan laat ik de verdediging graag aan je over. Elles, wij kennen elkaar al sinds blok 1 van onze geneeskunde studie. De studie zijn we al samen studerend doorgekomen, we startten tegelijk met onze coschappen en hebben die ook afgesloten met een bijzonder coschap in Tanzania, met als hoogtepunt toch wel het beklimmen van de Kilimanjaro. Dan heb je elkaar wel leren kennen. Je bent een vriendin waar je altijd van op aan kunt, dat was voor mij niet altijd te evenaren. Ik ben je dan ook extra dankbaar jij tijdens de promotie naast me wilt staan.

Lieve Willemijn en Aggie, ook al staat de frequentie op een laag pitje, toch doet het altijd goed om weer even met vriendinnen het leven, als vrouwen onder elkaar en ongecensureerd te kunnen delen.

Dank ook aan alle andere familie, collega's en bekenden, voor alle getoonde interesse en meeleven!

Lieve Michael, jij was de allereerste die mij steunde om het traject aan te gaan, en bent dit ook altijd blijven doen. En dat vraagt veel als partner. Vaak zag je zelfs nog veel meer strategische mogelijkheden om de uitwerking van waar ik mee bezig was in het onderzoek nog groter te laten zijn. In de beginfase heb je de website www.postup.nl en het logo van de Post-Up studie vormgegeven, en geholpen tijdens het drukproces van alle materialen (zie ook Appendix A), hulp waar ik heel blij mee was. En alleen jij hebt dagelijks ondervonden hoeveel uren er nodig zijn voor elke stap van het proces. Al met al zijn het voor ons echte tropenjaren geweest, en we hebben ons bootje best langs heel wat klippen en rotsen moeten manoeuvreren, maar dat is ons gelukt! Ik hoop dat we nu in rustiger vaarwater zijn aangekomen, en kijk er naar uit om samen meer tijd en ruimte te hebben om door het leven te meanderen.

Tot slot, lieve Evere en lieve Lenine, nu is mama's "boekje" dan eindelijk klaar. Er is mij altijd alles aan gelegen geweest om er voor jullie te zijn, al hebben jullie best heel wat keertjes geduld moeten hebben als ik weer achter de laptop zat. Jullie zijn de fijnste dochters die ik mij kan wensen, en ik ben heel erg trots op jullie. Ik geniet er van om jullie te zien opgroeien, te mogen opvoeden, en boven alles om met jullie samen te zijn. Wat is het fijn om mama te mogen zijn, dat te ervaren gun ik alle moeders!

CURRICULUM VITAE

CURRICULUM VITAE

Angarath van der Zee – van den Berg was born on the 12th of September 1977 in Groenlo, the Netherlands. She attended secondary school (VWO) at Scholengemeenschap het Assink in Haaksbergen and graduated in 1995. In that same year, she started studying medicine at the Katholieke Universiteit Nijmegen, as well as studying classical piano at the Hogeschool voor de Kunsten Arnhem. In 2000 she received her bachelor degree in music, and in 2002 she obtained her medical degree. In 2003 she worked as a Preventive Child Health Care (PCHC) physician at Thuiszorg Groningen, and in 2004 as physician at an institution for mental health (Stichting Adhesie) in Deventer. At the end of 2004, she returned working in PCHC, at the Municipal Health Service (GGD) Twente. In 2008 she obtained her degree in the field of PCHC at TNO. She started her PhD research project in 2011, when the Academic Collaborative Centre Youth Twente (AWJT) was set up, aimed to improve knowledge transfer between practitioners, policymakers, researchers and the education sector. The main partners of the AWJT were the University of Twente, GGD Twente, the 14 municipalities in Twente, Saxion University of Applied Sciences (Enschede), with the University Medical Center Groningen as advisor. The AWJT focused on strengthening care for vulnerable children and one of the major themes within the AWJT was addressing postpartum depression (PPD), as PPD not only has impact on the mother but also on the child. Her PhD research concerned the effectiveness of screening for PPD by PCHC, and the options to extend the attention for postpartum mental health to anxiety as well. Her PhD project was supervised by Magda Boere-Boonekamp (University of Twente) and Menno Reijneveld (University of Groningen). In the project she combined her work as researcher with her work as PCHC physician at GGD Twente. In 2019 she received an honourable mention from the committee of the 'Flora van Laar' prize for her research in the field of PCHC. She contributed to the development of an e-learning on early detection of PPD by the Trimbos institute, and is a partner in the project 'Prevention of depression in expectant and newborn mothers' led by GGD-GHOR.

From 2017 to 2020 she extended her work in PCHC by becoming part of the staff of the PCHC department, first at GGD Twente and in 2020 at CJG Apeldoorn. From 2021 she started as a trainer at the NSPOH (Netherlands School of Public & Occupational Health) providing postgraduate education in the field of social medicine. She teaches and coaches postgraduates performing the research part of their education.

