

WazzUp Mama?!

The development of an intervention to prevent and reduce
maternal distress during pregnancy

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For me, the word *maternal* is inseparably connected with my children, my mum and my mum's mother. Therefore I dedicate this thesis to them

WazzUp Mama?!

The development of an intervention to prevent and reduce
maternal distress during pregnancy

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CHAPTER 1

General introduction

Pregnancy is a distinct period in a woman's life but it cannot be separated from her past and present circumstances and experiences, her life-style, her emotions and opinions, and her hopes and expectations for the future ^{1,2}. Although pregnancy is primarily thought of as a physiological process - its intrusive, life-altering aspects together with the social, physical, and emotional changes, and challenges associated with becoming a mother - mark it as a psychological and social process as well. It is no surprise that women's emotional wellbeing is affected during pregnancy, and that these effects are more profound for some women.

Emotional wellbeing is described as a positive sense of wellbeing that enables an individual to be able to function in society, to meet the demands of everyday life and to have the ability to recover effectively from illness, change or adverse events ³⁻⁵. Emotional wellbeing is not just the absence of mental illness or the presence of constant happiness ⁶. Emotional wellbeing can be described only from someone's own perspective ³⁻⁵. Emotional wellbeing is associated with psychological health, thus when it is disturbed, we speak of psychological distress ⁴. Psychological distress is a temporary or permanent negative response to an internal or external stressor. The stressor creates a process of internal conflict between perceived demands and challenges, unmet desires or needs, and the current situation or experience. This internal process manifests in psychological and/ or physical discomfort and a change in emotional status, affecting one's ability to function and altering one's relationships ⁴. These negative effects vary in level of severity, in duration and impact ⁴.

Depending on the circumstances and characteristics, women may perceive pregnancy in positive as well as negative terms, as health or as illness. Thus, the degree to which pregnancy is perceived as stressful may vary widely among women. Not all women who experience the same level of demands and challenges during pregnancy experience equivalent stress. This is in part attributable to the factors that offset stress but may also relate to a woman's ability to cope with the stressors that confront them ⁷. A theoretical framework that helps us understanding coping in health and pregnancy is the model of salutogenesis, which is concerned with the relationship between health, stress and coping ^{5,8}. A key component of salutogenesis is the concept of sense of coherence, allowing some people who experience stressful life events to remain resilient and positive about their lives ⁸. When a woman views pregnancy and the context of her life as manageable, comprehensible and meaningful, she is more likely to view her pregnancy and her life as coherent ^{8,9}. In this sense, no matter how extreme a woman's experiences might be, she will have the ability to cope positively with and to adapt to adverse events in life generally and pregnancy specifically ⁹. Thus, when seeking to understand a woman's emotional vulnerability during the pregnancy, it is important to examine not only the stressors in pregnancy but also the strengths a woman brings to bear in handling stress in terms of their coping effectiveness. This is in line with the current view on public health, stating that health and wellbeing should be defined as the ability to adapt and self-manage in the face of social, physical and emotional challenges ⁶.

Maternal distress

The literature differentiates between psychological distress and maternal distress ^{10,11}. Psychological distress is regarded as a response to an internal or external stressor in life in general. Maternal distress is defined as a response to the changes accompanying the transitional period to motherhood, including changes to one's body, roles, relationships and social circumstances, birth experiences, and the emotional demands and challenges associated with becoming a (new) mother ¹¹. Regardless if the stressor(s) is/ are pregnancy-related or relate to a woman's life context, a process of internal conflict is created resulting in various subjective feelings and emotions (e.g.

sadness, uncertainty, worthlessness) and is manifested by signs (*e.g. poor sleep quality, lack of interest, muscle tension, suicidal ideation*) and symptoms (*e.g. depression, anxiety, stress*)¹¹. Levels of maternal distress vary between experiences of daily worries to emotional tension, extending to major symptoms of mental strains^{10,11}

The Netherlands Mental Health Survey and Incidence Study-2 (NEMESIS-2) showed that the prevalence rate of affective disorders among women in the fertile period (age range between 18 and 44 years of age) - classified according to the Diagnostic and Statistical Manual of mental disorders, fourth edition (DSM IV) - is 21.3% with regard to depressive disorders and 32.7% for anxiety disorders¹². Approximately 80% of Dutch women conceive and experience pregnancy¹³. Since a substantial percentage of Dutch women experience a disruption in their emotional wellbeing at some point between age 18 and 44, it is quite likely that these disruptions occur during pregnancy as a result of the continuation or exacerbation of existing complaints or as a relapse of previous affected emotional wellbeing. In addition, there will be women who will develop psychological complaints for the first time in their life during pregnancy.

There are a number of psychological symptoms, problems and diagnoses that describe a wide range of women's affected emotional wellbeing during pregnancy, varying from physiological mood states to severe mental disorders. Included here are general psychological constructs such as: depression, anxiety and distress. These constructs are related and often co-occur^{14,15}. There are terms that define the specific relation between the psychological problem or mood state and the perinatal period such as: perinatal depression¹⁶, antenatal depression¹⁷, pregnancy-specific anxiety^{18,19}, pregnancy-related fear²⁰, birth specific worry²¹, perinatal mental health^{11,22}, prenatal maternal emotional complaints²³, or antenatal mood state²⁴. There is also variation in the severity of these constructs, signified by the use of terms mild, moderate, severe and significant. Although terms and descriptions are all frequently used in the literature, the concept emotional wellbeing in relation to pregnancy has not been clearly articulated^{11,22}.

Underneath the variations in terminology and the differences in wording there is a common denominator. The descriptions refer to women who are emotionally unbalanced or experience emotional strain, ranging along a continuum that extends from daily worries and limited psychosocial disharmony, to major symptoms of emotional tension with a considerable disturbed psychosocial functioning^{10,11}. A general term that describes affected emotional wellbeing during pregnancy is *maternal distress*. This term refers to a spectrum of psychological, emotional and behavioural symptoms during pregnancy, either presented by one or multiple co-occurring psychological constructs^{2,11}. Maternal distress does not refer to psychiatric pathology where women are in need of specialized medical help and treatment such as hospitalization¹¹.

Maternal distress among Dutch pregnant women

Several studies report rates of maternal distress among Dutch pregnant women. The prevalence rates of maternal distress among various samples of Dutch pregnant women range from 3.4% to 30% for depressive symptoms, from 10% to 30% for anxiety and from 9% to 21% for pregnancy and birth-related anxiety. Prevalence rates, presented in Table 1, depend on the population studied and the measurement tools and cut-off points that are used. Analysis of the healthcare records and prescription data from a Dutch healthcare insurance company ($n = 29005$) found that during the first trimester of pregnancy 2-3% of all pregnant women in the cohort used antidepressants, which dropped slightly to 1.8% of all pregnancies in the second and third trimesters²⁵.

Table 1. Prevalence of maternal distress among various samples of pregnant women in the Netherlands presented by one-dimensional psychological constructs

Study	Design	Sample	Depressive symptoms	Anxiety	Fear of giving birth	Psychometric tool (ranges)/ cut-off point
de Bruijn et al ²³	Prospective longitudinal study	132 healthy Dutch Caucasian women with singleton pregnancies receiving midwife-led care in southern regions	25% at 12, 24, 36 weeks gestation	25% at 12, 24, 36 weeks gestation		EDS ¹ (0-30)/ ≥12 STAI ² (20-80)/ ≥ 39 SCL-90 ⁷ (10-50)/ ≥ 17
Bergink et al ²⁶	Validation study	845 low-risk Caucasian women with history of depressive episodes in (sub) urban, Eindhoven	3.4% to 5.6% in any trimester of pregnancy			EDS ¹ (0-30)/ 11 in 1 st trimester; 10 in 2 nd and 3 rd trimester
Woolthuis ²⁷	Randomized Controlled Trial	134 women (79 intervention/ 55 control) between 14-25 years of age and low social economic status; 54% with other ethnicity than Dutch	23% first trimester	10% first trimester		EPDS ¹ (0-30)/ 9-11 possible depression; ≥12 depression STAI ² (20-80)/ no cut-off point PRAQ ³ (10-50)/ no cut-off point
Heinrichs et al ²⁸	Population-based cohort study	6313 women in Rotterdam, including women with other ethnicities than Dutch (17%), lower levels of education and single unemployed women	15% mid-pregnancy			BSI ⁴ (0-212)/ top 15% scores
Loomans et al ²⁹	Community-based multi-ethnic cohort study	7740 women in Amsterdam, including women with other ethnicities than Dutch (24.5%), lower levels of education and single unemployed women	30%	29%	9%	STAI ² (20-80)/ ≥ 44 PRAQ ³ (10-50)/ above 90 th percentile CES-D ⁵ (0-60)/ ≥16
van Haaren et al ³⁰	Cohort study	550 nulliparous low-risk women	7% first half of pregnancy			EDS ¹ (0-30)/ ≥12 CWS ⁶ (16-80)/ no cut-off point
Brouwers et al ³¹	Prospective longitudinal study	105 healthy Caucasian women		30-35% at 32 weeks gestation		STAI ² (20-80)/ ≥ 1 SD above mean (≥ 37)
Verkerk et al ³²	Longitudinal study with community sample	184 women receiving midwife-led and obstetric-led care in Tilburg/ Eindhoven area.	2.3% - 22% at 32 weeks gestation			EPDS ¹ (0-30)/ ≥12
Van Son et al ³³	Longitudinal study with community sample	248 community sample, Southern regions	26% at 32 weeks gestation			EPDS ¹ (0-30)/ ≥12
van de Pol et al ³⁴	Longitudinal study	672, nulliparous, low-risk women receiving midwife-led care in Utrecht area	18.2% at 12 weeks gestation; 20.7% 36 weeks gestation			CES-D ⁵ (0-60)/ ≥16

Quispel et al ³⁵		330 women in urban Rotterdam receiving primary, secondary and tertiary care at low-risk for mental disorders. Including Dutch-speaking women with non-western ethnicity (38%) and low social and economic status (53%)	23% between 14 and 32 weeks gestation	23% % between 14 and 32 weeks gestation	21% % between 14 and 32 weeks gestation	DSM-IV ⁸ axis I and II
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¹E(P)DS: Edinburgh (Postnatal) Depression Scale

²STAI: State-Trait Anxiety Inventory

³PRAQ: Pregnancy-Related Anxiety Questionnaire

⁴BSI: Brief Symptom Inventory

⁵CESD-D: Center for Epidemiologic Studies Depression Scale

⁶CWS: Cambridge Worry Scale

⁷SCL-90: 90 item Symptom Check List

⁸DSM-IV: Diagnostic and Statistical Manual of mental disorders, 4th edition

There is great variation in the way constructs are measured; the timing of measurement, and the way rates are reported (as point prevalence or as period prevalence). Furthermore, the sensitivity and specificity of psychometric instruments make it difficult, if not impossible, to report exact prevalence rates of maternal distress during pregnancy ². Some studies include self-reported measurement instruments while others exclude these measures. Researchers vary in the use and interpretation of cut-off points. Some studies use very small samples or include samples with different health-related, cultural, demographic and socio-economic factors, all of which make it difficult to generalise findings to the larger population ³⁶. On top of all these variations, we know that quite a number of women with maternal distress remain ‘under the radar’ and fail to report their problems ^{37,38}, suggesting that maternal distress among pregnant women is underreported, consequently affecting ‘official rates’ of maternal distress.

Implications of maternal distress

The experience of maternal distress during pregnancy can be a predictor for negative birth outcomes for both mother and child ^{1,28,39}. Adverse short and long-term post partum mental health effects have been reported, for mothers ^{14,33,40}, their partners ⁴¹, for their children from infancy through adolescence ^{31,42} and for society ⁴³. Even subclinical features of maternal distress, that do not meet diagnostic threshold, contribute to those adverse outcomes ⁴⁴.

The experience of daily maternal distress during the first trimester of pregnancy is associated with an increased risk of low birth weight ⁴⁵ and the exposure to maternal distress in the third trimester of pregnancy is associated with preterm uterine activity ⁴⁶. Mennes et al. ⁴⁷ found that maternal distress occurring in the period between 12 and 22 weeks of pregnancy interferes with fetal neurodevelopmental processes and results in adverse cognitive and behavioural development of children ⁴⁷. Exposure to maternal distress in the second and third trimester is associated with elevated risks for affective disorders in children ⁴⁸.

Despite good prospects for treatment of and recovery from maternal distress, maternal distress often goes unrecognized, and thus remains untreated during pregnancy and thereafter. This can result in the symptoms persisting for many years, affecting not only the mother but also her baby, family and society ⁴⁹.

Are some women more vulnerable for maternal distress?

International studies show that there might be triggers in a woman’s life that can prompt maternal

distress. Prominent triggers are pregnancy and birth-related ^{11,50-52} but they can also emerge in a more general context. General triggers find their origin in past or present life experiences and can cause maternal distress or exacerbate existing problems with emotional wellbeing ^{53,54}.

Findings from a Dutch ³² longitudinal study suggest the value of risk profiles for predicting maternal distress. Elements of the risk-profile are: (i) poor relationship between the parents during the childhood of the pregnant woman, (ii) a first degree family history of depression, (iii) personal history of depression, (iv) mid-pregnancy high depressive symptomatology on the Edinburgh Postnatal Depression Scale (score >11). Women who reported positive on one of these four risk factors were assigned to be high-risk. Those reporting none of the first three risk factors and low depressive symptomatology (EPDS < 8) were assigned to be low-risk. Women with scores of 8 to 11 were presumed to be risk neutral. Women with a high-risk profile showed more antenatal depressive symptomatology (22%) at 32 weeks gestation than women with a low-risk profile (2.3%) ³². The prevalence of depression during the antenatal period suggests that personal circumstances and history influence the prevalence of depression. An Australian predictive index study for antenatal maternal depression supports these findings, and showed 78% explained variance of similar factors for the occurrence of antenatal depression ⁴¹.

Current midwifery practice with regard to maternal distress: guidelines and practice

Within Dutch midwifery care pregnant women usually present themselves early in pregnancy ⁵⁵. Using the 'Obstetric indication list' midwives make the distinction between women with a physiological pregnancy who will receive care from a midwife and those who need obstetric monitoring and/ or treatment ⁵⁵. The indication list serves as a formal standardized guideline in regard to the choice and management of care for women during the childbirth period, whether the individual woman requires midwifery-led care or obstetric-led care or the combination of both ⁵⁵. The obstetric indication list states that in case of a psychiatric disorder, the decision as to whether a woman will receive care from a midwife or obstetrician depends on the severity of the disorder, and on the judgment and advice of the lead medical specialist for the psychiatric disorder. It is known that on average 10% to 15% of pregnant women with the midwife as lead-carer at the of pregnancy, are referred to a Psychiatric Obstetric Paediatric (POP) outpatient clinic prior to 20 weeks gestation because of suspicion of, or reported mental disorders. At the POP clinic they are assigned a specialised lead-carer during pregnancy ⁵⁶.

The Obstetric indication list includes a paragraph on the use of medication and its effect of use during pregnancy where the teratogenic effect will determine who will be the woman's lead-carer during pregnancy. A guideline of the Dutch Association of Obstetrics and Gynaecologists on Selective Serotonin Reuptake Inhibitor (SSRI) use in pregnancy and during lactation ⁵⁷ gives several recommendations about antenatal and postnatal management of care. These recommendations include: antenatal assessment of psychiatric disorders, antenatal medication of preference and dosage, the potency of the anomaly scan at 20 weeks gestation, place of birth, paediatric involvement, neonatal observation post partum, medication during lactation, and discontinuation of SSRI use during pregnancy and in the post partum period.

In the Quality Standard for antenatal care published by the Dutch Royal Organization of Midwives (KNOV) ⁵⁸, there is recognition of the psychological and social processes that occur during pregnancy, including pregnancy-related stress and fear. This standard emphasizes the psychosocial support during pregnancy, predominantly on the interaction, the communication, and the provision of information regarding emotional health and wellbeing but does not provide practical guidance.

Within the standard there are recommendations for the midwifery management of care for specific groups of women, including teenagers and women who have experienced depression, miscarriage, and domestic abuse. There is, however, no care pathway for non-specific groups of pregnant women.

The Dutch College of General Practitioners (NHG) also has a Quality Standard for shared maternity care between General Practitioners (GP) and primary care midwives. This Quality Standard includes recommendations for collaboration and consultation between midwife and GP for maternal mental health and wellbeing. The guideline also includes information for the GP about self-management, psycho-education, and referral to mainstream services (e.g. psychological therapy), and use of medication ⁵⁹.

The public health role of midwives is expanding and although they have Quality standards to support their care, their responsibilities in relation to mental health promotion have not been fully articulated ⁶⁰.

Timing and nature of interventions for maternal distress

Eighty percent of Dutch fertile women will call upon maternity services at some point in their lives ¹³. This high percentage of women offers an immense window of opportunity to identify women who are more at-risk to develop maternal distress or who experience a negative effect on their emotional wellbeing. When we compare prevalence rates among Dutch pregnant women (Table 1) with Dutch women in the fertile period who are not pregnant, we find slightly more psychological distress among pregnant women. This indicates that pregnancy in itself is not an exclusive trigger and that a large number of women may already have existing affected emotional wellbeing when entering antenatal care. However, there will also be women with de novo maternal distress during pregnancy because they are more vulnerable because of life issues, or because of pregnancy and birth-related issues. It is important to recognize all these women in order to prevent or limit the level of maternal distress, and to optimise or improve emotional wellbeing during the period of pregnancy.

Interventions need to address the promotion of emotional wellbeing in order to prevent the onset or the progression of maternal distress in all pregnant women. Interventions need to be designed to help women who are vulnerable to develop maternal distress and women who are already experiencing maternal distress. This will require interventions with possible universal, selective, or indicated preventive strategies ⁶¹.

THIS THESIS

This thesis is a result of the studies that were conducted for the project “Gewoon Gezond Zwanger” of the Academie Verloskunde Maastricht-ZUYD University. “Gewoon Gezond Zwanger” is a health promotion project carried out between April 2011 and April 2015. The project is a response to the concerns of the ‘Stuurgroep Zwangerschap en Geboorte’ (Steering Committee Pregnancy and Birth) ⁶² regarding the prevalence and the adverse affects of disturbed emotional wellbeing in pregnancy. The steering committee emphasized the need for prevention and reduction of maternal distress in maternity services in order to promote emotional wellbeing during pregnancy and childbirth. The “Gewoon Gezond Zwanger” project adopted this stance. In addition practising midwives expressed their uncertainty about their specific role and responsibilities in providing responsive care for women with maternal distress. The project has articulated the aim to develop an evidence-based and best practice antenatal intervention to optimise maternal emotional wellbeing during pregnancy. The “Gewoon Gezond Zwanger” project followed a bottom-up approach and involved experts in the field

in order to design and implement an intervention best adapted to the needs of pregnant women. The general aim of this project was to translate systematically gathered evidence into an antenatal intervention that contributes to the prevention and reduction of maternal distress during pregnancy for women who receive midwife-led care.

The “Gewoon Gezond Zwanger” project is funded by Regional Attention and Action for Knowledge (RAAK), registered as RAAK PRO 2-014. RAAK is managed by Stichting Innovatie Alliantie (SIA) with funding from the Ministry of Education, Culture and Science (OCW).

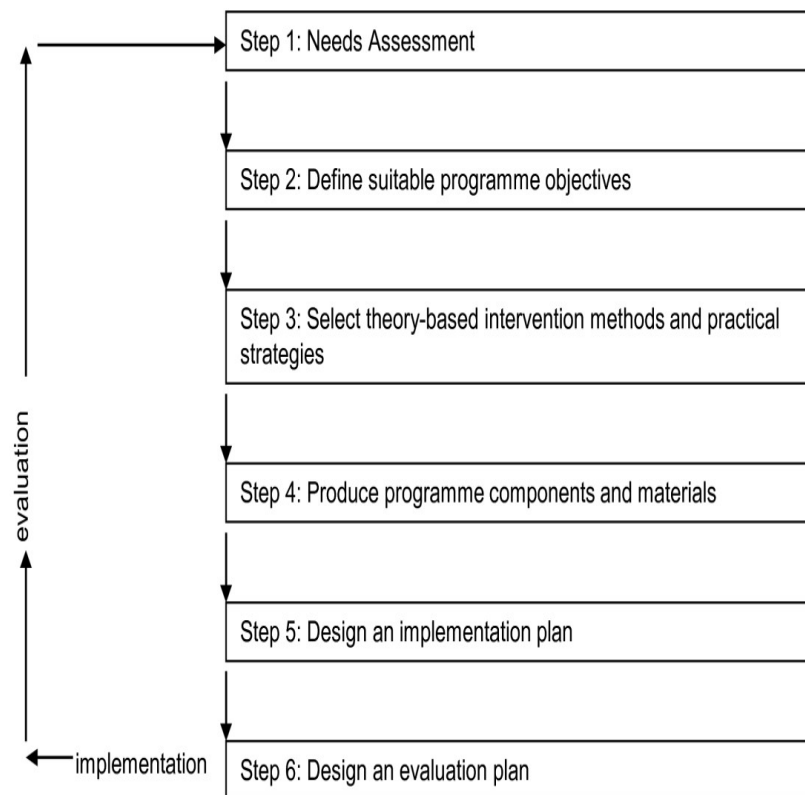
In this thesis we regard maternal distress as a spectrum. This is consistent with a broad approach to antenatal maternal emotional health and wellbeing, as opposed to a one-dimensional view that emphasizes distinct psychological constructs such as depression and anxiety. A broad approach can be interpreted as viewing all aspects of health and wellbeing without emphasizing a specific construct^{63,64}. There does not seem to be a need to prioritise or select between the above-mentioned mood disorders, as there is a recognised interrelation between them¹⁵. Restricting measurement to a single psychological construct will under-represent the degree of distress women experience during pregnancy. Therefore, the use of measuring different psychological constructs simultaneously may increase the accurate detection of distress experienced during pregnancy¹⁵. Maternal distress can be objectified by means of psychometric scores measuring the constructs of maternal distress.

Theoretical framework

Intervention Mapping is a protocol for developing effective health behavior change interventions that are underpinned by models and theories⁶⁵; we chose this approach to serve as a framework for the project (Figure 1).

Intervention Mapping consists of six steps starting with a needs assessment that offers an extensive description of the problem. In the first step the health problem is thoroughly described focusing on its impact on quality of life, the behavioural and environmental causes of the problem, and the determinants of these causes. In the second step important and changeable objectives of the selected target groups are determined. This step generates matrices of change objectives that define the content of the intervention at determinant level. Consequently, in step 3, behavioural and environmental change methods are identified and operationalized into practical applications that fit both the context and the target population. In the fourth step the program materials are produced and pre-tested among relevant stakeholders. Step 5 includes the development of a theory-informed implementation plan followed by the last step (6), an evaluation. While it is presented as a linear six-step model, Intervention Mapping is an iterative and dynamic process meaning that new insights may require a reassessment and adaption of previous steps⁶⁵.

Figure1. Intervention mapping process (Source: Bartholomew et al. ⁶⁵)



General aims and specific research questions

The general aims of this thesis are:

- To better understand the needs of healthy pregnant women with regard to antenatal maternal distress and to investigate the factors that influence the occurrence of antenatal maternal distress.
- To gain insight into the effectiveness of existing antenatal interventions.
- To examine the current midwifery management of care for maternal distress in daily midwife-led practice.
- To translate this information into an intervention to optimise maternal emotional wellbeing during pregnancy.
- To test the effectiveness of the developed intervention.

The studies included in this thesis focus on women with healthy pregnancies, giving the findings more general relevance. Our definition of healthy pregnancies includes pregnancies of women with minimal health and pregnancy-related risk factors that do not require medical interventions; these are different from pathological pregnancies that require medical obstetric care as a result of complications or the imminent threat of complications ⁵⁵.

The following research questions flow from our aims:

- What health needs of pregnant women should be considered when developing an intervention for optimising the antenatal maternal emotional wellbeing of mothers-to-be?

- What are the levels of maternal distress during pregnancy and which factors influence the occurrence of maternal distress?
- Which effective evidence-based antenatal interventions are available for the reduction of maternal distress during pregnancy?
- What are midwives' behavioural intentions with regard to the antenatal management of maternal distress and what are the underlying factors that influence midwives' intentions to provide antenatal management of maternal distress?
- How do we systematically develop an antenatal intervention for midwifery healthcare professionals capable of preventing and reducing maternal distress during pregnancy?
- Does an antenatal intervention developed according to the Intervention Mapping protocol have a positive effect on the prevention or reduction of maternal distress?

OUTLINE OF THIS THESIS

We used a variety of research methods to answer these research questions. We address the questions in the following order:

Chapter 2 describes an integrative review of pregnant women's emotional health needs.

Chapter 3 reports the results of a cross-sectional survey of the self-reported levels of maternal distress of women with a healthy pregnancy and the relationship between aetiological factors and the occurrence of antenatal maternal distress.

Chapter 4 describes a systematic review and reports the results of a meta-analysis into the effect of antenatal interventions on the reduction of maternal distress.

Chapter 5 describes the results of an exploratory survey of midwives' behavioural intentions to *screen* for maternal distress during antenatal care, to *support* women with maternal distress, to *collaborate* with other healthcare professional for maternal distress, and the underlying factors of their intentions.

Chapter 6 describes the systematic development of an antenatal intervention for midwifery healthcare professionals to optimise maternal emotional wellbeing during pregnancy.

Chapter 7 compares the effect of the intervention reported by women who received the intervention during pregnancy (experimental group) with women who received antenatal care-as-usual (control group).

Chapter 8 summarizes and discusses the main findings and conclusions of this thesis and provides the implications and recommendations for midwifery practice and future research.

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CHAPTER 2

A needs assessment to guide the development of an intervention for preventing and reducing antenatal maternal distress: an integrative review

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ABSTRACT

Objective

To perform a needs assessment of maternal distress to plan the development of an intervention for the prevention and reduction of antenatal maternal distress

Methods

A literature review validated by experts in the field. We searched PubMed, OVID and EBSCO. The needs assessment was done using the PRECEDE model.

Results

We identified 45 studies. Maternal distress was associated with diminished quality of life for both mother and child. Aetiological factors for maternal distress included past and present circumstances related to both obstetric factors and to a woman's context of living, her coping behaviour, and her social and professional support. Lack of knowledge of how to cope with (maternal) distress was identified as a predisposing factor. Reinforcing factors - which promote coping - were relaxation, partner support, counselling experiences and positive interaction with the midwife. Enabling factors - the conditions that favour coping - were the availability of a support network.

Conclusion

When planning the development of an antenatal intervention for preventing and reducing maternal distress, it is advisable to focus on assessment of antenatal emotional wellbeing, the context of the woman's past and present circumstances, her coping behaviour and her environment. The identified predisposing factors, and the enabling and reinforcing factors must also be taken into consideration.

INTRODUCTION

Our review is part of the project “Promoting healthy pregnancy”. This work is, in part, a response to the concerns of the Dutch Department of Health (VWS) regarding the limited attention within maternal care regarding psychosocial wellbeing in pregnant women ¹, and is focused on health promotion in Dutch midwifery. The worldwide prevalence of maternal distress among pregnant women varies between 10 to 41% ² and it is associated with adverse effects to both short and long-term health outcomes of mothers and children ^{3,4}. Given this, the aim of our project was to develop an evidence-based, best practice intervention to prevent and reduce maternal distress during pregnancy among women with a healthy pregnancy.

We adopted the term maternal distress as an umbrella term for a spectrum of psychological, emotional and behavioural symptoms during pregnancy ^{5,6}. Depression and anxiety in general or specifically related to pregnancy, are the most commonly mentioned constructs of maternal distress ^{5,7,8} and they often co-occur ⁸.

Various interventions to reduce maternal distress - including antenatal education, group antenatal care and mentoring programs - are available ⁹⁻¹¹ but they had limited success. The incomplete success of these programs is likely the result of an insufficiently systematic development of the intervention or the lack of rigorous theoretical underpinnings ¹² and an insufficient in-depth investigation of the context and the problem that the intervention needs to address ^{13,14}.

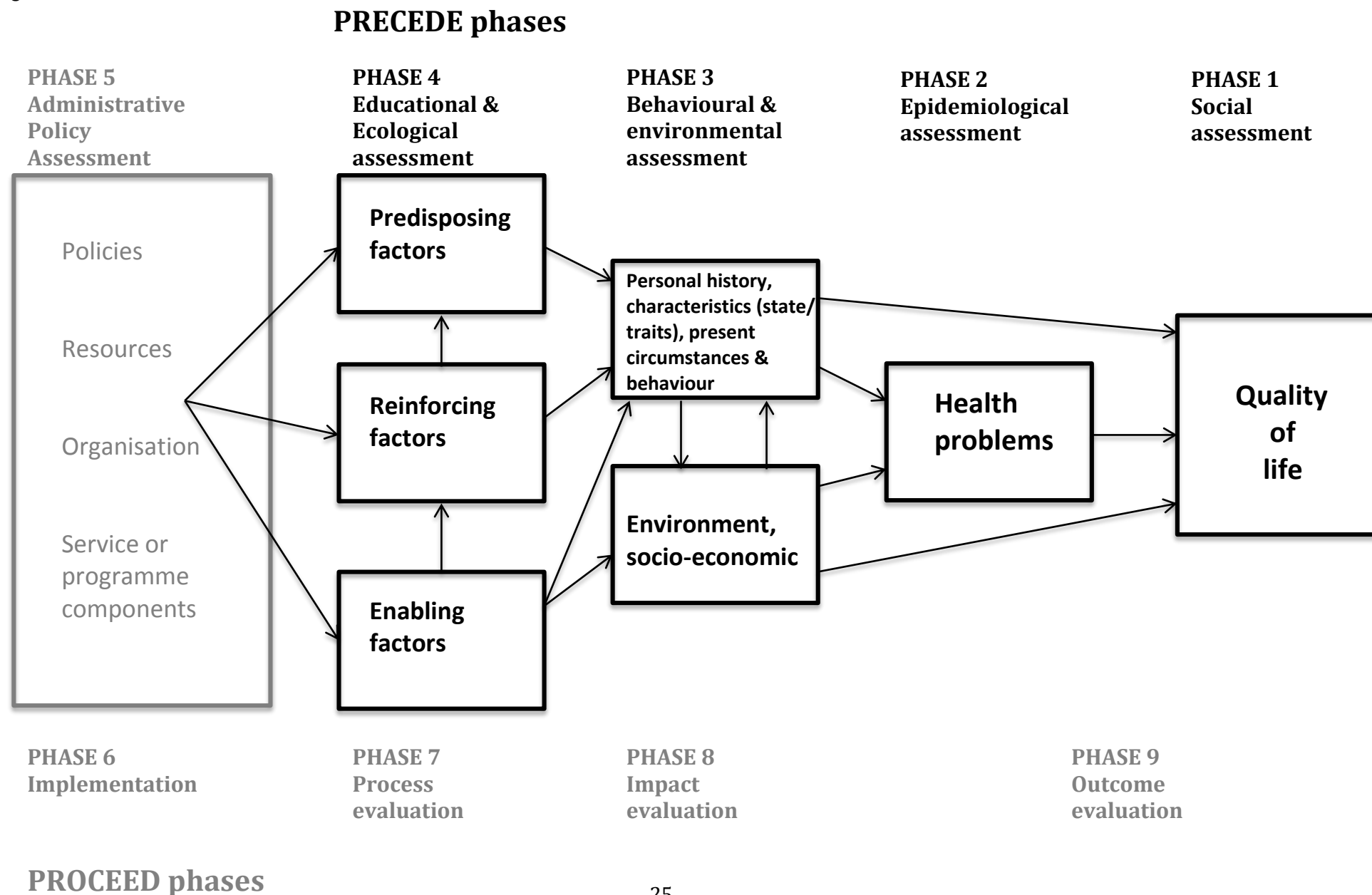
We aimed (i) to gain a more in-depth and systematic understanding of factors with a strong relationship to antenatal maternal emotional health needs to guide the development of an intervention to prevent and reduce maternal distress, and (ii) to assess the evidence for importance, relevance and changeability of the emerging factors. The first step in the systematic development of an intervention is a needs assessment to provide the necessary insight and theoretical grounding in the determinants of maternal distress ¹⁵. A second, and equally important step is collaboration with experts in the field to evaluate and understand the practical meaning of the findings ¹⁴⁻¹⁶.

METHODS

Model for planning

We organized our collection of information for the intervention using the PRECEDE component of the PRECEDE-PROCEED model. The model rests on the idea that a thorough needs assessment (*Precede*) is necessary for planning a health promotion intervention ^{15,18}. PRECEDE is an acronym for **P**redisposing, **R**einforcing and **E**nabling **C**onstructs in **E**ducational **D**iagnosis and **E**valuation. The first component of the model (*PRECEDE, phase 1-4*) focuses on a diagnostic and needs assessment. The second component (*PROCEED, phase 5-9*) includes implementation and evaluation of the intervention ^{15,18}. The PRECEDE component - our concern here - includes a social and epidemiological assessment, an aetiological assessment and an educational and ecological assessment (see Figure 1). Figure 1. PRECEDE-PROCEED model

Figure 1. PRECEDE-PROCEED model



Search strategy and study selection

Following the PRECEDE phases we aimed to identify studies including (i) antenatal maternal emotional and psychological health outcomes, (ii) quality-of-life aspects related to antenatal maternal emotional and psychological health, (iii) behaviour of pregnant women related to antenatal emotional and psychological health, (iv) environmental aspects in the immediate social and physical environment of pregnant women that can be linked to women's behaviour, and (v) factors influencing antenatal maternal emotional and psychological health(-related behaviour), including conditions of living that require change in order for behavioural and environmental changes to occur.

We focused on studies with healthy women. We excluded studies that reported no (significant) results or studies that included women with (i) overt severe mental pathophysiology (i.e. women requiring hospitalization for treatment; women requiring acute psychiatric care; women exhibiting psychotic, dissociative, hallucinatory, or delusional symptoms, suicidal ideation, or showing reduced communication abilities; women with active substance abuse), and (ii) physical pathophysiology (i.e. complex pregnancies; cancer; HIV/AIDS). We included studies using qualitative and quantitative data in an effort to increase understanding, to seek various perspectives, and to guard against misinterpretations ¹⁵.

We developed Boolean search strategies with the terms: ["maternal distress" OR "depression" OR "depressive disorder" OR "dep*" OR "mental health" OR "anxiety" OR "stress" OR "distress" OR "fear" OR "worry"] AND ["antenatal" OR "prenatal" AND IF "pregnancy" AND IF "preg*" OR "childbirth"] AND ["coping" OR "behaviour"]. We performed searches in PubMed, OVID and EBSCO following a comprehensive search strategy. We restricted our search to papers from January 2000 to August 2014 and retrieved papers published in English and Dutch language publications only. We scanned and hand-searched the reference lists of reviews. We performed the initial search in April 2011, and updated our search in August 2014.

Quality assessment of included studies

We determined the level of evidence for quantitative studies using the modified version of the Oxford's Centre scale (OCEBM). This scale is divided into five levels of evidence (I – V); the highest level is represented by level I ¹⁹. We selected the OCEBM scale because it aims to improve the identification of how treatment options, health outcomes, detection, and evaluation of maternal distress and women's characteristics can lead to performance measures ²⁰, a feature that is important for the development of an effective intervention. For qualitative studies we used criteria developed by experts in maternity care and published by the Association of Women's Health Obstetric and Neonatal Nurses (AWHONN) ²¹. Their tool has a scoring system ranging from 1 to 3, reflecting the quality of evidence. The highest level is ranked 1. These criteria were developed specifically for assessing the value of qualitative research for the practical management of care for women and children ²¹.

Analysis and expert validation

Given our aim - to gain a more in-depth and systematic understanding of pregnant women's emotional health needs to develop an intervention for maternal distress - we offer an integrated synthesis of the results. We selected the factors that showed the strongest relation with quality of life, health and health-related behaviour of pregnant women. Findings of quantitative studies were considered significant if $p < 0.05$.

In order to maximize the value of our findings for the delivery of care, we created a consortium of experts. We asked these experts to: (i) validate the results found in literature with a focus on their clinical importance and relevance for Dutch midwifery practice, and (ii) assess the changeability of the determinants of health behaviour using experience from their practice or academic discipline in order to determine where they fit in the larger chain of health determinants¹⁶. Using the evidence while accounting for relevance and changeability improves intervention planning and sustainability¹⁶. The consortium included (practising) midwives, public health professionals, someone who had experienced maternal distress during pregnancy – a so-called experience expert, a postdoctoral researcher in midwifery, a research methodologist, a woman's counselor, and a psychologist. On *ad hoc* basis mothers(-to-be), a General Practitioner, a counsellor, a health visitor, midwifery lecturers, and a maternity care provider were consulted. During the period of the needs assessment the consortium met every four to six months and the research group led the meetings (Y.F., M.A., M.N.). Meetings with consortium members were tape-recorded and minutes were taken for retrospective use.

RESULTS

In total our search yielded 804 citations. These publications were screened and were selected when the title or the abstract included an indicator for (i) the antenatal period, (ii) an emotional or psychological health outcome, (iii) quality-of-life aspects related to emotional or psychological health, or (iv) any factor associated with or affecting antenatal emotional or psychological health (negatively or positively; retrospectively or prospectively). This screening led to the exclusion of 734 papers. The full-text of the remaining 70 papers were read and were screened on two additional criteria: (i) inclusion of women who are likely to have healthy pregnancies or with minimal risk factors and (ii) use of sample populations with demographic characteristics similar to those of Dutch pregnant women²²⁻²⁵. Ultimately, a total of 45 studies met the inclusion criteria (see Table 1).

The 45 studies were conducted between 2000 and 2014 and included samples with healthy primiparous and multiparous women with a minimum of health-related risk factors. These studies recruited participants from a variety of countries (Australia, United States, Canada, New Zealand, Great Britain, Sweden, Norway, Finland, Denmark, Netherlands, Belgium, Germany).

Maternal distress was assessed during all trimesters of pregnancy and included depression^{7,26-43}, anxiety⁴⁴⁻⁵⁹, stress^{41,48,54-57,60}, distress^{40,58,59}, emotional wellbeing⁶¹, and fear of childbirth⁶²⁻⁶⁸. Quality of life aspects were reported in maternal health outcomes measured up to one-year post partum^{26,27,34,36,37,45,67} and child health outcomes, measured from birth up to 15 years of age^{34,47,53,57,58}.

The studies included one systematic review of observational studies⁴¹, three randomized controlled trials^{42,47,53}, one quasi-experimental pre-post test study⁴⁸, 26 prospective studies^{4,7,26,27,29,32-34,36,37,39,44-46,49-52,55-60,64,67}, one retrospective study⁴³, seven cross-sectional studies^{28,30,31,35,61,66,68}, and six qualitative studies^{38,40,54,62,63,65}. Three quantitative studies showed a quality level of evidence I, 21 studies showed levels of evidence II, and 15 studies showed a level of III (I – V levels OCEBM scale). Reasons to grade down were randomization, attrition, confounding and selection bias¹⁹. Two qualitative studies showed levels of evidence 1 and four studies were rated with a level 2 according to the AWHONN tool (1 – 3 AWHONN score). The rating of the qualitative studies was influenced by limited theoretical connectedness, intuitive recognition or procedural rigor²¹. We also identified which of the four PRECEDE phases the study was concerned with. Details and

results of the included studies are presented in Table 1.

Table 1. Overview study details and results literature review

Study (year)	Design / Level of Evidence	Sample characteristics	Factors	PRECEDE phase
Verkerk et al ⁴	Longitudinal population-based cohort prospective study / I	N=184 Dutch pregnant women derived from midwifery practices. Age 22-43; 48.8% medium level education; 92% partnered; 49.4% primiparous/ 50.6% multiparous Depression 2.3% - 22% (Gestational Age (GA) 32 weeks)	High depressive symptomatology 2nd trimester OR = 2.9 [95% CI 1.07-8.04] $p=.036$ → PPD*	1 - social
Van den Bergh et al ⁴⁶	Prospective longitudinal cohort study / I	N=68 Dutch-speaking mother-child pairs, Belgium (29 boys/ 29 girls); mean age 15 (SD 3 months) with mothers with high levels of anxiety during pregnancy (GA 12-22)	Antenatal anxiety 2nd trimester → depressive symptoms 14-15 year old girls $p=0.04$	1 - social
Loomans et al ⁵²	Large prospective community-2007; based cohort study / I	N=3758 children; mean age 5.1 (0.13) N=3446 mothers; mean age 31.8 (4.6); 75.5% Dutch; 56.7% primiparous. Low-risk population. Netherlands. Depression 30%; Anxiety 29%; Fear of Childbirth 9% (GA 16)	Antenatal anxiety $\beta=0.13$, $p<0.01$ → overall problem behaviour at 5 years (stronger in boys) $\beta=0.09$, $p<0.01$ → over activity in boys at 5 years $\beta=-0.07$, $p<0.01$ → decreased pro-social behaviour at 5 years	1 – social
			Antenatal depression 2 nd /3 rd trimester → PPD up to 8 months post partum $r=0.63$, $p<.001$ / OR = 6.55 [95% CI 4.68-0.17]	1 - social
Heron et al ²⁷	Longitudinal prospective cohort study / II	N=8323 women from Avon, United Kingdom. Low risk population. Depression 11%; Anxiety 13% (GA 18-32)	Antenatal depression → PPD* up to 1 year post partum $p=.04$	1 - social
Söderquist et al ⁶⁴	Longitudinal prospective cohort study / II	N=940 women from South-east Sweden. Mean age 28.8 (SD 4.5); 99% partnered; 13% history of psychiatric problems; 40% primiparous/ 60% multiparous. Fear of childbirth 13.5%; Anxiety 8.6%; Depression 9.1% (GA 16-20)	Antenatal anxiety 1 st and 2 nd trimester → FoC** OR 2.3 (1.5-3.8), $p=.004$	1- social
van Son et al ³²	Prospective longitudinal cohort study / II	N=248 Dutch community sample. Age 31 (SD 4.0) range 19-43; 94% married; 43% nulliparous/ 57% multiparous Depression 26% (GA 32)	Antenatal depression → PPD* $\beta.50$, $p=.05$	1 - social
			Antenatal depression → postpartum stress $\beta.15$, $p=.05$	1 - social
Mennes et al ³³	Prospective longitudinal cohort study / II	N=49 17 years old adolescents (29 boys/ 20 girls); mean age 17 (SD 3 months) with Dutch-speaking mothers with high levels of anxiety during pregnancy (12-22 weeks). Netherlands. Maternal anxiety 25% (GA 12-22)	Antenatal anxiety 2nd trimester → cognitive deficits (task performance $F[1.41]=5.78$, $p=.02$; multi-tasking $F[2.82]=3.38$, $p=.03$ at child's age 17)	1 - social
Grant et al ⁴⁵	Longitudinal prospective cohort study / II	N=100 women from Sydney, Australia. 93% Caucasian; 81% tertiary level of education; 90% partnered; mean age 31.97 (SD 4.43) 20-43 years; 70% primiparous/ 30% multiparous. Depression 7%;	Antenatal anxiety 3 rd trimester → postnatal anxiety 7 months post partum OR = 4.97 [95% CI 1.31-18.88] $p=0.02$ → PPD* 7 months post partum OR = 4.99 [95%	1 - social