APPENDIX A

Information brochure

UP POST

Onderzoek naar screening op postpartum depressie op het consultatiebureau

Informatie voor ouders

academische werkplaats jeugd in twente

Waar gaat het om?

Veel vrouwen zijn na de bevalling een paar dagen extra emotioneel. Ze zijn gevoeliger en moeten vaker huilen. Deze huildagen na de bevalling noemt men ook wel kraamtranen of babyblues. Bij de meeste moeders duurt dit niet langer dan één tot twee weken. Als een vrouw langer last houdt van deze gevoelens, kan er sprake zijn van een depressie. Eén op de 10 vrouwen krijgt hier mee te maken. Artsen noemen deze depressie een postpartum depressie (postpartum betekent na de bevalling).

De moeder kan veel last hebben van deze depressie. Het kan ook gevolgen hebben voor het contact tussen moeder en baby en de verdere ontwikkeling van het kind. Hoe eerder de depressie herkend en behandeld wordt, hoe beter voor moeder en kind.

Een depressie na de bevalling wordt helaas regelmatig niet of laat herkend. Voor zorgverleners zoals de huisarts, verloskundige en kraamhulp kan het moeilijk zijn om een depressie te herkennen. Voor moeders zelf is het vaak een hele stap om er over te praten.

Om een depressie na de bevalling beter te herkennen wordt er op sommige consultatiebureaus gewerkt met een korte **depressie vragenlijst**. Moeders die op het bureau komen vullen de lijst in. Tijdens het gesprek met de arts wordt de lijst met moeder besproken. De consultatiebureaus in Twente gebruiken zo'n depressievragenlijst, de consultatiebureaus in regio Apeldoorn en Deventer niet.

Wat houdt het onderzoek in?

Er wordt onderzocht of het standaard gebruiken van een depressie vragenlijst helpt om een depressie na de bevalling eerder te herkennen. Ook wordt gekeken of een moeder eerder hulp krijgt en of dit een positief effect heeft op de ontwikkeling van het kind.

Wilt u meedoen?

De jeugdverpleegkundige komt bij u thuis langs als uw kind ongeveer twee weken is. Zij bespreekt met u of u wilt deelnemen aan het onderzoek. U kunt dan op dat moment het toestemmingsformulier ondertekenen. Heeft u meer tijd nodig om uw besluit te nemen, dan kan dat ook. De jeugdverpleegkundige vraagt u dan of de onderzoekers u mogen bellen.

Wat betekent het voor u als u mee doet?

Als u mee doet benaderen we u drie keer met een vragenlijst:

- 3-4 weken na de bevalling
- 9 maanden na de bevalling
- 12 maanden na de bevalling

Het invullen van de vragenlijst duurt per keer 15 tot 30 minuten. In de vragenlijsten staan vragen over uw (pasgeboren) kind, uzelf en uw partner. De vragen gaan bijvoorbeeld over

- de zwangerschap en bevalling
- de gezondheid en ontwikkeling van uw kind
- hoe het met uzelf gaat

Voor het invullen van de vragenlijst krijgt u een emailbericht met een link. De verbinding is speciaal beveiligd. Als u de vragenlijst op papier in wilt vullen, kan dat ook.

Wilt u niet meedoen?

Als u niet wilt deelnemen kunt u dit ook aangeven tijdens het eerste huisbezoek van de jeugdverpleegkundige. U wordt gevraagd om het afmeldformulier in te vullen. Als u niet deelneemt aan dit onderzoek verandert dit niets aan de begeleiding van u en uw kind door het consultatiebureau.

Deelname is anoniem

Alle gegevens van u en uw kind worden anoniem verwerkt. Dit betekent dat alle naam en adresgegevens worden vervangen door een nummer. Alle onderzoeksgegevens worden zorgvuldig verwerkt en alleen gebruikt voor dit wetenschappelijk onderzoek.

Voor- en nadelen

Er zijn aan dit onderzoek voor uw kind of u zelf geen voor- of nadelen verbonden. U helpt er wel andere kinderen en ouders in de toekomst mee.

Heeft u nog vragen?

Neem dan gerust contact op met de onderzoekers. Wij zijn op werkdagen bereikbaar via tel.nr. 053 – 487 6900 . Voor meer informatie over het onderzoek kunt u kijken op de website www.postup.nl. Op deze website kunt u in de toekomst ook terecht voor de resultaten van het onderzoek.

Mevr. A.I. van der Zee – van den Berg
Jeugdarts en onderzoeker
E-mail: a.i.vandenberg@utwente.nl

Hartelijk dank voor uw interesse. We hopen met hulp van uw deelname de zorg voor nieuwe moeders en hun kinderen in de toekomst te verbeteren!

Het Post-Up onderzoek wordt mede mogelijk gemaakt door:

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