		Anxiety 21% (GA 35-39)	CI 1.37-18.15] $p=.02$	
Leigh and Milgrom ³⁶	Longitudinal prospective cohort study / II	N=367 women from Melbourne, Australia. Predominantly Australian origin (87,5%), income above average, primiparous and multiparous. Depression 16.9% 28 – 32 weeks gestation; Anxiety 27.7% (GA 26-34)	Antenatal depression → parenting stress $\beta=-.52$, $p=.00$	1 - social
Leigh and Milgrom ³⁶	Longitudinal prospective cohort study / II	N=161 postnatal women from Melbourne, Australia. Predominantly Australian born (87,5%), 95.9% partnered; income above average 35.7% primiparous/ 64.3% multiparous. Depression 16.9%; Anxiety 27.7% (GA 26-34)	Antenatal depression → PPD* $\beta=-.47$, $p=.00$	1 - social
			Antenatal anxiety → PPD* $\beta=.18$, $p<.05$	1 - social
Milgrom et al ³⁷	Prospective cohort study / II	N=12361; 74% Australian born; mean age 30.4 (SD 5.6); mean of 2.2 pregnancies and 1.1 children. Australia. Depression 8.9%	Antenatal depression → PPD* 6 weeks post partum OR = 1.18 [95% CI 1.15-1.21] $p<.001$	1 - social
Robinson et al ⁵⁶	Longitudinal prospective cohort study / II	N=2979 women from Perth, Australia; N=2868 children/ 2 years n=1978/ 5 years n=2179. Maternal mean age pregnancy 28.4 (SD 5.65); Stress event 2.08 (SD 1.97); primiparous n=1272/ multiparous n=1707	Antenatal stress events during 2nd and 3rd trimester → mental health problems at child's age 2 and 5 OR = 1.41 [95%CI 1.29, 1.55], $p=.005$	1 - social
Tegethoff et al ⁵⁷	Prospective population-based cohort study / II	N=66203. Age <27 20.6%/ 27-29 27%/ 30-32 25%/ >32 27.5%; 44.7% primiparous/ 54.3% multiparous; 93% average to very good health; 84.5% medium to high socio-economic status. Denmark	Antenatal stress → increased risk of physical conditions in children 0-3 years of age OR = 1.13 [95% CI 1.06-1.21] $p<.001$ → increased risk of mental disorders in children 0-2.5 years of age OR = 2.03 [95% CI 1.32-3.14] $p=.007$	1 - social
Matthey et al ²⁶	Prospective longitudinal study / III	N=166. Mean age 28.7 (SD4.6) 17-45. Australia. Depression 12.3%	Antenatal depression → PPD* up to 1 year post partum $p=.04$	1 - social
Rubertsson et al ³¹	Cross-sectional study / III	N=1866; mean age 30; 43% primiparous/ 57% multiparous; 6.6% other ethnicity; 92.5% partnered; 87.3% employed. Sweden. Depression 13.7% (GA 16)	Antenatal depression → PPD* OR =6.78 [95% CI 4.07, 11.31]	1 - social
de Bruijn et al ³⁹	Prospective cohort study / II	N=132 Caucasian mothers and children from Southern regions in the Netherlands. Depression and anxiety 25% (GA 12-36)	Antenatal depression and anxiety all trimesters → reduced birth weight in boys at term $p<.05$	1 – social 2 - epidemiological
Van Bussel et al ⁵⁰	Longitudinal prospective exploratory cohort study / II	N=403 women from Leuven, Belgium. Mean age 30.15 (SD 4.39); 96.7% Flemish; 95.5% partnered; 70.3% higher education; 92% working; 39% primiparous/ 61% multiparous; 25% miscarriage	Antenatal anxiety 1 st trimester $F=9.47$, $p<.0001$ → birth related anxiety 2 nd and 3 rd trimester	2 - epidemiological
Adams et al ⁶⁷	Prospective cohort study / II	N=1586 women with uncomplicated pregnancies. Mean age 30.9 (SD 4.7); 50.5% primiparous/ 49.5% multiparous. Norway. Fear of childbirth 7.5% (GA 32)	FoC** → longer labour duration β 1.31 [95% CI 0.32-2.31] $p=.05$	2 - epidemiological
Helbig et al ⁵⁹	Prospective study / II	N=104 Norwegian women with uncomplicated pregnancies.	Antenatal emotional distress → reduces	2 – epidemiological

		Mean age 31.5 (SD 4.1); 43% primiparous/ 47% multiparous. Medium-high emotional stress 24.1%; High stress 20.7% (GA 30)	fetoplacental volume blood flow at 30 weeks gestation β -2.583, p =.0001	(1 – social)
Ayers and Pickering ⁴⁴	Prospective study / III	N=289 women from London, United Kingdom at 16-36 weeks gestation. 69% Caucasian; 88% partnered; 90% diploma or higher level of education; 52% primiparous/ 48% multiparous	Antenatal anxiety 3 rd trimester → negative expectations of the birth r =.25, p <.001	2 - epidemiological
Storksen et al ⁶⁸	Cross-sectional survey / III	N=1642. Mean age 31 (SD 4.7) range 18-45; 49% primiparous/ 50.1% multiparous. Norway. Fear of childbirth 8%; Anxiety 8.8%; Depression 8.9% (GA 32)	Antenatal anxiety → FoC** OR = 2.4 [95% CI 1.1–5.2]	2 - epidemiological
			Antenatal depression → FoC** OR = 8.4, [95% CI 4.8–14.7]	2 - epidemiological
Vossbeck-Elsebuch et al ⁶¹	Cross-sectional survey / III	N=224 1-6 months post partum women from Munster, Germany. Mean age 30.54 (SD 4.56); 98.2% partnered; 70% SVD***; 8% instrumental delivery; 22.3% caesarean section. Stress 12.5%	Reduced antenatal emotional wellbeing → FoC** β -.15, p <.05	2 - epidemiological
			Antenatal anxiety AND antenatal depression → FoC** OR = 11.0 [95% CI 6.6–18.3]	2 - epidemiological
Schneider ⁵⁴	Qualitative- Grounded theory / 1 (Score 25)	N=13. Age 25-42 years; primiparous; Australian born; diploma/ degree; 12 employed. Australia	Positive interactions with midwife → reduces antenatal stress Positive relationship between woman and midwife → reduces antenatal stress	3 – environment
			Available social support → reduces antenatal stress	3 - environment
Nilsson and Lundgren ⁶⁵	Phenomenological study / 1 (score 27)	N=9 women from Gothenburg, Sweden. Age 27 – 34 years; employed; low risk pregnancies	Antenatal encounter with midwife → decreases FoC**	3 – environment
			Low self-confidence → increases FoC**	3 – personal state
			History of negative previous birth experience → increases FoC**	3 – personal history
DiPietro et al ⁵⁵	Longitudinal cohort study / II	N=189 low-risk pregnant women. Mean age 30.6 (SD 3.8) years; education 16.5 (SD 2.4) years; 94% partnered; 63% primiparous/ 37% multiparous; 77% white. USA	Multiparity → more hassles than emotional uplifts in 3 rd trimester Primiparity → more emotional uplifts than hassles in 3 rd trimester F (1.50)=5.71, p <.001	3 – personal circumstances 3 – personal state
Sjöström et al ²⁹	Longitudinal prospective cohort study / II	N=177 low-risk women, Stockholm area, Sweden. Mean age 30.3 (SD 4.3); 87% employed; 40% university degree; 37% primiparous/ 63% multiparous. Anxiety 2% - 9%; Depression 3% - 6% (GA 12-34)	Positive coping with stressful situations → reduces antenatal depression 1st trimester β -.26; 3rd trimester β -.50 p <.001	3 – behaviour
			Positive coping with stressful situations → reduces antenatal anxiety 3rd trimester β -.38 p <.001	3 - behaviour
			Multiparity (more child than 1) → antenatal depression 3rd trimester p <.01	3 – personal circumstances

Söderquist et al ⁶⁴	Longitudinal prospective cohort study / II	N=940 women from South-east Sweden. Mean age 28.8 (SD 4.5); 99% partnered; 13% history of psychiatric problems; 40% primiparous/ 60% multiparous. Fear of childbirth 13.5%; Anxiety 8.6%; Depression 9.1% (GA16-20)	Psychological counselling/ support related to pregnancy/ childbirth → FoC** OR 2.4 (1.1-5.2), $p=.04$	3 - environment (4 – reinforcing)
			History of traumatic birth → FoC** OR 4.0 (1.7-9.3), $p=.001$	3 – personal history
			History of psychological problems → FoC** OR 1.7 (1.1-2.5), $p=.01$	3 – personal history
			Low stress coping mechanisms → FoC** OR 1.8 (1.1-2.8), $p=.01$	3 - behaviour
			Limited social support → FoC** OR 1.8 (1.2-2.9), $p=.008$	3 – environment
Rich-Edwards et al ³⁴	Prospective cohort study / II	N=1662 pregnant women in urban and suburban Boston, USA. Age range <23 - >40; 72% white; 78% USA born; 94% partnered; 95% wanted pregnancies (mid-pregnancy)	History of (diagnosed/ treated) depression → antenatal depression OR = 4.07 [95% CI 3.76, 4.40]	3 – personal history
Leigh and Milgrom ³⁶	Longitudinal prospective cohort study / II	N=367 women from Melbourne, Australia. Predominantly Australian origin (87,5%), income above average, primiparous and multiparous. Depression 9% (GA 26-34)	Low income $\beta=-.05$, $p=.04$ → antenatal depression	3 – personal circumstances (socio-economic)
			History of abuse $\beta=.06$, $p=.03$; (history) major life events $\beta=-.07$, $p=.01$ → antenatal depression	3 – personal history
			Negative cognitive style → Antenatal depression $\beta=.11$, $p=.00$	3 - behaviour
			Social support → Antenatal depression $\beta=-.18$, $p=.00$	3 – environment
			Self-esteem → Antenatal depression $\beta=-.34$, $p=.00$	3 – personal trait
Leigh and Milgrom ³⁶	Longitudinal prospective cohort study / II	N=161 postnatal women from Melbourne, Australia. Predominantly Australian born (87,5%), 95.9% partnered; income above average 35.7% primiparous/ 64.3% multiparous. Depression 16.9% 28 – 32 weeks gestation; Anxiety 27.7% (GA 26-34)	Lack of partner support → antenatal depressive symptoms	3 – environment
			Domestic violence → antenatal depressive symptoms [OR = 2.5]	3 – personal circumstances
			Unintended pregnancy → antenatal depressive symptoms	3 – personal circumstances
			Low finances → antenatal depressive symptoms	3 – personal circumstances (socio-economic)

Vieten and Astin ⁴⁷	Randomized controlled Trial – pilot study / II	N=31 pregnant women, San Francisco, USA with affected emotional wellbeing (no psychiatric pathology). Mean age 33.9 (SD 3.8); Mean gestation 25 (SD 4), range 18-31; all married; 74% white	Professional supported coping by positive regulation of emotions and feelings (relaxation/ acceptance/ self-awareness) → reduces anxiety $F_1(2.24)=4.32, p=.04, d=.85$	3 – behaviour 3 - environment
Beddoe et al ⁴⁸	Pretest-posttest quasi-experimental pilot study / II	N=16 community sample primiparous (13-32 weeks gestation) college-educated married middle class women, California, USA. Mean age 30.4 years; 81% working; healthy women; no obstetric complications; intention to have a vaginal birth and to breastfeed	Mindfulness-based yoga → reduces antenatal stress 3 rd trimester $MS_T 54.4 (df 4.6), p=.05$ → reduces antenatal anxiety 3rd trimester $MS_T 34.1 (df 5.8), p=.03$	3 - environment
van Bussel et al ⁵⁰	Longitudinal prospective exploratory cohort study / II	N=403 women from Leuven, Belgium. Mean age 30.15 (SD 4.39); 96.7% Flemish; 95.5% partnered; 70.3% higher education; 92% working; 39% primiparous/ 61% multiparous; 25% miscarriage	Perception that unborn baby controls pregnancy and life (negative thoughts) → general and birth related antenatal anxiety all trimesters $\beta=0.01, p<.001$	3 – personal trait
			Negative coping → general and birth antenatal anxiety $\beta=0.28, p<.0001$	3 - behaviour
Lancaster Palladino et al ⁴¹	Systematic review / II	N=57 eligible high quality studies. Mean sample size 522 (SD 1014) (homogeneous SES populations USA, Canada, Europe, Australia, New Zealand). Studies with samples with obstetric complications and existing diseases and studies with adolescent samples were excluded. Included studies had a quality score of ≥ 7	Life stress → antenatal depressive symptoms	3 – personal circumstances
			Lack of social support → antenatal depressive symptoms	3 – environment
			Domestic violence → antenatal depressive symptoms	3 – personal circumstances
Milgrom et al ⁴²	Randomized controlled Trial – pilot study / II	N=143 modal income pregnant women receiving midwife/ GP-led care, Melbourne, Australia. Mean age 31.96 (SD 5.58); Mean gestation 24.73 (SD 3.71) weeks; 88.7% partnered; 38% primiparous/ 62% multiparous; 53.5% higher education/ university. Depression 12%; Anxiety 7%; Stress 6.5% - 8% (GA 20-32)	Self-management (preparation parenthood) and support psychologist → reduces depression $F_1(86)=7.82, p<.01, d=.6$ → reduces anxiety $F_1(86)=7.35, p<.01, d=.58$	3 – behaviour 3 – environment
Bogaerts et al ⁵³	Randomized controlled longitudinal study / II	N=219 Dutch speaking (Flanders) women with healthy pregnancies. Mean age 28.7 (SD 4); 80% Belgium ethnicity; 96% partnered. Belgium. Depression 4.1% (1 st trimester)	Obesity (existing prior to pregnancy) → antenatal anxiety all trimesters $p<.005$	3 – personal circumstances/ health/ lifestyle
			History of stressful (family) events → antenatal anxiety all trimesters $\beta 5.08, p=.002$ → antenatal depression all trimesters $\beta 1.91, p=.01$	3 – personal history
			Ethnicity	3 – personal

			→ antenatal anxiety all trimesters β 4.67/5.85, $p < .04$ → antenatal depression all trimesters β 1.63, $p = .04$	circumstances (non-modifiable)
			Being single → antenatal anxiety all trimesters β 10.11, $p = .008$	3 – personal circumstances
			History of miscarriage → antenatal anxiety all trimesters β 3.61, $p = .01$	3 – personal history
			Multigravidity → antenatal depression all trimesters β 1.67, $p = .0004$	3 – personal circumstances
			History of depression → antenatal depression all trimesters β 1.91, $p = .01$	3 – personal history
Melender ⁶²	Qualitative study – semi-structured interviews / 2 (score 21)	N=20. Age 19-37 years; all partnered; 50% primiparous. Finland	Help-seeking → reduces FoC**	3 – behaviour
			Social support → reduces FoC**	3 – environment
			(Self-)knowledge distress → reduces FoC**	3 – personal characteristic
			Self-disclosure to midwife → reduces FoC**	3 – behaviour 3 – environment
Escott et al ⁶³	Qualitative semi-structured interviews / 2 (score 20)	N=24 university hospital North England. Age 27 (SD6.1.) range 17-38; partnered n=22; Caucasian n=21.	Problem focussed coping → reduces FoC**	3 - behaviour
Blanchard et al ³⁸	Phenomenological study design / 2 (score 20)	N=7 depressed (EDS ≥ 10) predominantly primiparous partnered Caucasian American pregnant women	Stressors → antenatal depression	3 – personal circumstances
			Lack of perceived partner support → antenatal depression	3 – environment
			Available support in general → antenatal depression	3 – environment
Furber et al ⁴⁰	Qualitative study (Semi-structured interviews) / 2 (score 21)	N=24. Age 23-39; gestational age 7-39 weeks; primiparous and multiparous. United Kingdom	History of adverse life-events → antenatal psychological distress (depression)	3 – personal history
			History of have given birth/ having children → antenatal psychological distress (depression)	3 – personal history
Huizink et al ⁷	Prospective longitudinal study / III	N=230, rural and urban primiparous women from urban and suburban Utrecht, Netherlands; from all social classes.	Emotion-focussed coping → depression 2 nd trimester β -.28, $p = .04$	3 - behaviour
Yali and Lobel ⁵⁸	Prospective longitudinal	N=163. Mean age 27 (SD 5.7) range 18-40; 71% white, 39%	Avoidant coping → pregnancy distress (PSS,	3 - behaviour

	study/ III	single; 36% miscarriage. USA	STAI) 1 st / 2 nd trimester $r = .91/ .48, p < .001$	
Rubertsson and Waldenström ³⁰	Cross-sectional study / III	N= 3011; mean age 30; 43% primiparous/ 57% multiparous; 9.5% other ethnicity than Swedish; 88.5% partnered; 82.2% employed. Sweden. Depression 8% (GA 15)	Lack of partner support → antenatal depression primiparous/ multiparous OR = 6.9/ 3.4 [95% CI 3.4-13.9/ 1.9-6.1] $p < .001/ p < .001$	3 – environment
			History of 2 or more stressful life events in year prior to pregnancy → antenatal depression primiparous/multiparous OR = 2.4/ 1.8 [95% CI 1.2-4.8/ 1.1-3.0] $p = .01/ p = .03$	3 – personal history
			Ethnicity/ other language than Swedish → antenatal depression primiparous/multiparous OR = 6.9/ 3.4 [95% CI 3.4-13.9/ 1.9-6.1] $p < .001/ p < .001$	3 – personal circumstances 3 – environment
			Increased number of children → depression RR 2.1 [95% CI 1.0-4.3]	3 – personal circumstances
Rubertsson and Waldenström ³⁰	Cross-sectional study / III	N=1282 primiparous women (derived from larger sample, see above). Depression 8% (GA 15)	History of miscarriage → antenatal depression OR = 1.9 [95% CI 1.1-3.5] $p = .03$	3 – personal history
			Younger than 25 years → antenatal depression OR = 1.8 [95% CI 1.1-3.0] $p = .02$	3 – personal circumstances (non-modifiable)
			Unplanned pregnancy with mixed feelings about pregnancy → antenatal depression OR = 1.9 [95% CI 1.1-3.5] $p = .03$	3 – personal circumstances 3 – personal trait
			Being single → antenatal depression OR = 2.7 [95% CI 1.3-5.5] $p = .005$	3 – personal circumstances
			Unemployed → antenatal depression OR = 1.7 [95% CI 1.0-2.8] $p = .03$	3 – personal circumstances
			History of a negative birth experience → antenatal depression OR = 2.0 [95% CI 1.2-3.1] $p = .005$	3 – personal history
			Anticipating lack of social support after the birth → antenatal depression OR = 2.9 [95% CI 1.9-4.4] $p < .001$	3 – environment
Matthey et al ²⁸	Cross-sectional study / III	N=2167 women from Sydney, Australia. Age 15-45 years; 43.1% primiparous/ 56.9% multiparous. Uncomplicated pregnancies. Depression 13% (all trimesters)	5 or more risk factors in 3 rd trimester (support; perceived stressors; worriers; lack self-confidence; past/ present mental health; childhood abuse; family violence) → antenatal depression $\chi^2(1)=4.78, p < .05$	3 – personal history 3 – personal circumstances 3 – behaviour 3 – environment
Rubertsson et al ³¹	Cross-sectional study /	N=1866; mean age 30; 43% primiparous/ 57% multiparous; 6.6%	Stressful life events → antenatal depression OR	3 – personal

	III	other ethnicity; 92.5% partnered; 87.3% employed. Sweden. Depression 13.7% (GA 16)	= 3.7 [95% CI 2.2-6.1] $p < .001$	circumstances
			Ethnicity/ other language than Swedish → antenatal depression OR = 3.6 [95% CI 2.0-6.8] $p < .001$	3 – personal circumstances 3 – environment
			Increased number of children → depression RR 2.6 [95% CI 1.2-6.7]	3 – personal circumstances
			Unemployment → antenatal depression OR = 2.6 [95% CI 1.5-4.7] $p = .001$	3 – personal circumstances
			History of depressive symptoms → antenatal depression OR = 4.51 [95% CI 4.24, 4.80]	3 – personal history
Elsenbruch et al ³⁵	Cross-sectional study / III	N=896 Berlin women, Germany. Mean age 29.27 (SD 4.9) 16-43; partnered n=888; 61% primiparous/ 39% multiparous. Depression 22% (1 st trimester)	Available social support (network) → antenatal depression 1 st trimester $F=83.60$, $p < .001$	3 - environment
Fertl et al ⁴⁹	Longitudinal prospective study / III	N=143 women from Berlin, Germany. Uncomplicated pregnancies.	History of miscarriage (one or more) → antenatal anxiety up to 13 weeks $p = .001$	3 – personal history
Haines et al ⁶⁶	Cross-sectional survey / III	N=386. Age 25-35; 43.5% primiparous; 78.9% previous SVD***. Sweden. Fear of childbirth 31.1% (GA 17-19)	Having children → FoC** $Z = -3.01$, $p = .003$	3 – personal circumstances
			Negative previous birth experience → childbirth related fear $Z = -6.40$, $p < .001$	3 – personal history
			Complicated previous mode of childbirth → childbirth related fear $Z = -2.65$, $p = .008$	3 – personal history
			Negative state towards forthcoming birth → childbirth related fear $Z = -10.87$, $p < .001$	3 – personal state
Haines et al ⁶⁶	Cross-sectional survey / III	N=123 Australian women, age 25-35 (68.5%); 37.1% primiparous; 61% previous SVD***. Australia. Fear of childbirth 29.5% (GA 18-20)	Negative previous birth experience → childbirth related fear $Z = -3.70$, $p = 0.000$	3 – personal history
			Negative feelings forthcoming birth → childbirth related fear $Z = -4.77$, $p < .001$	3 – personal state
Woods-Giscombé et al ⁵¹	Longitudinal prospective exploratory study / III	N=363. Mean age 27.4 (SD 5.78); 63% white; 88% partnered; 70% employed; 36% primiparous/ 64% multiparous. USA> Stress 6% (GA 20-36)	History of previous miscarriage $F[3.409] = 7.93$, $p < .001$ → anxiety 2 nd and 3 rd trimester	3 – personal history
Røsand et al ⁴³	Retrospective population-based cohort study / III	N=49425 women from hospitals and maternity units. Mean age 29.9 (SD 4.5); 43.7% primiparous/ 56.3% multiparous; 97.3% partnered; 38.9% degree; 95.4% employed. Norway	History of depression $\beta = 0.27$, $b = 0.21$, $p < .001$ → antenatal depression early pregnancy	3 – personal history
			Unsatisfactory relationship $\beta = 0.21$, $b = 0.33$, $p < .001$ → antenatal depression early pregnancy	3 – environment
Aktan ⁶⁰	Prospective study / III	N=177 healthy pregnant women. Mean age 32 (SD 4.14); 60.5%	Limited/ no social support during pregnancy	3 – environment

		primiparous/ 39.5% multiparous; 83.6% white; 83.2% degree. USA	→ increased antenatal state anxiety $r=-.308$, $p=>.001$ → increased antenatal trait anxiety $r=-.420$, $p=>.001$	
Nilsson and Lundgren ⁶⁵	Phenomenological study / 1 (score 27)	N=9 women from Göteborg, Sweden. Age 27 – 34 years; employed; low risk pregnancies	Availability approachable/ positive relationship midwife	4 - enabling
Melender ⁶²	Qualitative study – semi-structured interviews / 2 (score 21)	N=20. Age 19-37 years; all partnered; 50% primiparous. Finland	Available social support networks → increases social support	4 – enabling
			Acquired information coping distress → increases knowledge coping distress	4 - preceding
Furber et al ⁴⁰	Qualitative study (Semi-structured interviews) / 2 (score 21)	N=24. Age 23-39; gestational age 7-39 weeks; primiparous and multiparous. United Kingdom	Relaxing activities → positive coping with distress	4 - reinforcing
Rubertsson and Waldenström ³⁰	Cross-sectional study / III	N= 3011; mean age 30; 43% primiparous/ 57% multiparous; 9.5% other ethnicity than Swedish; 88.5% partnered; 82.2% employed. Sweden. Depression 8% (GA 15)	Unavailable partner support	4 – reinforcing

* PPD: Post Partum Depression; **FoC: Fear of Childbirth ***SVD: Spontaneous Vaginal Delivery

Ranked by: (i) PRECEDE phase, (ii) level of evidence (quantitative-qualitative), (iii) publication year, and (iv) alphabetical order

Phase 1 and 2: Social and epidemiological health needs

Literature

Phases 1 and 2 are concerned with the social and epidemiological aspects of maternal distress, examining how the psychological problems of pregnancy interfere with the quality of life. For these phases we identified maternal distress as measured by different constructs described in the literature, and the quality of life outcomes related to maternal distress. The evidence for the first two phases was provided by quantitative studies with level I and II of the OCEBM scale ¹⁹. Maternal distress was identified as a priority health problem and was reported in one-dimensional constructs (such as depression, anxiety, birth-related anxiety/ fear of childbirth and stress). Antenatal depression can lead to fear of childbirth ^{61,68} and antenatal anxiety might lead to a negative anticipation of the forthcoming birth ^{44,50} and fear of childbirth ^{64,68}. Fear of childbirth is associated with longer duration of labour ⁶⁷.

Negative effects on the quality of life of mothers and their infants were reported as outcomes of the different constructs of antenatal maternal distress. Antenatal depression can lead to post partum depression ^{4,26,27,32,34,36,37} and parenting stress ³⁶. Antenatal anxiety can lead to post partum depression and anxiety up to 7 months post partum ^{36,45}. The combination of antenatal anxiety and stress reduces the fetoplacental blood flow at 30 weeks gestation, which successively can lead to fetal growth restriction and low birth weight, and thus adversely affects the quality of life of children ⁵⁹. Antenatal maternal stress can also lead to an impaired physical condition in infants up to 3 years of age, such as metabolic disorders and diseases of the circulatory system when adjusting for confounders ⁵⁷. Antenatal anxiety, predominantly measured in the 2nd and 3rd trimester of pregnancy ^{33,52,56} can lead to behaviour problems ⁵², cognitive deficits ³³, and mental health problems ^{52,56,57} in children. The combination of antenatal depression and anxiety can result in a child's emotional and behaviour problems and psychopathology ³³ and in reduced birth weight of at term baby boys ³⁹.

Experts in the field

There seemed to be less insight in the consequences of maternal distress and in the different constructs of maternal distress among midwives compared to other experts in the field. General Practitioners and health visitors, who are involved with women over a sustained period of time throughout the life course, were more aware of, and knowledgeable about the consequences of maternal distress. Their experiences were that pregnant women seem on average very motivated to strive for their child's health, probably more than for their own health. Midwives in the consortium found it challenging to tell women about the possible negative consequences of maternal distress. They feared that emphasizing that a child's quality of life might be adversely affected by maternal distress would exacerbate maternal feelings of guilt or inadequacy. Midwives regarded providing information about how a child's quality of life may be affected by maternal distress as a negative approach. They recognized that this information was relevant within the scope of informed decision-making, and although changeable, they emphasized that it should be provided with great care.

Phase 3: Aetiological factors

Literature

Studies related to this phase identified factors that determined maternal distress. The evidence for phase three was provided by quantitative studies with level II and III of the OCEBM scale ¹⁹ and qualitative studies with level 1 and 2 scores according the AWHONN tool ²¹. Review of the literature

showed that various *factors from a woman's past life* are associated with the occurrence of maternal distress during pregnancy. A history of psychological problems such as depression or stress is associated with the occurrence of antenatal depression^{26,34,43,53} and fear of childbirth⁶⁴. A history of negative life-events such as childhood abuse is related to anxiety, depression and feelings of stress^{28,29,40,53}. A negative or traumatic birth experience or a complicated birth can contribute to fear of childbirth⁶⁴⁻⁶⁶ or depression³⁰. A history of miscarriage(s) can contribute to antenatal anxiety in all trimesters of pregnancy^{49,51,53}.

A *woman's personal current circumstances and lifestyle* are also associated with maternal distress. An unintended pregnancy³⁶ but also having (multiple) children is linked to antenatal depression^{29-31,40,53,66} or stress⁵⁵. Experiencing stressors and hassles in (daily) life^{28,31,38,41}, including domestic violence^{28,36,37}, might contribute to the occurrence of depression. Being younger than 25 years of age³¹, being obese⁵³, and having a low(er) income^{31,36} can lead to depression. Being single and having a different ethnicity from the people in the country of habitation can contribute to depression and anxiety in pregnancy^{30,31,53}.

Personal characteristics such as low self-confidence, little (self-) knowledge and awareness about coping with distress are related to the occurrence of childbirth related anxiety^{50,62,65,66}. The literature showed that negative coping *behaviour*^{29,36,64} such as worrying²⁸ and avoidance⁵⁸ contributes to antenatal depression. Positive coping behaviour^{7,47} such as self-disclosure⁶², help-seeking⁶², emotion-focused coping⁷, problem-focused coping⁶³, self-management⁴², and acceptance⁴⁷ are protective against maternal distress.

Important *environmental* factors contributing to depression, anxiety and birth-related anxiety are the lack of provided social support by the direct environment (*e.g. friends, family*)^{28,31,35,36,38,41,60,64} and partner^{36,38,43}, and the lack of support from healthcare professionals^{42,47,48,64}, including the midwife^{54,62,65}.

Experts in the field

Experts from different health disciplines recognised the existence and effect of aetiological factors on the occurrence of maternal distress during pregnancy. Midwives noticed that an increasing number of women seem to go under the umbrella of 'vulnerability' compared to women from earlier generations. This was recognized by experts from other health disciplines. Midwives perceived assessment of vulnerability for maternal distress as relevant and changeable.

Midwives in the consortium mentioned that stimulating self-disclosure and encouraging help-seeking behaviour by involving significant others in the woman's environment were frequently applied skills. However, based on the findings from the literature they expressed they had likely undervalued its importance. Encouragement of self-management is less frequently practised in contrast to the psychologist and woman's counsellor, as midwives perceived themselves as problem-solvers instead of facilitators of self-management. Midwives saw the positive effects of self-disclosure and promoting self-management as eye-openers. Although not practiced in its full potential by midwives, they regarded the encouragement of self-disclosure, help-seeking and self-management as health-enhancing behaviours, and saw that kind of encouragement as an important and achievable element in antenatal care.

Phase 4: Educational and ecological assessment

Literature

For this phase we identified studies that found predisposing, reinforcing and enabling factors

associated with how pregnant women cope with maternal distress including factors in the environment that influence coping ability. These are factors that influence the likelihood that behavioural and environmental changes will occur¹⁸. Predisposing factors exist at cognitive level and include knowledge, skills, attitudes and self-efficacy. Reinforcing factors include factors that encourage coping behaviour with maternal distress. Enabling factors represent the necessary conditions that must be present for coping behaviour to occur¹⁸. The evidence for phase four was provided by quantitative studies with level II and III of the OCEBM scale¹⁹ and by qualitative studies with level 1 and 2 scores according the AWHONN tool²¹.

Our review showed that having knowledge about (i.e. sources and possibilities) how to cope with (maternal) distress⁶² is a factor that facilitates pregnant women in coping with the presence or development of maternal distress (*predisposing*). Factors that may encourage pregnant women to cope with maternal distress in a positive way (*reinforcing*) are relaxation skills⁴⁰, partner support^{30,38}, counselling experiences⁶⁴, and a positive interaction with the midwife^{54,65}. Environmental factors that facilitate coping with maternal distress (*enabling*) are the availability of a support network^{35,62}, including healthcare professionals such as a therapist/ counsellor/ psychologist⁴⁷ and a midwife⁶⁵. Also the availability of facilities such as psycho-education pregnancy and birth, self-management facilities such as (online) peer-groups, mindfulness, yoga, meditation, relaxation/ breathing exercises for pregnant women^{40,42,48,62,64}, preferably facilitated by a person speaking the mother's first language^{30,31}.

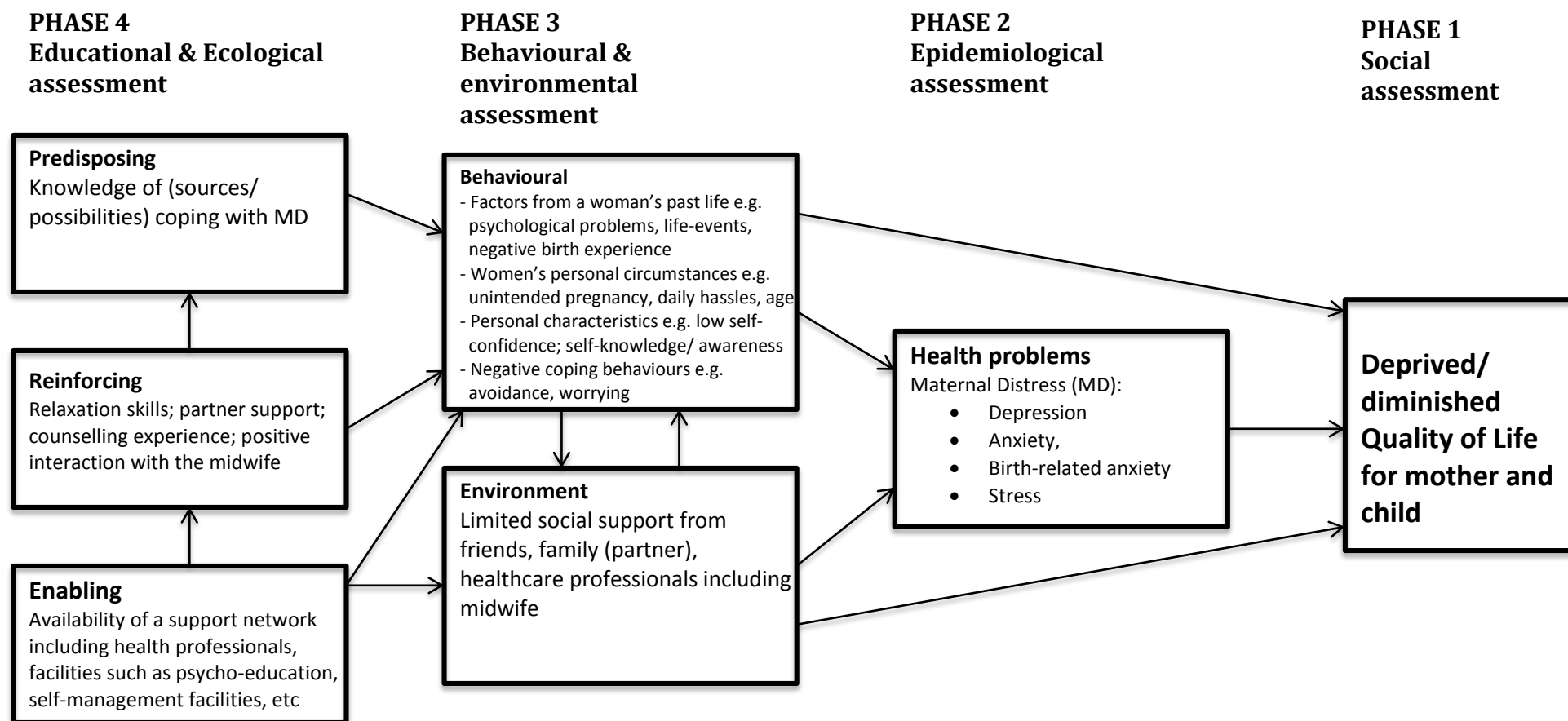
Experts in the field

Experts from the different health disciplines recognised these predisposing, enabling and reinforcing factors. Midwives did not fully appreciate the impact of the woman-midwife interaction, indicating that they had undervalued the importance of this aspect in the woman-midwife relationship. Most midwives in the consortium found this to be new and useful information. As the usual lead-carer of pregnant women, midwives perceived this as an aspect they could influence and change. Midwives expressed that they mostly leave it with the pregnant women to take the initiative to determine and access members of her support network. On the other hand, based on the findings from the literature, the midwives mentioned that they could influence and change the organisation of antenatal care in order to create an accessible professional network with various disciplines for consultation and referral. They also believed they could help to involve members of a woman's own social network during the period of antenatal care. This was also perceived as a relevant and modifiable feature of antenatal care.

Midwives in the consortium mentioned that their social norm about maternal distress influences women's coping behaviour. They perceived it as relevant but also as necessary to reflect on their professional role as coach, counsellor, and advisor regarding maternal distress, to enable women's coping with maternal distress.

Figure 2. PRECEDE phases presenting needs assessment of maternal distress

PRECEDE phases



DISCUSSION

We searched the literature in order to gain a more in-depth and systematic understanding of pregnant women's emotional health needs as a first step for the development of an intervention to prevent and reduce maternal distress. Discussing findings from the literature with experts in the fields, allowed us to assess the relevance and modifiability of the determinants we identified. Experts in the field related findings to practice and personal experience with women in the target group. This underscored the importance of the findings and helps in the selection of potential components to be considered for incorporation in the future intervention ¹⁴⁻¹⁶. The validation of the results from scientific research by experts in the fields is a strong point of our study.

Most studies focused on risk factors for maternal distress looking at isolated aspects of a woman's personal history, her daily circumstances or her behaviour. To our knowledge, our review is the first to systematically compile evidence, relating to the health needs of pregnant women with regard to maternal distress, to verify the evidence with experts in the field and to summarize that evidence into a cogent model for maternal distress. Our findings are presented in the PRECEDE model in Figure 2.

The ultimate goal is to improve quality of life ¹⁸. Our review showed that there are multiple issues that substantially impinge on quality of life of mothers and children as a result of maternal distress. Our review also showed that different psychological constructs of maternal distress lead to similar impaired quality of life issues for mothers and their children affecting bonding, mother-child interaction and parenting ^{69,70}, early discontinuation of breastfeeding ⁷¹, and even the choice for having a subsequent child ⁷². The negative short and long-term health outcomes that result from antenatal maternal distress have their own consecutive effects on future life and the quality of life of mothers, their children, significant others, and society as a whole.

We identified a great variety of measures and consequences of maternal distress in phase 1 and 2 of the PRECEDE component. Different constructs were reported in our included studies. None of the constructs was singled out to have a more profound meaning. Jomeen ⁷³ and DiPietro ⁷⁴ have noted that the focus on one individual psychological construct overestimates its importance within the spectrum of maternal distress. The recently updated NICE guideline on antenatal and postnatal mental health ⁷⁵ approaches maternal mental health without the emphasis on anxiety or depression as a distinct construct or of greater or overestimated significance within the spectrum of maternal distress. This is congruent with our findings and approach of maternal distress.

The focus of phase 3 of the PRECEDE component was the identification of the aetiological factors for maternal distress. Behavioural determinants encompassed behaviour, past and current life and personal characteristics; these aspects will direct the planning of intervention components ¹⁸. Based on our findings and discussion with experts in the field, we indicated that self-disclosure, help-seeking and self-management were important coping behaviour styles linked to the occurrence of maternal distress. Experts in the field identified these coping styles as realistic and achievable targets in the management of antenatal care. Recognition of contributing factors to maternal distress is an essential first step in the process of effective self-management, self-disclosure and help-seeking ²⁰.

We know that recognition, self-disclosure, help-seeking and self-management are particularly worthwhile targets in a health promoting intervention for emotional wellbeing ¹². Recognition is likely to change more quickly than self-disclosure and help-seeking, as recognition is knowledge based and self-disclosure and help-seeking require behaviour change ¹⁵. This can be of importance in the future development and evaluation process of our intervention. Although the initiative for self-disclosure is placed upon the midwife, self-disclosure is not possible without the

woman's willingness ⁷⁶, making self-disclosure a dyad target - to be approached together by the caregiver and the woman - for our intervention.

The environmental assessment focused on factors in the immediate social and physical environment that could be causally linked to coping behaviour or linked directly to maternal distress ¹⁵. Our review showed that people in a woman's direct social circle, in particular her partner, are the designated people to support self-disclosure and to ask for help and support. Healthcare professionals are also important sources of social support; women mentioned the midwife in particular as important in this regard ^{7,36,38,42,43,47,48,54,62,64,65}.

The focus of phase 4 was to identify predisposing, reinforcing and enabling factors that increase the likelihood that behavioural and environmental changes will occur. Enabling factors of importance for midwifery care were linked to matched care (*care matching to the needs and wishes of women*) and collaborative care (*collaboration with other healthcare professionals*), both of which are building blocks in care pathways for emotional health and wellbeing ⁷⁷. Enabling factors that pertained to change in the environment were also identified in phase 3 as environmental factors. This is a recognized phenomenon in a PRECEDE needs assessment ¹⁵. The enabling and reinforcing factors of importance in our review indicated resources and facilities that need to be addressed in a collaborative infrastructure ⁷⁷. The predisposing factor 'having knowledge of sources and possibilities of ways of coping with (maternal) distress' ⁶² requires further investigation to uncover specific needs, but it points to an intervention component with a psycho-educative and informative character. Midwives were not always aware of the importance of their interaction with women. The evidence found in the literature comes from the consumer's perspective and not from midwives. In developing our intervention we must keep this in mind ⁷⁸.

Limitations of the study

Although few studies with a grade I level of evidence were available, many cohort studies provided insight into relevant factors and most of the included studies showed a moderate to a fairly good level of evidence. We included only studies that reported significant results or effects. This could introduce selection bias. However, from an intervention planning point of view it will be only those factors with strong evidence that will serve as a theoretical ground for the future intervention targets, components and planning ¹⁶.

The studies included in our review focused on women with healthy pregnancies, rather than a psychopathology sample. While this ensures that our findings have general relevance to the majority of pregnant women, those findings cannot be extrapolated to specific groups of pregnant women with morbidities and co-morbidities.

Recommendations

The best way to design interventions to achieve positive changes in health is to understand why persons behave as they do and what might help or hinder them to change ¹⁸. A proven theoretical base on which to build an intervention is essential. The development of our intervention is expected to be an iterative process in which we will go back and forth through the steps of problem analysis, design and pretesting. Throughout the process, information will become available which will influence earlier steps or a lack of knowledge will be revealed, requiring refinement through additional study, creativity and close cooperation with our consortium members, target population and materials designers of the intervention ¹⁶.

Quality of life issues emphasize the need for screening for maternal distress and contributing

factors to maternal distress, albeit with precaution for stigmatization and labeling^{79,80}. Multiple past and present aetiological factors that contribute to maternal distress have been identified and it would be of interest - for the purpose of the project - to determine specific factors that make Dutch pregnant women vulnerable for maternal distress. Antenatal assessment of maternal distress, information provision about consequences of maternal distress and raising awareness among women about triggers and causes for maternal distress, and the ability to recognize maternal distress can become very important components of the midwife's antenatal management of care. These components will expand the midwife's role and scope of practice⁸¹. Exploration of the midwife's behavioural intentions and facilitating factors and barriers is relevant, as prevention and reduction of maternal distress should be integral to the antenatal care. The midwife's role needs further investigation in order to formulate components of a successful intervention.

CONCLUSION

In this paper we developed a model of the factors contributing to maternal distress, using a literature review and seeking a pragmatic balance between evidence and clinical relevance. The results can guide future program planners to develop effective interventions. Given the multiple quality of life issues for mothers and children that are diminished by maternal distress, preventing or reducing this distress is an important health objective. Factors that contribute to maternal distress include past and present circumstances, coping ability and the environment. In addition, information and available resources and facilities for women seem to play a key role in affecting women's behaviour. The results suggest that maternal distress is a multi-factorial and multi-dimensional health problem that can be changed by women themselves with the support and adaptation of their environment, and with midwives as key health practitioners, in order to be successful. An antenatal intervention to prevent or reduce maternal distress should focus on the assessment of maternal distress and the identification of factors that make women vulnerable for maternal distress and should take the availability and accessibility of individual support for women in the collaborative organization of care into account.

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CHAPTER 3

Factors influencing maternal distress among Dutch women with a healthy pregnancy

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ABSTRACT

Background

Maternal distress is a public health concern. Assessment of emotional wellbeing is not integrated in Dutch antenatal care. Midwives need to understand the influencing factors in order to identify women who are more vulnerable to experience maternal distress.

Objective

To examine levels of maternal distress during pregnancy and to determine the relationship between maternal distress and aetiological factors.

Methods

A cross-sectional study including 458 Dutch-speaking women with uncomplicated pregnancies during all trimesters of pregnancy. Data were collected with questionnaires between 10 September and 6 November 2012. Demographic characteristics and personal details were obtained. Maternal distress was measured with the Edinburgh Depression Scale (EDS), State-Trait Anxiety Inventory (STAI), and Pregnancy Related Anxiety Questionnaire (PRAQ). Behaviour was measured with Coping Operations Preference Enquiry-Easy (COPE-Easy). Descriptive statistics and multiple linear regression analysis were used.

Results

Just over 20 percent of the women in our sample (21.8%) showed heightened scores on the EDS, STAI or PRAQ, on one or more measure. History of psychological problems ($B = 1.071$; $p = .001$), having young children ($B = 2.998$; $p = .001$), daily stressors ($B = 1.304$; $p < .001$), avoidant coping ($B = 1.047$, $p < .001$), somatisation ($B = .484$; $p = .004$), and negative feelings towards the forthcoming birth ($B = .636$; $p < .001$) showed a significant positive relationship with maternal distress. Self-disclosure ($B = -.863$; $p = .004$) and acceptance of the situation ($B = -.542$; $p = .008$) showed a significant negative relationship with maternal distress.

Conclusion

Maternal distress occurs among women with a healthy pregnancy and is significantly influenced by a variety of factors. Midwives need to recognise the factors that make women more vulnerable to develop and experience maternal distress in order to give adequate advice about how to best cope with this condition.

INTRODUCTION

Maternal distress refers to a spectrum of psychological, emotional and behavioural symptoms during pregnancy, birth and the postnatal period ¹. Levels of maternal distress vary, ranging along a continuum. This continuum extends from daily worries and limited psychosocial disharmony, to major symptoms of emotional tension and mental strains with a considerable unbalanced psychosocial functioning ²⁻⁴. Depression and anxiety in general or specifically related to pregnancy, are the most commonly mentioned constructs of maternal distress ^{1,2,4,5} and they often co-occur ^{4,6,7}.

There is increasing evidence that maternal distress among otherwise healthy pregnant women can be a predictor for negative birth outcomes, including low birth weight and prematurity ^{8,9}. Additionally, adverse short and long-term post partum mental health effects have been reported for both mother and child, including post partum depression and post-traumatic stress ^{6,10-13}, psychiatric morbidity ¹⁴, and impaired child behavioural, cognitive and emotional development ¹⁵⁻¹⁷. With rates of maternal distress varying between 10 and 41%, the detrimental health effects of the condition have been recognised as a worldwide public health concern ¹⁸. Prevalence rates of maternal distress among Dutch women vary between 2.3% and 33.3%, depending on the constructs of maternal distress being measured (*i.e.*, *depression, anxiety*) ^{8,10,19-21}.

Dutch government policy directs that women with healthy pregnancies receive midwife-led antenatal care. As a result, more than 80% of pregnant women in the Netherlands begin their care with a midwife ^{22,23}. Given the relatively high rate of maternal distress, midwives must be alert for the presence or development of (psychosocial) risk factors or complications ²⁴.

The Dutch Steering Committee Pregnancy and Birth ²⁵ expressed concern about the prevalence and the adverse affects of maternal distress for maternal and child health, seeing prevention and reduction of maternal distress as a critical goal of maternity care services. In order to provide adequate care, maternity healthcare providers need to be aware of the factors that relate to the prevalence of maternal distress. In response to the concerns of the Dutch Steering Committee Pregnancy and Birth the Project “Promoting Healthy Pregnancy (2011–2015)” was established. The four-year project aims to develop an antenatal midwife-led intervention to contribute to the reduction of maternal distress. Part of the intervention includes the change of midwives’ behaviour with regard to the antenatal management of maternal distress, as earlier research has shown that in particular the majority of Dutch midwives do not routinely screen for maternal distress ²⁶. Other studies confirm that midwives’ antenatal assessment of psychological and mental wellbeing and risk factors are not integrated in existing antenatal practice ^{27,28}. This deficiency in the assessment of maternal distress limits the identification of women who are experiencing maternal distress and women who are more vulnerable to develop maternal distress. This complicates further support and care.

We conducted this study as part of the project “Promoting Healthy Pregnancy”, in order to bridge the gap in midwives’ understanding about the factors that are related to maternal distress. We need to better understand the specific factors that can help identify women who are more susceptible to experience maternal distress during pregnancy ²⁹. Various studies have looked at factors that influence maternal distress among women with healthy pregnancies from different perspectives, such as personal characteristics ³⁰⁻³², history ^{12,13,30,32-34,36-38}, and circumstances ^{12,13,30-39}, coping styles ^{2,12,38-40,43}, income ^{12,34}, social support ^{12,13,30,35}, and positive and negative enhancing factors for maternal distress ^{13,30,31,37,38,40,42-44}. Studies have addressed different constructs of maternal distress like antenatal depression ^{12,30,32-35,39,41}, childbirth related fear ^{13,31,42,43}, anxiety ^{32,36,37,40}, and antenatal stress ^{37,38,44}. This present study maps all possible factors that influence

maternal distress and approaches maternal distress as a multi-dimensional concept that includes different psychological symptoms and constructs.

For the purpose of this study we want to examine the occurrence of maternal distress in a population of Dutch women with healthy pregnancies and to identify the explicit factors among this population that might serve as a proxy for midwives to recognise women during antenatal care who are more vulnerable to experience maternal distress. In order to fulfil this purpose, we sought answers to the following questions:

- What are the levels of maternal distress reported by women with a healthy pregnancy?
- What are the aetiological factors influencing the occurrence of maternal distress among these women?

METHODS

Design and sample procedure

We conducted a cross-sectional study including a sample of Dutch-speaking pregnant women with uncomplicated pregnancies during any trimester of pregnancy, receiving midwife-led primary care. We included women who were pregnant with a singleton infant and who did not require obstetric-led care as a result of existing or likely complications. Women in secondary and tertiary care were excluded.

The 140 midwife-led primary care practices that offer placements for the students of the Faculty of Midwifery Education & Studies, Maastricht were approached and informed about the content of the study. 31 midwifery practices agreed to recruit a minimum of 30 pregnant women during a routine antenatal appointment between 3 and 28 September 2012. All women in their caseload that attended the clinics during this period were invited to participate. Explanation of the study was also provided via a poster at the recruiting practices. 950 women expressed interest in the study. They were given additional information by telephone and were invited to fill out a questionnaire. Pregnant women chose suitable times for these telephone calls. 766 women agreed verbally to participate and received a consent form by post including a stamped return envelope. 540 women signed and returned the consent form and, depending on the woman's preference, subsequently received a digital or paper questionnaire or a telephone interview done by a student midwife. After two weeks a reminder was sent by mail or email. To raise the response rate, participants could opt to take part in a raffle of mother and baby skincare gift packages.

Data were collected between 10 September and 6 November 2012. The research ethics committee METC-Atrium-Orbis-Zuyd, reviewed and approved the research protocol and confirmed that ethical approval was not necessary according to Dutch guidelines.⁴⁵

Measures

Maternal distress

We approached maternal distress as a multi-dimensional concept, indicated by symptoms of different psychological constructs identified by the measurement instruments described below. We chose to sum the different individual measures, to provide a more complete and clear picture of maternal distress⁴⁶. Compiling scores of different measurement instruments measured at the same time provides more stable data⁴⁶. In this study we used Dutch versions of the *Edinburgh Depression Scale*⁴⁷, *State-Trait Anxiety Inventory*⁴⁸, and the *Pregnancy Related Anxiety Questionnaire*⁴⁹. Scores

above the cut-off level of one or more of the respective individual measures, is rated as having heightened levels of maternal distress.

Edinburgh Depression Scale (EDS)

We used the EDS ($\alpha = 0.78$), a 10-item questionnaire developed to screen for the likelihood of antenatal depression⁵⁰. The Dutch EDS has a similar standardized Cronbach's alpha of $\alpha = .82$ ⁴⁷. We asked participants to reflect on their feelings and thoughts of the last seven days. Responses are scored 0, 1, 2 or 3 in seriousness of symptoms. The total score ranges from 0 to 30. In this study we measured depression using a validated cut-off score of 11 or more for women in the first trimester and 10 or more for women in the second and third trimester. Cut-off scores were based on a Dutch validation study of the EDS among pregnant women in the Netherlands. These cut-off scores appear adequate and yield sensitivity, specificity and positive predictive value per trimester⁵¹.

State-Trait Anxiety Inventory (STAI)

To identify feelings of anxiety we employed the Trait scale ($\alpha = .89$) of the STAI⁵². The Dutch Trait scale has a similar standardized Cronbach's alpha of $\alpha = .91$ ⁴⁸. Trait-anxiety is viewed as proneness to anxiety, a relatively stable personality characteristic. The Trait scale shows high concurrent validity in the pregnant validation sample⁵³. We asked participants to describe how they generally felt during the past year. The Trait scale contains 20 items and uses a 4-point rating scale to measure anxiety (1 'not at all'; 4 'very'). Scores vary between 20 and 80. Women with scores of 41 and higher are perceived to have high levels of anxiety. This cut-off point has been validated in pregnant Dutch women⁴⁸.

Pregnancy-Related Anxiety Questionnaire (PRAQ)

We measured pregnancy-related anxiety with the 10- item PRAQ⁴⁹. The questionnaire consists of three subscales measuring: fear of giving birth, fear of bearing a physically or mentally handicapped child and concern about their own appearance ($\alpha = .78$; $\alpha = .82$; $\alpha = .84$). The Dutch PRAQ has similar standardized Cronbach's alphas of $\alpha = .81$, $.87$, $.80$ respectively⁵⁴. The PRAQ uses a 5-point rating scale to measure fear and worries (1 'not at all'; 5 'very'). We adapted question 8 "I am scared of labour and birth because I have never experienced this" for multiparous women by putting 'never' between brackets. We asked women to choose the most appropriate answer about feelings during their current pregnancy. Scores vary between 10 and 50. Based on an earlier Dutch study⁸ we used the 90th percentile of the PRAQ total scores to identify women scoring high on pregnancy-related anxiety. The PRAQ total scores show predictive validity⁵⁴.

A multi-dimensional approach

To justify our multi-dimensional approach we measured the degree of relationship between the anxiety (STAI), depression (EDS), and pregnancy-related anxiety (PRAQ) scores with Pearson's correlation coefficient (one-tailed): Anxiety and depression $r = .743$, $p = <.001$; anxiety and pregnancy-related anxiety $r = .432$, $p = <.001$; depression and pregnancy-related anxiety $r = .361$, $p = <.001$. We subsequently did three preliminary separate multiple linear regression analyses with anxiety, depression and pregnancy-related anxiety as dependent variables respectively. We used ten coping styles (described below) as independent variables. Each separate analysis showed the same significant independent variables confirming our multi-dimensional approach. We summed the STAI, EDS and PRAQ scores and used this score as our dependent variable, defining it as maternal distress.

Factors related to maternal distress

To map the factors related to maternal distress, we examined the literature for factors associated with the occurrence of depression, anxiety, (di)stress and childbirth related fear during pregnancy. Our focus was on studies including women with healthy pregnancies and studies including samples with similar demographic characteristics as Dutch pregnant women ^{23,55-57}. Studies were eligible if they examined any construct belonging to the spectrum of maternal distress (*e.g. depression, anxiety*). To guide this review of the literature we used the PRECEDE-PROCEED planning model ^{58,59}. This eight-phase model for the development of health promotion interventions offers a framework to analyse health factors related to the prevalence of maternal distress. The first component of the model (*PRECEDE, phase 1-4*) focuses on the diagnostic and needs assessment. The second component (*PROCEED, phase 5-8*) includes implementation and evaluation of the intervention. We focused on phase 3 of the PRECEDE component: Aetiological assessment of maternal distress (personal characteristics, history, and personal circumstances, behavioural and environmental factors).

The literature review showed several factors that make women with healthy pregnancies susceptible to the occurrence of maternal distress (Table 1). Items in the questionnaire were developed from factors identified in PRECEDE phase 3. We phrased *history of psychological problems* as 'suffering from (un)diagnosed complaints and symptoms of depression, anxiety, stress, and burnout'. *Family with (history of) psychological problems* was defined as 'mother or sister(s) with (a history of) psychological problems' ⁶⁰. *Somatization* was perceived as 'physical complaints with a psychological origin' ⁴. *Rapport* with the midwife was phrased as 'a non-judgmental attitude of midwife, the midwife's interest in, attention for and listening to the woman' ^{42,44}.

To measure the behavioural factor *coping style* that emerged from PRECEDE phase 3, we used the adapted version of the *Coping Operations Preference Enquiry-Easy (COPE-Easy)* ⁶¹. The COPE-Easy has been used in Dutch populations to measure health-related quality of life in relation to coping with life events ^{62,63} and consists of 32 questions, incorporating 15 distinct coping strategies. These strategies are grouped into three main coping styles: active problem focused coping, avoidant coping, and seeking social support ($\alpha = .85$; $\alpha = .66$; $\alpha = .80$). The COPE-Easy also includes subscales measuring four different coping styles: use of medication, smoking and drinking; seeking support in religion; use of humour and acceptance of the situation. We asked participants to think of a personal difficult event that had occurred during the past year (including pregnancy) and how they had coped with that situation. The COPE-Easy uses a 4-point rating scale to measure coping (1 'not at all'; 4 'very'). Scores range between 32 and 128, with a higher score indicating more use of that specific coping strategy. Coping behaviour styles that were not included in the COPE-Easy but had emerged from the literature such as self-disclosure ^{13,39,43}, somatization ³⁸ and help-seeking ⁴³, were operationalised in our questionnaire.

Table 1. Factors related to the occurrence of maternal distress according to PRECEDE phase 3 among women with a healthy pregnancy

PRECEDE phase 3	Factors related to occurrence of maternal distress
Aetiological assessment:	
Personal characteristics	<ul style="list-style-type: none"> • Maternal young(er) age ³⁰ • Increased number of children ^{31,32,39}
Personal history	<ul style="list-style-type: none"> • History of psychological problems ^{13,32-35} • History of psychological problems in a woman's Family ^{12,33} • History of miscarriage(s) ^{20,32,36,37} • Life events one year prior to or during pregnancy ^{12,30,38}
Personal circumstances	<ul style="list-style-type: none"> • Negative previous birth experience ^{13,30,31,37,38,42} • Having young children ^{30,31} • Being single ^{30,32,35} • Language other than the country of habitation ^{30,32} • Working status ³⁰ • Low(er) level of income ^{12,34} • Experiencing domestic violence ^{33,34} • Experiencing daily stressors ^{33,39} • High pre-pregnancy weight ³² • Negative feelings towards forthcoming birth ^{31,32,39,40,43}
Behavioural factors	<ul style="list-style-type: none"> • Knowledge of maternal distress ⁴³ • Negative coping styles ^{2,12,13,38-40,43}
Environmental factors	<ul style="list-style-type: none"> • Limited/ no existing (social/ partner) support mechanism(s) ^{12,13,30,35} • Unsupportive midwife ^{43,44} • Unavailable/ limited (peer) networks ^{13,30,34,43,44} • Rapport with midwife ^{42,44}

A 7-point Likert scale (1 – 7) was used for items other than those from existing instruments, with the extremes labeled in a positive direction ‘completely disagree’ – ‘completely agree’. Items concerning feelings towards forthcoming birth were in the opposite direction, thus the negative experiences had the highest scores. To ensure validity, the questionnaire was pre-tested by a random sample of pregnant women not participating in the study ($n = 7$), using cognitive interviewing ⁶⁴. They applied the following criteria: (i) the focus of items, (ii) comprehensibility, and (iii) time to complete. Pre-testing resulted in the rephrasing of ambiguous and poorly worded questions. The questionnaire took 15 minutes (range 10-20 minutes) to complete. The questionnaire is available in Dutch upon request from the first author.

Analysis

Sample size calculation with statistical significance set at $p = .05$ (95% CI) showed that we required a minimum of 383 participants in order to make inferences about pregnant women receiving midwife-led care from the sample. With an expected response rate of 40%, 920 respondents were invited to participate. To enter the aetiological factors ($n = 30$) that emerged from the literature in a multiple linear regression analysis, we needed a minimum sample of 300 participants ⁶⁵.

We calculated descriptive statistics for the personal characteristics, personal history and personal circumstances. Crude data were used for descriptive analysis. When fewer than 10% of the values for an item were missing, missing values were imputed with sample means. Mean sum scores were calculated for items belonging to the same psychological construct and for items belonging to different coping styles. Normality of distribution was confirmed using visual interpretation of histograms and Q-Q plots. We calculated Cronbach's alpha (α) to measure internal consistency of the existing questionnaire items and in each case the results were acceptable, $\alpha > .60$ ⁶⁵.

Multiple linear regression analysis was used to examine the relationship between the dependent variable (maternal distress) and the multiple independent variables⁶⁵. Maternal distress was the summed score of the total of the EDS, STAI and PRAQ scores. The aetiological independent variables are shown in Table 4. Data entry and analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 19.0.

RESULTS

540 women received a questionnaire; 418 were digitally distributed, 117 were distributed by mail and 5 women opted for a telephone questionnaire. The response rate of the women who consented was 88% ($n = 474$). Sixteen questionnaires were excluded (12 women had given birth and 4 women had incorrect due dates), which left 458 (85%) questionnaires for our analyses.

Characteristics of the respondents

The mean age of the respondents was 31 years. The mean gestational period was 28 weeks: 17 women (3.7%) were in the first trimester of pregnancy, 177 (38.6%) in the second trimester and 264 (57.6%) in the third trimester of pregnancy. Half of the women (48.3%) were nulliparous women and half (51.7%) were multiparous women. A large majority of the women (436, 95.2%) were born in the Netherlands. A relatively large number of women (26.2%) had a history of personal psychological problems (See Table 2).

Table 2. Characteristics of participants ($N = 458$)

Characteristic	Mean (SD \pm , range)	N (%)	Dutch population
Age	30.62 (± 3.9 , 21-45)		30.6 ²³
Gestational period in weeks	28.27 (± 8.28 , 9-43)		
No children		221 (48.3)	44.9% ²³
1 child		176 (38.4)	35.9% ²³
2 children		50 (10.9)	19.2% (P2 +) ²³
3 children		9 (2)	
4 children		2 (.4)	
History of miscarriage(s)		97 (21.3)	
Life events in year prior to/ during pregnancy		126 (27.7)	
Current domestic violence		17 (3.7)	
With partner		454 (99.1)	90% ⁵⁶
Single		4 (.9)	10% ⁵⁶
Respondent born in the Netherlands		436 (95.2)	74% ²³
Respondent born in other Western country		12 (2.6)	4.9% ²³
Respondent born in non-Western country		10 (2.2)	21.1% ²³
Mother respondent born in the Netherlands		431 (94.1)	
Mother respondent born in other Western country		14 (3.1)	
Mother respondent born in non-Western country		13 (2.8)	
Father respondent born in the Netherlands		430 (93.9)	
Father respondent born in other Western country		14 (3.1)	
Father respondent born in non-Western country		14 (3.1)	
Income above average (€ 33.000/ annum)		342 (75.2)	62% ⁵⁷
Income below average (€ 33.000/ annum)		112 (24.6)	
Working (paid job)		405 (89)	
Low level of education		30 (7)	
Medium level of education		156 (34.3)	
High level of education		269 (59.1)	
Weight prior to pregnancy	69.48 (± 13.24 , 41-125)		
Smoking during pregnancy	2.13 sig./day (± 8.67)	86 (18.9)	
Drinking during pregnancy	.01 units/week ($\pm .08$)	2 (0.4)	

Drugs during pregnancy	None	None
History of psychological problems		119 (26.2)
History of treatment for psychological problems		78 (17.1)
Current medication use (prescribed) for psychological problems		7 (1.5)
Family with (history of) psychological problems		59 (13)
Own history of psychological problems + family with (history of) psychological problems		26 (5.7)

Maternal distress

More than 20 percent of the women in our sample showed heightened scores on one or more of the EDS, STAI or PRAQ (Table 3).

Table 3. Maternal distress measured by depression (EDS), trait anxiety (STAI) and pregnancy & birth related anxiety (PRAQ) (*N* = 458)

Measure	Mean (SD \pm , range)	N (%)
EDS (range 0-30)	4.69 (\pm 3.20, 0-23)	
EDS score 10/11 or more		29 (6.3)
STAI (range 20-80)	28.8 (\pm 9.33, 20-58)	
STAI score 41 or more		66 (14.4)
PRAQ total (range 10-50)	19.6 (\pm 7.45, 10-46)	
PRAQ 1 (fear of giving birth) (range 3-15)	6.03 (\pm 3.18, 3-15)	
PRAQ 2 (fear of bearing a handicapped child) (range 4-20)	8.73 (\pm 3.97, 4-20)	
PRAQ 3 (concern own appearance) (range 3-15)	5.37 (\pm 3.14, 3-15)	
PRAQ total scores >90 th percentile		54 (11.8)
Maternal distress: women with heightened scores on one or more measure (0-80)*	17.96 (\pm 6.7, 0-58)	102 (21.8)

* EDS \geq 10/11 or STAI \geq 41 or PRAQ >90th percentile

Multiple linear regression analyses

Multiple linear regression analysis was performed with maternal distress as the dependent variable. Analysis shows (in a descending order of strength of association) that a (family) history of psychological problems, having young children, daily stressors, negative feelings towards the forthcoming birth, avoidant coping, and somatisation, have a significant positive relationship with the occurrence of maternal distress. Self-disclosure and acceptance of the situation have a significant negative relationship with the occurrence of maternal distress (Table 4).

Table 4. Multiple linear regression analysis of aetiological factors of maternal distress

FACTORS	<i>B</i>	<i>t</i>	<i>p</i> -value	95% CI for <i>B</i>	
				Lower Bound	Upper Bound
(Constant)	.759	3.129	.002	5.114	22.404
PERSONAL CHARACTERISTICS					
Age	-.051	-.745	.457	-.184	.083
Number of children	-.028	-.506	.613	-.136	.080
PERSONAL HISTORY					
(Family) history of psychological problems	1.071	3.455	.001*	.462	1.681
Life events during the last year	-.346	-.577	.564	-1.527	.834
Having young children	2.998	3.429	.001*	1.279	4.717
History of miscarriage(s)	1.081	1.640	.102	-.215	2.376
Previous birth experience	.121	1.156	.248	-.084	.326
PERSONAL CIRCUMSTANCES					
With partner	4.314	.770	.442	-6.697	15.325
Currently experiencing domestic violence	.976	.469	.640	-3.117	5.069
Ethnicity other than Dutch	-1.834	-1.538	.125	-4.178	.510
Working (paid job)	.629	.742	.459	-1.038	2.297
Level of income	.314	.496	.620	-.930	1.557
Weight prior to pregnancy	-.030	-1.507	.132	-.069	.009
Daily stressors	1.304	12.152	.000*	1.093	1.515
Negative feelings towards forthcoming birth	.636	9.352	.000*	.502	.770
Knowledge maternal distress	-.101	-.723	.470	-.377	.174
BEHAVIOUR					
Self-disclosure	-.863	-2.920	.004*	-1.445	-.282
Problem (active) focused coping	.033	.100	.920	-.607	.672
Emotional (social support) focused coping	.071	.262	.793	-.463	.606
Avoidant coping	1.047	3.569	.000*	.470	1.623
(Increased) substance usage	.383	.876	.381	-.476	1.243
Seeking support in religion	-.173	-1.095	.274	-.483	.137
Use of humour	-.035	-.184	.854	-.404	.334
Acceptance of the situation	-.542	-2.679	.008*	-.940	-.144
Somatisation	.484	2.935	.004*	.160	.809
Help-seeking	-.268	-1.108	.268	-.743	.207
ENVIRONMENTAL FACTORS					
Existing (social/ partner) support mechanism(s)	.015	.268	.789	-.098	.129
Availability of supportive midwife	.110	1.511	.132	-.033	.254
Availability of (peer) network	.016	.538	.591	-.043	.075
Rapport midwife	.012	.160	.873	-.138	-.162

**p* = <.05 *R*² of all factors .629

DISCUSSION

Our study showed that more than twenty percent of the participants had heightened levels of maternal distress as expressed by symptoms of depression, trait anxiety and/or pregnancy-related anxiety. Trait anxiety was most common with the highest average score, followed by successively lower scores for pregnancy-related anxiety (which was subdivided in fear of giving birth, fear of bearing a physically or mentally handicapped child, and concerns about own appearance), and by depressive symptoms.

The amount of variation in maternal distress that is explained by the regression model was

high ($R^2 = .629$). The variables most clearly associated with maternal distress were a personal and family history of psychological problems and having young children. The more positive the forthcoming birth was anticipated, the more the occurrence of maternal distress decreased. Self-disclosure and acceptance of the situation were positive coping styles, while avoidance of the situation and somatisation were negative coping styles for maternal distress.

The overall levels of depression and anxiety in our study were similar to those found in other Dutch studies with low risk women of Dutch ethnicity, measured at all trimesters of pregnancy^{51,66}. We chose the 90th percentile as cut off score for heightened levels of pregnancy-related anxiety. This percentile captures very high scores but omits the moderate and high scores⁶⁷. This reduces the possibility of false positive reports of maternal distress, but makes likely an underreport of pregnancy-related anxiety and thus an underreport of maternal distress. Our study showed a higher number of women with a personal history of psychological problems compared to other studies among Dutch women with healthy pregnancies^{5,8}. The number of women with a family history of psychological problems was similar to other studies¹⁸. Our higher number of participants with a personal history of psychological problems could be explained by the fact that we enquired about psychological problems in general terms and not necessarily for diagnosed conditions. We asked women if they had suffered from psychological problems, leaving room for participants to report subjective problems.

Having negative feelings about the forthcoming birth was related to the occurrence of maternal distress of the participants. It is plausible that a previous birth experience can play a role. The literature shows that that one in 10 women in the Netherlands has a traumatic birth experience⁷⁰ and one in 6 women has a negative recall of their birth experience⁶⁹. Addressing feelings with regard to a forthcoming birth during antenatal care ultimately belong to the midwife's scope of practice. Addressing such feelings reflects the midwife's unique supportive role with regard to the process and emotions concerning labour and birth. This enhances the central concepts of the midwife's role: exchanging information, developing trust and interpersonal and supportive interaction.

Having children was a significant predictor for maternal distress. Women with multiple roles: being a mother, a partner, an employee are found to be more vulnerable for maternal distress as this is related to more stressors in a woman's life⁶⁸. This was consistent with the characteristics of our sample and the significant variable daily stressors for maternal distress. Avoidance^{71,72} and somatisation⁴ are recognised to be associated with heightened levels of maternal distress; this was consistent with our findings. Women in our study adopted different coping styles. Education and income may increase the number and kind of coping options⁷¹, which could have been relevant to our sample containing on average a high number of well-educated and rather affluent women.

A strength of our study is incorporating all possible predicting factors for maternal distress, as this has never been studied before. Most studies focused on risk factors for maternal distress, concerning different aspects or fragments of a woman's personal history or her daily circumstances^{12,13,30-37}. We reviewed the literature for influencing factors with regard to maternal distress and systematically categorised these in order to analyse them. To the best of our knowledge there are no studies that have used a multi-dimensional approach with regard to maternal distress. Our study showed that a woman can have heightened scores on more than one measure and that depression and the different constructs of anxiety are significantly correlated. A one-dimensional focus on a single psychological construct may overestimate its importance within the spectrum of maternal distress^{73,74}. Asking women one or two single questions about how they feel, rather than

administering questionnaires to assess different constructs, may have more clinical relevance ⁴⁶.

Limitations of the study

Our study does have limitations. Our sample contained mostly well-educated women with on average a good level of income. Most women were in a relationship and were born in the Netherlands. These characteristics do not perfectly reflect those of the average Dutch pregnant population ^{23,55-57}. Generalisability of our findings to a broader population must be done carefully. Recruitment of our participants occurred in primary care midwifery practices in the Netherlands. Because of the selection within primary care midwifery practices, our findings cannot necessarily be generalised to women in obstetric settings as evidence suggests that women in obstetric care have higher levels of maternal distress ²⁰.

Selection bias could have occurred in our recruitment of midwifery practices and participants. We approached 140 midwife-led practices for the study, and 31 practices agreed to participate. Practices that agreed to participate were perhaps more interested in maternal distress than practices that did not participate. It is known that the more interested midwives are in maternal distress, the more they engage in identifying and supporting women with maternal distress ²⁶. As their own midwives approached women regarding participation in the study, selection bias could have occurred. It is unknown exactly how many women were approached and if midwives consciously and categorically asked certain women to participate rather than others. Women's decision to participate in the study could have been triggered by self-recognition of maternal distress. Self-selection could have led to a higher prevalence of maternal distress but could not have affected the influencing factors for maternal distress.

We have used self-reported screening instruments to examine the levels of maternal distress. We did not use diagnostic instruments for maternal distress, which implies that we identified only those women who are *more likely* to develop maternal distress but not necessarily *suffer* from maternal distress ^{75,76}. The number of women in our study *at-risk* for maternal distress does not necessarily represent women *diagnosed* with maternal distress ^{73,74}. Therefore our number of women with maternal distress could be higher, including women with physiological distress associated with adjustment to pregnancy and women with pathological distress with clinical relevance ⁷³. However, our heightened levels of maternal distress are within the range of global findings ¹⁸.

Recommendations for research

We chose to adopt a multi-dimensional approach, compiling the scores of most of the known psychological constructs during pregnancy: depression, anxiety and pregnancy-related anxiety. Several researchers have called for multi-dimensional measures of maternal distress in light of the increasing evidence that women experiencing maternal distress report symptoms belonging to more than one construct, and that different constructs correlate ^{6,73,77-79}. Future research should build on our work examining and using validated instruments measuring different aspects of maternal distress. The EDS, for example, is validated to measure depression and anxiety simultaneously ⁷⁹. The 4 Dimensional Symptom Questionnaire for pregnancy (4DSQ) has been validated among Dutch pregnant healthy women to measure distress, anxiety, somatisation and depression at the same time, ⁴ but was not available at the time of our study. Our study used a cross-sectional design and reliance on one source of information. The next step in the analysis of the factors that generate maternal distress is the use of a longitudinal design.

Recommendations for practice

The findings of our study highlight the need for midwives to familiarise themselves with women and their personal history and circumstances. Midwives need to reconsider that these issues impact women's emotional wellbeing during pregnancy ²⁵. In order to provide adequate care to vulnerable women, clinical practice guidelines should incorporate the thoughtful identification of women who are more vulnerable to present with or develop maternal distress during pregnancy ¹². In order to reduce maternal distress, feelings about the forthcoming birth require attention and should be discussed during antenatal care. Because of their specific knowledge, expertise, engagement with, and support for the emotional health of women during pregnancy and birth, midwives are uniquely qualified to initiate those discussions.

Our study included women that are assumed to be in a fairly stable and comfortable position in life, based on having a relationship, a good level of education and income, and a having a healthy pregnancy. However, evidence from Confidential Enquiry into Maternal and Child Health ⁸⁰ illustrates that it is in particular this group of women that seems to be a very vulnerable group to develop maternal distress. As these 'everyday women' are part of midwives' caseloads, it is important that midwives are aware that vulnerable women are among those populations where least expected.

CONCLUSION

More than twenty percent of pregnant women with a healthy pregnancy showed heightened maternal distress scores. Maternal distress was predominantly associated with a variety of coping styles, a woman's personal history and her personal circumstances. We recommend that midwives use these factors in their assessment of each woman and remain aware throughout antenatal care that these issues are related to the occurrence or development of maternal distress. Midwives need to be aware of the importance of their role with regard to pregnant women and maternal distress.

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CHAPTER 4

Antenatal interventions to reduce maternal distress: A systematic review and meta-analysis of randomised trials

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ABSTRACT

Background

Maternal distress can have adverse health outcomes for mothers and their children. Antenatal interventions may reduce maternal distress.

Objective

To assess the effectiveness of antenatal interventions for the reduction of maternal distress during pregnancy and for up to 1 year post partum.

Search strategy

EBSCO, Medline, PubMed, Cochrane, secondary references of Cochrane reviews and review articles, and experts in the field.

Selection criteria

Randomised Controlled Trials in which the association between an antenatal intervention and the reduction of maternal distress was reported.

Data collection and analysis

Two authors independently abstracted data from each trial. A random-effect meta-analysis assessed the reduction of maternal distress associated with antenatal preventive and treatment interventions, compared to routine antenatal care or another intervention.

Main results

Ten trials with 3167 participants met the inclusion criteria, and nine trials ($n = 3063$) provided data for the meta-analysis of six preventive interventions and three treatment interventions. The preventive interventions indicated no beneficial reduction of maternal distress (six trials, $n = 2793$, standardized mean difference, SMD -0.06; 95% confidence interval, 95% CI -0.14 to 0.01). The treatment interventions indicated a significant effect for the reduction of maternal distress (three trials, $n = 270$; SMD -0.29, 95% CI -0.54 to -0.04). A sample of women, selected retrospectively, who were more vulnerable for developing maternal distress showed a significant reduction of maternal distress after the interventions (three trials, $n = 1410$; SMD -0.25; 95% CI -0.37 to -0.14).

Author's conclusions

Preventive antenatal interventions for maternal distress show no effect. Antenatal interventions for women who have maternal distress or are at risk for developing maternal distress are associated with a small reduction in maternal distress.

Keywords

Interventions, midwifery, mental health, maternal distress, pregnancy, public health

INTRODUCTION

Maternal psychological health problems during pregnancy and the post partum period are common: rates vary between 10 and 41% ¹. Maternal psychological problems have become a public health issue, as they are associated with an increase in the risk of obstetric complications ^{2,3}, postnatal problems ⁴⁻⁷, including severe and/or chronic maternal mental health problems ⁸, and unfavourable infant and child neurobehavioral and cognitive development ⁹⁻¹¹.

Maternal psychological problems are evident in a spectrum of different constructs, most commonly identified as depression, anxiety in general or specifically related to pregnancy. Disregarding the difference in symptoms these constructs are significantly correlated ², and have imbalanced or disturbed psychosocial functioning in common ¹². In this article we will use the term 'maternal distress'. Maternal distress is an appropriate conceptualisation of the wide spectrum of psychological problems, and refers to the distinct period of maternal transition, including pregnancy, birth and the postnatal period, excluding psychiatric pathophysiology ¹². Midwives are identified to have an extended public health role with regard to maternal distress during this period ¹³.

From a public health perspective, the antenatal period offers a window of opportunity to implement interventions in order to prevent or to limit any further exacerbation of negative outcomes. Antenatal interventions fall into two categories: preventive interventions that target pregnant women before the onset of maternal distress, and treatment interventions aimed at women already suffering from maternal distress, thereby aiming at a wide population of pregnant women ^{14,15}. Although various antenatal interventions for maternal distress have been systematically reviewed, focusing on separate constructs of maternal distress, an unambiguous antenatal approach for maternal distress has not yet been identified ¹⁶⁻¹⁸. Intervention studies have focused mainly on postnatal depression, specific interventions and defined populations of pregnant women ¹⁹. Jomeen and DiPietro have noted that a one-dimensional focus on a single psychological construct overestimates its importance within the spectrum of maternal distress: they argue in favour of a non-fragmented and broad approach ^{19,20}. Within this broad approach, a number of different individual measurements can be compiled ²⁰.

To date, broadly, there have been no systematic reviews examining the effect of antenatal interventions on the reduction of maternal distress. Our systematic review seeks to answer the following question: do preventive and treatment interventions for maternal distress during the antenatal period reduce maternal distress during pregnancy and up to 1 year post partum, when compared with routine antenatal care or another intervention? Using meta-analyses we summarised the reduction of maternal distress associated with antenatal preventive and treatment interventions, and we evaluated whether outcomes differed between these types of interventions.

METHODS

We carried out this review and meta-analysis in accordance with the *Cochrane Handbook for Systematic Reviews of Interventions* ²¹.

Search strategy and study selection

In order to capture the appropriate studies we searched articles limited to humans, and used multiple combinations of the Medical Subject Headings (MeSH) terms and related phrases: low risk pregnancy; health condition; intervention and study design; (pregnancy or midwifery or midwife or midwives) AND (mental health or maternal mental health or perinatal mental health or maternal

distress or psychological distress) AND (education or health education or health promotion or early interventions or interventions) AND (randomized controlled trial). The key terms for inclusion in the search strategy were discussed and agreed with three authors (Y.F., M.N., and M.A.). Two authors (Y.F. and M.N.) performed the search between 1 May 2011 and 25 August 2011. We performed independent searches of the electronic databases EBSCO (CINAHL, EMBASE, Psycarticles, Psychology and Behavioral Sciences Collection, Psycinfo), Medline (OVID), PubMed, and Cochrane, with publication dates between 2002 and August 2011. We manually searched one journal that frequently appeared in our initial searches (*Journal of Affective Disorders*), and we entered frequently appearing authors (*Matthey S, Priest RG, Vieten C*) in the previously mentioned electronic databases. We scanned reference lists of relevant articles and those of Cochrane reviews of antenatal interventions to reduce maternal distress. We asked experts in the field for references. We considered articles published in all languages.

We applied the following inclusion criteria: published randomised controlled trials (RCTs) carried out from 1999 onwards and methodologically strong, based on a validity assessment; trials with primiparous and multiparous pregnant women of all ages and ethnicities, from economically developed countries²², who entered the maternal health service during pregnancy; trials with demonstrated levels of maternal distress ranging from absent to mild or severe; trials that studied the effects of an antenatal intervention to reduce maternal distress offered by a health professional or lay person (individual or group sessions); trials in which the primary or secondary outcomes of interest were scores of psychological constructs within the spectrum of maternal distress measured, using one or more validated measurement instruments, for up to 1 year post partum. We identified maternal distress as depression, anxiety, stress, fear, worry, distress, insufficient self-efficacy, and self-esteem, and any of these descriptions combined with the word 'disorder' within the text of the article. We excluded studies including women with overt severe mental pathophysiology (i.e. women requiring hospitalisation for treatment; women requiring acute psychiatric care; women exhibiting psychotic, dissociative, hallucinatory or delusional symptoms, suicidal ideation, or showing reduced communication abilities; women with active substance abuse) or physical pathophysiology (i.e. complex pregnancies; cancer; HIV/AIDS). We aimed to represent a Western, modern, healthy, low-risk pregnant population.

Two authors (Y.F. and M.N.) independently assessed the eligibility of the trials by using the title and abstract for initial screening followed by examination of the full text. We used a data extraction form to document generic data items of individual records. We extracted details on study design, study objective, participants, inclusion/exclusion criteria, intervention type, control group (alternative intervention), outcomes, and statistical methods.

Data collection and analysis

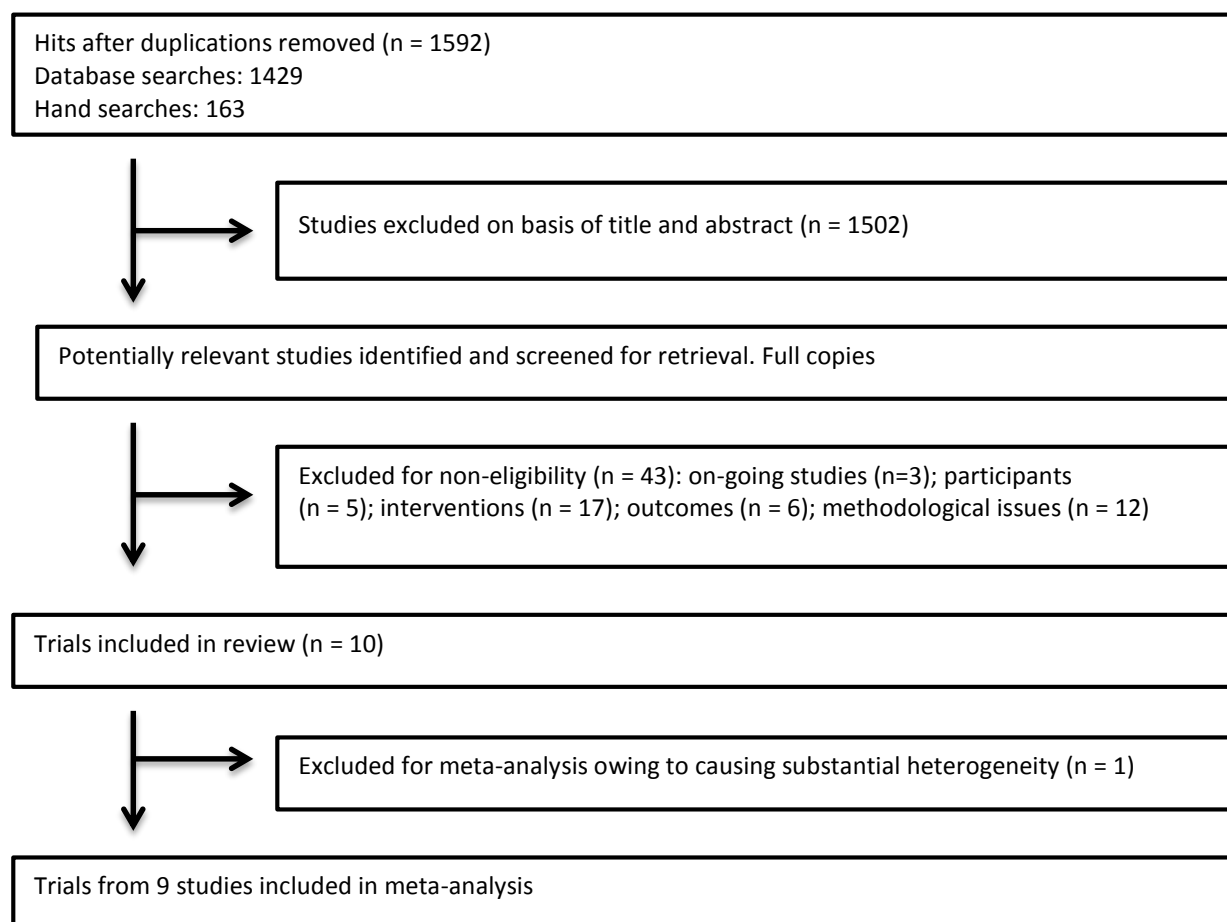
Figure 1 describes the literature search process. We used the CONSORT 2010 checklist to gain insight into trials' methodological quality and validity of the trials²³. Details of the excluded studies can be requested from the corresponding author. The results were compared by two researches (Y.F. and M.N.) and differences were resolved through discussion. The search yielded ten trials. A kappa value of 0.69 reflects good agreement between the reviewers²¹.

The primary outcome of the pooled analyses was maternal distress reported at the final assessment of the trial. We calculated pooled estimates using standardized mean differences (SMDs) with 95% confidence intervals (95% CIs). The differences were statistically significant when the 95% CI excluded 0. Pooling was performed on the *a priori* intervention characteristics: prevention and

treatment, as these differ in function and aim ^{14,15}. We decided to use the random-effects model to address between-study variance of the maternal distress parameters as data were drawn from different populations and included different implementation of interventions ^{24,25}. When multiple outcome measurements were used in one study, the single endpoints were combined by means of the formulae for combining groups ²¹. If trials contained a two-arms control group, the control groups were combined to create a single pairwise control comparison group using the same formulae ²¹.

We assessed each trial for risk of bias according to the recommendations of the Cochrane Collaboration, and we evaluated the quality of the body of evidence using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach ²¹. Heterogeneity was assessed by I^2 statistic to quantify heterogeneity across studies, and it was evaluated graphically using forest plots ²¹. We explored heterogeneity between the trials by looking at factors that could be responsible for heterogeneity, such as characteristics of the samples and publication year. We carried out a sensitivity analysis and evaluated the stability of the pooled estimates by examining changes to the results after the exclusion of specific studies ²¹. Meta-analysis was performed with Review Manager version 5.1 (Cochrane collaboration software).

Figure 1. Flow chart



RESULTS

The ten included trials included were conducted between 2001 and 2008, and were reported between 2005 and 2011. Collectively they had a total of 3167 participants in their analyses (1696 in intervention groups; 1471 in control groups), with a range from 34 to 977 participants per RCT. Three RCTs were conducted in Australia ²⁶⁻²⁸, three were conducted in the USA ²⁹⁻³¹, two were conducted in Europe (in Sweden and Northern Ireland) ^{32,33}, and two were conducted in Asia (in Iran and in Taiwan) ^{34,35}. The maternal mean age ranged between 20.4 and 33.9 years. Interventions in the experimental groups were compared with standard antenatal care ^{26,28,29,33-35}, or with another antenatal intervention ^{27,30,32}. The trials included 2841 primiparous women (90%), 295 multiparous women (9%), and 31 women who were not classified as primiparous or multiparous (1%). Four trials included only primiparous women ($n = 1594$) ^{27,32-34}. Combined samples of primiparous and multiparous women were found in six trials (primiparous $n = 967$; multiparous $n = 295$; non-specified $n = 31$) ^{26,28-31,35}. The starting-point of the interventions varied amongst all trimesters of pregnancy and two interventions included post partum sessions ^{26,35}. Details of the trials are presented in Table 1.

Table 1. Characteristics of included studies ($n=10$)

Study	Participants	Intervention	Outcome measure	Notes
Bergström ³²	N = 1087 (Ne 544/ Nc 543). Sweden. Inclusion criteria: primiparous and Swedish-speaking women. No baseline maternal distress information.	Intervention: Group couple antenatal education with the focus on preparation on natural childbirth (breathing, relaxation massage techniques, information non-pharmacological methods for pain relief). Started at the third trimester; follow-up session within 10 weeks post partum. Control: Standard antenatal education	WDEQ and SPSQ at 3 months post partum	
Chang ³⁵	N = 241 (Ne 120/ Nc 121). Southern Taiwan. Inclusion criteria: > 18 years of age, expected to have uncomplicated births. PSS, STAI and EPDS used for baseline assessment.	Intervention: Two weeks of a minimum of 30 minutes daily listening to a CD of 4 types of music/ CD (classical, lullabies, nature sounds, crystal music) during second or third trimester. Control: Standard antenatal care.	PSS, STAI and EPDS post intervention during 2 nd (2-24 weeks) or 3 rd (32-36 weeks) trimester of pregnancy	Predominantly educated women from middle-class and high social class. High percentages of satisfaction in relationships.
Cupples ³³	N = 343 (Ne 172/ Nc 171). Northern Ireland. Inclusion criteria: primiparous women, no co-morbidity requiring on-going healthcare, <20 gestation, English speaking. SES used for baseline assessment.	Intervention: Peer-mentoring by a lay-worker fortnightly during pregnancy, starting at the end of the first trimester and monthly for the following year (home visits, telephone contacts). Control: Standard	SF-36, PSI and SES at 1 year post partum	Participants from socio-economically disadvantaged areas in Belfast (postcodes in the lowest tertile of deprivation scores). Mean SES scores 3.5 at baseline.

		antenatal care		
Ickovics ²⁹	N = 1047 (Ne 653/ Nc 394) USA. Inclusion criteria: <24 weeks gestation, age ≤ 25, no medical problems (high risk pregnancy) and English or Spanish speaking. CESD-D, PSS and Rosenberg used for baseline assessment.	Intervention: Group prenatal care (physical assessment, education/ skills building and support starting at 18 weeks. Control: Standard antenatal care	PSS, SES and CES-D at 3 rd trimester of pregnancy, 6 and 12 months post partum	Predominantly young (mean age 20.4 ± 2.7) African-American women. (80%). Included women (n=280) with low self-esteem
Svensson ²⁷	N = 248 (Ne 124/ Nc 124) Australia. Inclusion: primiparous and English-speaking women. PES and CWS used for baseline assessment	Intervention: Group couple antenatal education (problem-solving, experimental learning, emphasis on childbearing experience and parenting activities, practical baby care sessions). 1 post partum session. Onset not described. Control: Standard antenatal education	PES and CWS at 8 weeks post partum. Only CWS included in analysis for last assessment, as PES differed in direction of measurement.	Predominantly middle class, English speaking, educated women with a male partner. 34.7% of participants' self-reported major stress during the last 12 months at baseline.
Taft ²⁸	N = 174 (Ne 113 / Nc 61). Australia. Inclusion: aged ≥16 and who disclosed IPV. Exclusion criteria: Serious mental illness or inadequate in English or Vietnamese language. EPDS used for baseline assessment	Intervention: Weekly home visiting from trained and supervised local mothers offering non-professional support (befriending, supporting advocacy, parenting support, referrals). Onset at the end of the first trimester. Control: Standard antenatal care	EPDS ≥ 13 at 12 months after the intervention commenced	High proportion of socially and financially disadvantaged women. Over a third of the participants were born outside Australia. Culturally and linguistic diverse sample. 64% of participants EPDS score >13 at baseline. Attrition 24%
Bastani ^{34*}	N = 110 women (Ne 55/ Nc 55) from prenatal clinics of 3 teaching hospitals in central Teheran, Iran. Women were included with moderate to severe anxiety levels on the STAI, scores between 21 to 40 or 41 to 60. STAI and PSS used for baseline assessment	Intervention: Relaxation classes (various taught relaxation techniques) started at the second trimester. Control: Standard antenatal care	STAI and PSS post intervention (7 weeks)	All Iranian women. All women were married; had no higher education and were unemployed. Mean age 23.5
Manber ³⁰	N = 159 women (Ne 52/ Nc 58 acupuncture/ Nc 49 massage) USA. Inclusion criteria: Between 12 and 30 weeks gestation, age ≥ 18, meeting criteria for MDD determined by the Structured Clinical Interview for DSM-IV and a HAM-D score ≥	Intervention: Acupuncture sessions (2 times for first 4 weeks and weekly for 4 more weeks) commencing at the second trimester. Control: 1) Acupuncture not specific for depression and 2) Swedish massage	HAM-D at 4 and 8 weeks of treatment	Predominance of white population (67%) with high education and socioeconomic status. Harmful effects: Experiment acupuncture (n=13): tiredness, headache, agitation, sleep disturbance, nausea, aggravation depression; Massage: transient

	14. Exclusion: other current primary Axis I psychiatric disorder; psychotic features; abnormal thyroid panel or drug screen results; serious uncontrolled medical conditions or conditions that may be a medical basis of depression; cluster B personality disorders; current psychotherapy; herbs or psychotropic medication; electroconvulsive therapy in the past year; current active suicidal potential; absence of antenatal care; conditions necessitating bed rest. HAM-D and BDI used for baseline information			discomfort; Control acupuncture (n=4): tiredness, irritability, sleep disturbance, headache, aggravation depression; Swedish massage; (n=4) tiredness Attrition 22%
Milgrom ²⁶	N = 143 women (Ne 71/ Nc 72) Australia. Inclusion: EPDS score ≥13 and/or RAC score >13 with even DOB. Exclusion criteria: inability to understand written English; presence of psychotic symptoms; extreme levels of distress requiring crisis management; >32 weeks gestation. EPDS and RAC used for baseline assessment	Intervention: couple parenting support & preparation self-help workbook (content discussed by telephone with a (trainee) psychologist; Contact details for support services). Onset at third trimester. Control: Standard antenatal care	BDI-II, DASS and PSI at 12 weeks post partum. PSI not included in analysis at last assessment: not similar sample as for BDI and DASS.	Imbalanced socioeconomic groups. Multi regression showed no relation between outcomes and socioeconomic variables. Attrition 38%
Vieten ³¹	34 women (15 in intervention; 19 in control) with a history of mood concerns at a large private non-profit hospital in San Francisco, US. Exclusion criteria: a history of mental disorders with psychotic, dissociative, hallucinatory or delusional component; inability to attend classes or participation in the assessments. PSS and CES-D used for baseline assessment	Intervention: Mindfulness group training (additional reading; guided meditation CD during 2 nd and 3 rd trimester. Control: Standard care	PSS, STAI and CES-D at following the end of the intervention (8-10 weeks)	Predominance of white population (74%) and all married.

* Not included for meta-analysis

Outcome data were collected through various self-completed questionnaires in order to measure levels of maternal distress, all with one-dimensional scaling. Data were collected during the

second and third trimester of pregnancy^{29-31,34,35}, up to 1-year post partum^{26-29,31-33}. The included scales measured in the same direction. Eight trials included multiple outcome measurements^{26,27,29,31-35}. For depression the Edinburgh Postnatal Depression Scale (EPDS) was used^{28,35}. The Beck Depression Inventory (BDI-II)²⁶, the Hamilton Rating Scale for Depression (HAM-D)³⁰, and the Centre for Epidemiological Studies-Depression Scale (CES-D)²⁹⁻³¹ were also used to measure depression. The State-Trait Anxiety Inventory (STAI) was used to measure anxiety^{34,35}. Mental wellbeing was measured with the Short Form Health Survey (SF-36)³³. Anxiety and stress were measured with the Depression Anxiety Stress Scale (DASS)²⁶. The perception of presence of stress was measured with the Perceived Stress Scale (PSS)^{29,31,34,35}. Parenting stress was measured with the Swedish Parenting Stress Questionnaire (SPSQ)³² and the Parenting Stress Index (PSI)^{26,29,32}. Perceived parenting self-efficacy was measured with the Parent Expectations Survey (PES)²⁷ and self-esteem was measured with the Self Esteem Scale (SES)^{29,32}. Pre- and postnatal fear of childbirth was measured with the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ)³². Maternal worry was measured with the Cambridge Worry Scale (CWS)²⁷. An overview of measurement instruments and cut-off points at last assessment for maternal distress is presented in Table 2.

Two trials did not report continuous outcome measurements, but these were obtained from the corresponding authors of the trials^{26,30}. Timing and length of interventions differed between the trials. Maternal distress was measured at baseline, except in one study³² and at final assessment, which was either during pregnancy or in the post partum period. Some trials had measurements in between these points^{27,29,30}. There was no common time point used in all trials. The times of assessment varied among trials, and therefore the final assessment of maternal distress from the trials was included in the meta-analysis. Eight trials included multiple outcome measurement at the last study assessment^{26,27,29,31-35}, the single endpoints of which were then combined²². One trial contained a two-arms control group³⁰, and the control groups were combined as planned.

The data indicated that amongst preventive intervention trials, samples of women were included who appeared to be more vulnerable to develop maternal distress^{28,29,33}, based on predisposing factors such as a low social economic status and low self-esteem^{12,13,36,37}. We performed a subgroup analysis on this selected sample.

Table 2. Overview of measures and cut-off points at last assessment for maternal distress

Construct maternal distress	Measurement instrument	Cut-off point	Author
Preventive interventions			
Maternal mental wellbeing	SF-36 mental health	No cut-off point	Cupples ³³
Presence of depression	EPDS	9/10	Chang ³⁵
Presence of depression	EPDS	≥ 13	Taft ²⁸
Presence of depression	CES-D	No cut-off point	Ickovics ²⁹
Presence of high level of anxiety	STAI	≥ 80	Chang ³⁵
Perception of presence of stress	PSS	No cut-off point	Chang ³⁵ , Ickovics ²⁹
Parenting stress	SPSQ	No cut-off point	Bergström ³²
Perceived parenting self-efficacy	PES	No cut-off point	Svensson ²⁷
Pre and postnatal fear of childbirth	W-DEQ	No cut-off point	Bergström ³²
Maternal worry	CWS	No cut-off point	Svensson ²⁷
Self-esteem	SES	No cut-off point	Ickovics ²⁹
Treatment interventions			
Presence of depression	EPDS	≥ 13	Milgrom ²⁶
Presence of mild depression	HAM-D	8-13	Manber ³⁰
Presence of moderate depression	HAM-D	14-18	Manber ³⁰
Presence of severe depression	HAM-D	19-23	Manber ³⁰
Presence of very severe depression	HAM-D	> 23	Manber ³⁰
Presence of mild depression	BDI-II	14-19	Milgrom ²⁶

Presence of moderate depression	BDI-II	20-28	Milgrom ²⁶
Presence of severe depression	BDI-II	29-63	Milgrom ²⁶
Presence of clinical depression	CES-D	No cut-off point	Vieten ³¹
Presence of clinical anxiety	STAI	No cut-off point	Vieten ³¹
Presence of moderate to severe anxiety	STAI	State 21-40 Trait 41-60	Bastani ^{34*}
Presence of high anxiety	STAI	> 60	Bastani ^{34*}
Presence of mild anxiety	DASS	≥ 8	Milgrom ²⁶
Presence of mild stress	DASS	≥ 15	Milgrom ²⁶
Perception of presence of stress	PSS	No cut-off point	Bastani ^{34*} , Vieten ³¹
Parenting stress	PSI	> 260	Milgrom ²⁶

Ranked by intervention character, construct maternal distress, and measurement instrument

* Not included for meta-analysis

Preventive interventions

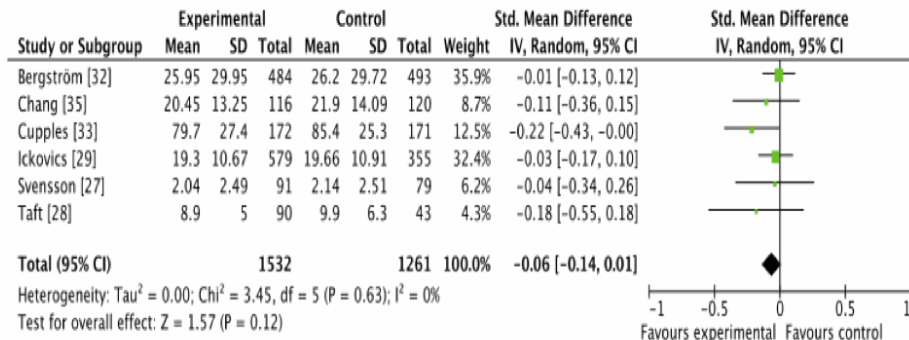
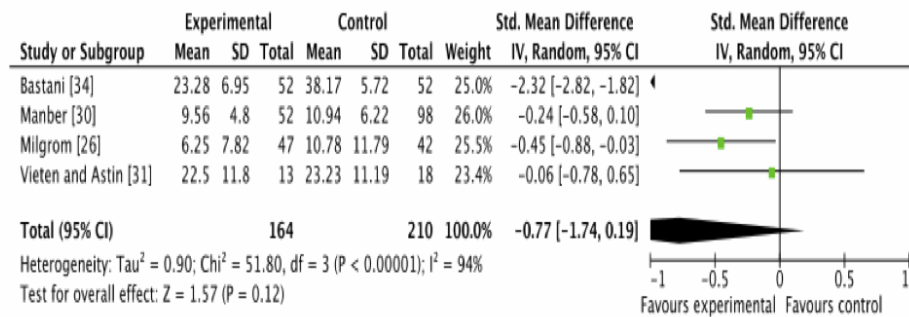
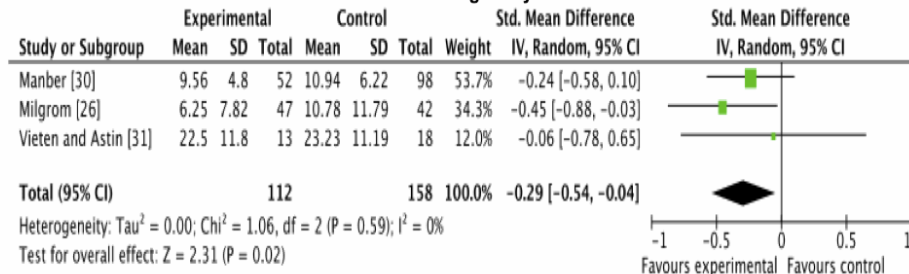
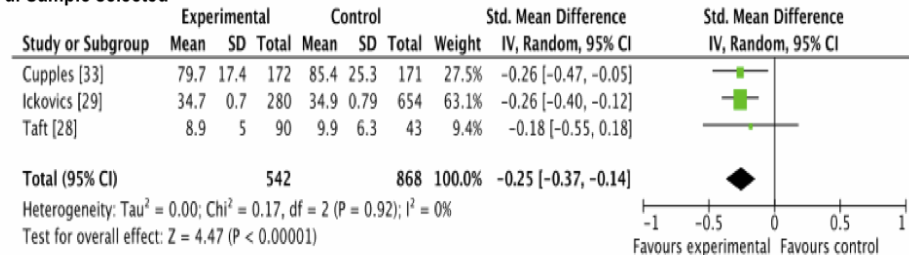
The pooling of results from six trials focusing on prevention (including antenatal education programs ^{27,32}, mentoring interventions ^{28,33}, music therapy ³⁵, and group antenatal care ²⁹) indicated no observed beneficial effect in relation to the reduction of maternal distress (six trials; $n = 2793$; SMD - 0.06; 95% CI -0.14 to 0.01; Figure 2a) ^{27-29,32,33,35}. These trials included pregnant women who were selected because of the non-occurrence of maternal distress. The preventive intervention trials focused on the overall improvement of maternal health, including pregnancy, intrapartum, postnatal, and parental issues. There was no heterogeneity among the studies ($I^2 = 0\%$; $p = 0.63$).

The results of the subgroup analysis from trials in which participants were selected on characteristics that made them more vulnerable to develop maternal distress, showed a small significant effect for the reduction of maternal distress (three trials; $n = 1410$; SMD -0.25; 95% CI -0.37 to -0.14; Figure 2d) ^{28,29,33}. There was no heterogeneity among the studies ($I^2 = 0\%$, $p = 0.92$).

Treatment interventions

The treatment interventions included four trials (including relaxation ³⁴, acupuncture ³⁰, a self-help support workbook ²⁶, and mindfulness ³¹). Treatment intervention trials selected women with scores above a set cut-off point for maternal distress. The treatment interventions focused on maternal distress only. There was significant clinical heterogeneity among all the treatment intervention trials ($I^2 = 94\%$; $p = < .00001$; Figure 2b). Exploration of heterogeneity showed that one study sample ³⁴ differed from the other three study samples ^{26,30,31}. These women were from Iran, were younger, were married, were not employed, and had no higher education. The publication year from this trial was from an earlier date than the other three trials. Removing this trial reduced heterogeneity ($I^2 = 0\%$). Although the reliability of I^2 was affected, given the small magnitude of effect of the interventions ²¹, we decided to exclude this trial for meta-analysis (Figure 1). Pooling of results from the three trials showed a small but significant effect for the reduction of maternal distress (three trials; $n = 270$; SMD -0.29; 95% CI -0.54 to -0.04; Figure 2c) ^{26,30,31}. The exclusion of that one trial positively influenced the magnitude of effect of the interventions. Sensitivity analysis showed selection bias in one trial ³¹; excluding this trial did not alter the results.

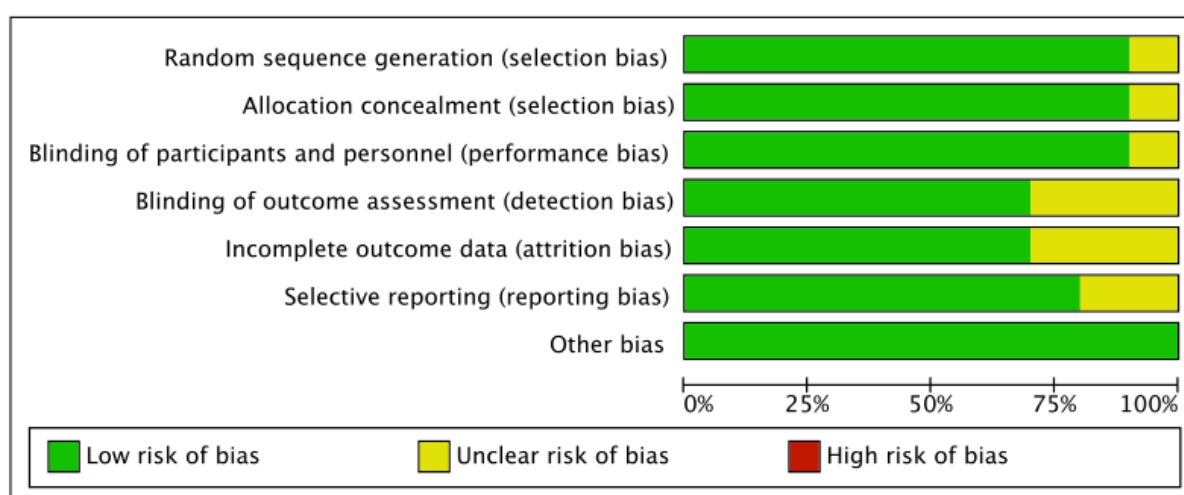
Figure 2. Forest plots

a. Preventive interventions**b. Treatment interventions****c. Treatment interventions 1 trial excluded for heterogeneity****d. Sample selected**

Quality of evidence

Data available for the review was provided by nine randomised trials, providing a high quality rating²¹. Most of the trials showed an unclear risk of bias for one or two key domains within the trials. These studies provided specific evidence for having been conducted in a manner that avoided bias, such as following strict protocols³⁵, including supervision for adherence to the protocol^{26,27,31}, and adjusting for bias in analysis^{28,29,32}. The trials showed mostly low and some unclear risk of bias across studies (Figure 3) and caused no serious limitations for the quality of evidence. In two trials, the concealment of allocation was not described^{31,34}. Blinding of the participants^{26,28,35} and providers^{26,29,31,32} was not always feasible due to the nature of the interventions. The blinding of assessors was described in six trials^{26,29,30,33-35}. Three trials showed attrition rates of greater than 20%^{26,28,30}. An intention-to-treat analysis was stated to have been carried out in six trials^{26,28-30,32,33}. This implies that participants were kept in the intervention group to which they were randomized²¹. Four trials applied available case analysis^{26,28-30}, decreasing the power of the estimates but not affecting bias³⁸. Two trials used imputation for a limited number of missing cases evenly distributed over control and experimental groups. There were potential limitations, mainly arising from blinding, but these were unlikely to lower the confidence in the estimate of the effect. Two trials did not address our inclusion and exclusion criteria^{27,32}, but characteristics of the participants included in the analyses showed no information that was likely to lower the confidence in the estimate of effect. The treatment interventions in particular showed wide confidence intervals, which seriously weakened the confidence in the results, downgrading the quality rating by one level. There was no unexplained heterogeneity affecting the quality of the evidence. We could not use a funnel plot, and Duval and Tweedle's trim and fill method to detect publication bias could not be applied, as only nine trials were included²¹. Publication bias cannot be completely ruled out, but negative and positive trials were identified. The level of quality of evidence according to the GRADE approach was rated as moderate.

Figure 3. Risk of bias graph



DISCUSSION

Main findings

This meta-analysis, which summarises the results of nine trials, did not find a significant effect of preventive interventions on the reduction of maternal distress. We found a small but significant

effect of interventions offered to women who have maternal distress and women who are more likely to develop maternal distress as a result of predisposing factors.

Strengths and limitations

To our knowledge, a broad approach to examine various interventions and different constructs of maternal distress has not been used before. As a result of this approach a wide variety of interventions with different content have been combined. By pooling the interventions by intervention characteristics, function and aim (prevention and improvement or cure through treatment)^{14,15}, we believe we have been able to show the effects of interventions with a preventive and treatment function. The advantage of a broad approach is that it allows generalisability and consistency of findings to be assessed across a wider range of different settings, populations and behaviours²⁰. However, we limited our study to healthy low-risk women in developed countries, because we considered that maternal distress might be different in high-risk women or in women from developing countries and cultures. Our findings cannot be generalized to pregnant women belonging to these populations. Grimshaw claims that a broad approach is able to identify generalisable features in interventions³⁹. This was evident in our subgroup analysis, which showed that women who are more vulnerable to develop maternal distress benefit from antenatal interventions.

It has been suggested that compiling scores of different measurement instruments provides more stable and readily interpretable data²⁰. It can be argued, however, that a reliable compilation of scores will only be realised when cut-off points and time of assessment are consistently measured. A limitation of our broad approach is that the comparison of outcomes assessed by different measurement instruments can affect disparity in scores⁴⁰. Calculating change scores was not possible in this study as not all of the trials provided baseline information, or used the same measurement instrument at baseline and at the last study assessment. It is also difficult to assess the extent to which the obtained results reflect clinically objective changes in maternal distress, because of the nature of the predominantly self-reported outcome measures, although these measurement instruments are widely accepted and validated^{41,42}.

We did not include the different construct of maternal distress - depression, anxiety and stress - in our search strategy, and so might have missed studies in our search; however, we found studies including other constructs of maternal distress. The quality of evidence was rated as moderate, because of the imprecision of results created by wide confidence intervals, which lowered the rating of the quality of the evidence from an initial high-quality rating. The preventive and treatment interventions were clinically diverse. The treatment interventions contained smaller samples than the preventive interventions, thereby contributing to wide confidence intervals. The fact that it was not possible to combine many trials in the pooled treatment intervention group and the subgroup of selected women precluded the possibility of narrowing the confidence intervals. The use of a random-effects method in the meta-analysis may have contributed to the wide confidence intervals, whereas small trials gained more influence even though the effects are less precise²⁵. This suggests that some of the treatment interventions might work; however, the evidence remains inconclusive. The wide confidence intervals may have been the result of the small numbers: the subgroup analysis contained three trials selected retrospectively. The *post hoc* creation of the subgroup might contribute to false-positive findings, although they can have clinical meaning⁴³. Findings must be interpreted with caution.

It should be noted that, unlike treatment interventions, maternal distress scores above a

fixed cut-off point were not part of the inclusion criteria for preventive interventions ^{27-29,32,33,35}. The preventive interventions were offered to a general population of pregnant women with few if any symptoms of maternal distress at baseline measurement, who then experienced no effect of the interventions. This is congruent with the findings of a review of interventions for women showing no symptoms of maternal distress ⁴⁴. As the preventive interventions in this study had a population approach, it is known that these interventions have relatively small influence on the improvement of health ⁴⁵.

By way of contrast, and not surprisingly, all of the participants of the treatment interventions suffered from maternal distress prior to the intervention, as this was part of the inclusion criteria ^{26,30,31}. Treatment interventions offered to these women with elevated scores of maternal distress proved effective, with significantly reduced levels of maternal distress post-intervention.

The subsample of participants who were more vulnerable for developing maternal distress because of predisposing factors such as a low social economic status and low self-esteem ^{28,29,33}, showed a significant effect of interventions. In a large prospective study it was concluded that the women who are 'at risk' for developing maternal distress, might benefit most from interventions to prevent maternal distress ⁷. This seems congruent with our findings.

CONCLUSION

Results of the current study are informative and valuable to different groups of public health professionals. Our findings suggest that it does not seem effective to provide all pregnant women with preventive interventions. Instead, interventions may be offered to women who are more vulnerable to develop, or are already suffering from, maternal distress. In order to provide comprehensive clinical care, treatment, and adequate follow-up for women, the timely detection of potential predisposing factors and maternal distress in the antenatal period seems of importance. Screening methods could be considered as part of routine antenatal care ⁴⁶⁻⁴⁸.

In our review and meta-analyses we chose to adopt a broad approach, examining various antenatal interventions and different psychological constructs of maternal distress, including depression, anxiety, stress, mental wellbeing, distress, self-esteem, self-efficacy, fear and worry. Different measurement instruments were used to assess the different constructs. Measures of maternal distress should be multidimensional, given the increasing evidence that women experiencing maternal distress report more than one of the described symptoms ². A possible strategy for compiling the several dimensions of maternal distress in future studies is to use validated measurement instruments that measure more than one construct. The EPDS, for example, is validated to measure depression and anxiety simultaneously ⁴¹ and the Four-Dimensional Symptom Questionnaire (4DSQ) is validated to measure distress, somatization, depression and anxiety in pregnant women ⁴⁹.

As data continue to mount on the association between antenatal interventions and the reduction of maternal distress, there is a temptation to consider introducing maternal distress reduction interventions into clinical practice. However, this would be premature in the absence of evidence to identify the most effective antenatal interventions or effective elements of interventions. The evidence provided is inconclusive, and predominantly based on small samples. It is recommended that future research should involve the recruitment of larger samples. The use of treatment interventions and interventions for women with predisposing factors for the development of maternal distress are worthy of further research. This review and meta-analyses highlighted the

continuing need for further research in the area of antenatal interventions to reduce maternal distress to address the major gap in the literature on effective interventions. It should also be noted that the evidence was identified for short-term outcomes of maternal distress and further research is needed to evaluate longer-term outcomes.

Disclosure of interest

All authors declare that: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

Contribution of authorship

M.N. and M.A. designed the study and Y.F., M.N., and M.A. developed criteria for including studies. Y.F. and M.N. carried out the literature search and extracted data. Y.F. and L.B. performed the statistical analysis. Y.F. drafted the article. All authors interpreted the data, contributed to discussion, and reviewed or edited the article. All authors take responsibility for the integrity of the data and the accuracy of the data analysis. R.d.V. supervised the study and is guarantor.

Details of ethical approval

No ethical approval was required

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CHAPTER 5.

Dutch midwives' behavioural intentions of antenatal management of maternal distress and factors influencing these intentions: an exploratory survey

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ABSTRACT

Objective

To explore midwives' behavioural intentions and the determinants of these intentions with regard to the management of antenatal care of women with maternal distress.

Design

An exploratory survey using a questionnaire. Descriptive statistics calculated expanded Theory of Planned Behaviour (TPB) constructs, demographic information, personal characteristics and work related details. Multiple linear regression analyses were used to examine which factors influence midwives' intentions to provide antenatal care of maternal distress

Setting

Midwives working in Dutch primary care.

Participants

112 midwives completed the survey

Results

Midwives did not report a clear intention to screen for maternal distress (3.46 ± 1.8). On average, midwives expressed a positive intention to support women with maternal distress (4.63 ± 1.57) and to collaborate with other healthcare professionals (4.63 ± 1.57). Finding maternal distress an interesting topic was a positive predictor for the intention to screen ($B = .383$; $p = .005$), to support ($B = .637$; $p < .001$), and to collaborate ($B = .455$; $p = .002$). Other positive predictors for the intention to screen for maternal distress were years of work experience ($B = .035$; $p = .028$), attitude about the value of screening ($B = .326$; $p = .002$), and self-efficacy ($B = .248$; $p = .004$). A positive attitude toward support for women with maternal distress ($B = .523$; $p = .017$) predicted the intention to support these women. Number of years of work experience ($B = .042$; $p = .017$) was a positive predictor for the intention to collaborate with other healthcare professionals.

Key conclusions

The intention to screen for maternal distress was less evident than the intention to support women with maternal distress and the intention to collaborate with other healthcare professionals. Important factors predicting the midwife's intention to screen, support and collaborate were finding maternal distress an interesting topic, years of work experience, attitude about the value of screening and support, and self-efficacy about screening.

Implications for practice

To provide care involving all three components of antenatal management of maternal distress implies efforts to influence the factors that predict the intention to screen, to support women with maternal distress and the intention to collaborate with other healthcare professionals.

INTRODUCTION

Maternal distress involves a wide spectrum of different psychological and emotional problems that may manifest during the distinct period of maternal transition, including pregnancy, birth and the postnatal period. These psychological and emotional problems are most commonly referred to as depression, anxiety and stress, worry and fear ¹⁻³, and range from a disbalanced emotional and psychological homeostasis to disturbed psychosocial functioning ^{1,2}, but exclude psychiatric pathology ³. Maternal distress can be related to pregnancy and its accompanying maternal role development, or other obstetric related factors such as a previous traumatic birth experience, miscarriage or assisted conception ^{2,4}. Maternal distress can also be caused by non-pregnancy or birth related factors such as previous or current mental health problems, stressful life events, low self-esteem or inadequate social support ⁴.

Worldwide rates of maternal distress during and after pregnancy vary between 10% and 41% depending on definition ⁵. Maternal distress is an important public health issue as it can have extensive immediate and long-term adverse consequences for women, children, and their families. It can increase the risk of obstetric complications ⁶⁻⁸, affect infant and child neurobehavioral and cognitive development ⁹⁻¹¹, contribute to absence of work ¹², result in severe and/ or chronic maternal mental health problems ^{4,13}, and even lead to suicide ^{14,15}.

Maternal distress has been identified as one of the major concerns for perinatal health in the Netherlands ¹⁶. Midwives have explicitly been appointed as promoters of maternal mental health ¹⁷ as about 80 percent of pregnant women start their care with midwives in primary care ¹⁸. Midwives now have a more extended public health role, but their responsibilities in relation to mental health promotion have not been articulated ¹⁷. When maternal distress is present during pregnancy, follow-on care can be provided by the referral of the woman's General Practitioner to a psychologist or psychiatrist if necessary ^{19,20}. The severity of maternal distress and the judgment and advice of the lead-medical specialist and the teratogen effect of use of medication during pregnancy, determines whether the midwife will be the woman's lead-carer during the childbirth period ²¹. Hence, the midwife can be faced with various levels of severity of maternal distress.

Currently many women with maternal distress remain 'under the radar' and the provision of care is thus often inadequate ²⁰. The Dutch Royal Organization of Midwives (KNOV) has published a Quality Standard for antenatal care, including descriptive information for providing psychosocial care ²². The Quality Standard of the Dutch College of General Practitioners (NHG) for shared maternity care between General Practitioners (GP) and primary care midwives is also available. This Quality Standard includes recommendations for collaboration and consultation between midwife and GP for maternal mental health and wellbeing ²³. Both Quality Standards describe the elements of management of care: screening and assessment; mental health information and psychosocial support; transfer of information, consultation of, and referral to other healthcare professionals ^{22,23}, but are by no means best-practice guidelines. Recently an antenatal assessment tool for psychological health to be used by primary care midwives, the Four-Dimensional Symptom Questionnaire (4DSQ), has been validated, but has not been implemented ³.

Despite the available documents, midwives have reported insufficient awareness and understanding of maternal distress, and uncertainty about their specific role and responsibilities in providing adequate care for women with maternal distress ²⁴. In response to this the Project "Promoting Healthy Pregnancy (2011- 2015)" has been established. This four-year project aims to develop an antenatal intervention for primary care midwives to reduce maternal distress. To achieve a reduction of maternal distress we need to base the intervention on an understanding of the factors

that can lead to positive changes in maternal distress, including midwives' behaviour with regard to this aspect of care ²⁵. If we want to achieve a change in the behaviour of midwives, firstly we need to look at whether midwives are willing to take on the role and responsibilities in relation to maternal mental health promotion and thus the reduction of maternal distress ²⁶.

There is a breadth of literature about midwives' behaviour in relation to antenatal management of care of maternal distress and underlying factors influencing this care ²⁷⁻³². We know however, very little about midwives' willingness to provide antenatal management of maternal distress and what factors influence their willingness, as this has never been thoroughly studied. We do have some preliminary insight in the beliefs of Dutch midwives with regard to maternal distress, based on semi-structured interviews with Dutch primary care midwives ³³. The salient belief was that maternal distress is a serious problem and midwives wished to contribute to a positive change for women with regard to this problem. Midwives were not truly convinced if they could, or how they could make an effective difference. Beliefs seemed to be affected by practice experience, midwives' interest in maternal distress, finding maternal distress an important issue in midwifery care, and personal and professional experience with the topic. Midwives also expressed that view of their professional remit, professional identity and their sense of responsibility and competence, and confidence, ability, and willingness to address maternal distress affected their beliefs. Barriers to changing practice that were mentioned, included lack of education, perceiving maternal distress as complex, lack of time and resources, lack of guidelines for screening, and limited insight in clinical pathways ³³. Ross-Davie et al. ²⁶ concluded from their survey, including a sample of 187 hospital-based midwives of the Inner London Trust, that midwives are willing to take on a more developed public health role in relation to mental health but midwives expressed the need for education and involvement of other (mental health) healthcare professionals for follow-on care in order to do so.

We conducted this study in order to gain familiarity with, and to increase insight in midwives' willingness for the provision of antenatal care in relation to maternal distress and what factors influence their willingness. With this study we want to begin to develop baseline quantitative data of midwives' antenatal management of maternal distress. Our study aims to explore the behavioural intentions of midwives for antenatal management of maternal distress and examines the factors that influence those intentions. In order to fulfil this purpose indicated above, we sought answers to the following core questions:

- How are midwives' behavioural intentions of antenatal management of maternal distress?
- Which underlying factors influence midwives' intention to provide antenatal care of maternal distress?

Our study uses the Theory of Planned Behaviour (TPB) as a theoretical starting point. TPB has been used to examine a wide variety of different health professionals' behaviours and their intentions ^{25,34,35}. Behavioural intention has the potential to change clinical behaviour ^{32,35,36} and has been identified to form the basis for interventions ³⁶. Because maternal distress seems to be a fairly new aspect of care and in development ^{17,26,29} we have therefore chosen behavioural intention as the focus of our study as intention precedes behaviour ³⁵. Self-reported behavioural intention is known to be a reliable source to reflect actual behaviour as it is less influenced by situational elements of clinical practice in comparison to self-reported behaviour ^{37,38}.

According to TPB, behaviour is directly driven by 'intention', an authentic and intrinsic

motivator of one's behaviour ³⁵. Behavioural intention is, in turn, influenced by the constructs of attitude, self-efficacy (perceived control) and social norm. Attitude is the degree to which an individual has a (un) favourable evaluation of the behaviour in question. Self-efficacy describes the perceived confidence and ease (or difficulty) an individual has for performing the desired behaviour. Subjective norm measures the perceived pressure from others to be motivated to engage or not to engage in the behaviour ^{37,38}. Personal norm has also been identified as contributing to behavioural intention. It measures the self-identity and underlying moral referents an individual has about performing or not performing certain behaviour and one's willingness to comply with those referents ³⁴. Armitage and Conner ³⁴ performed a meta-analysis that showed that the 'subjective norm' rarely relates to, or predicts the behavioural intention and leading them to support use of the 'personal norm' rather than subjective norm in the TPB model. Together, attitudes, self-efficacy and personal norm are held to determine intentions to act.

METHODS

Design

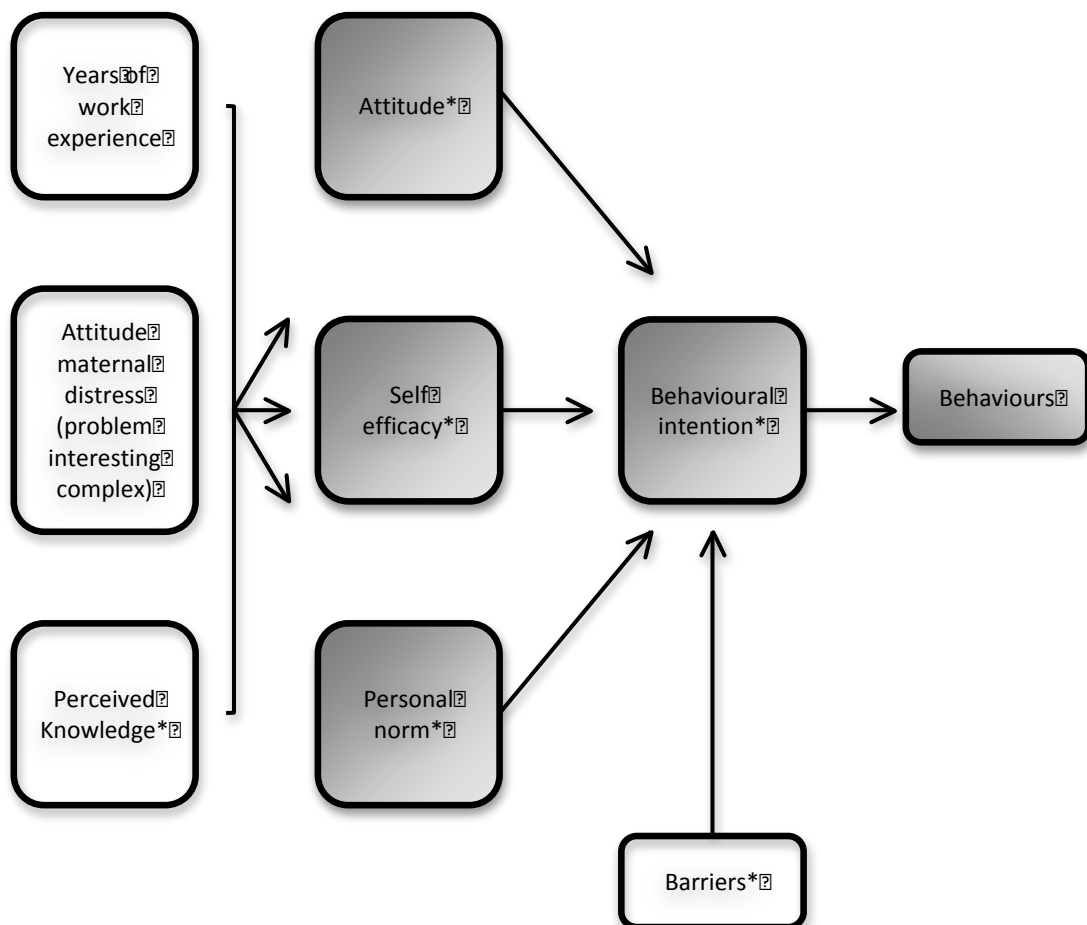
An exploratory survey was used in this study. A questionnaire was developed for the study. The framework of the questionnaire was structured on guidelines ³⁹⁻⁴¹ and Quality Standards ^{22,23} of antenatal management of maternal distress, in which midwives are appointed as target users. Three key components emerged: screening, support and collaboration. Screening contained the use of a measurement instrument ^{39,41}. The component support contained aspects of management, information and needs assessment ^{22,40-42}. Collaboration consisted of consultation, transfer of information and referral to other healthcare professionals ^{23,39-41}.

On the basis of theoretical considerations ^{26,33,34} we created *a priori* a model with meaningful factors related to the behavioural intentions of screening, support and collaboration. These included: the TPB constructs behaviour, intention, attitude, self-efficacy (perceived control), and personal norm in relation to screening, support and collaboration. We expanded the TPB constructs with midwives' years of work-experience, attitude towards maternal distress and perceived knowledge and barriers of the components screening, support and collaboration. See Figure 1 for the expanded TPB model.

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Figure 1. Expanded TPB model



* Measured per component: screening, support, collaboration

 Original TPB model

 Included in analyses

Ethical considerations

The research ethics committee for higher education of the Dutch province of Limburg reviewed and approved our research protocol.

Participants and setting

The study included Dutch midwives based in the community. Qualified midwives working in a primary care setting in the Netherlands were eligible for the study. These midwives are the responsible professional for women with a physiological pregnancy and birth^{21,43}.

We invited midwifery practices ($n = 163$), derived from the clinical placement record for midwifery students from our Faculty of Midwifery Education & Studies, to join our study. These practices are located in the Southern and central parts of the Netherlands. An announcement of the study was sent by email, informing midwives about the forthcoming study and that an invitation for participation would follow. This invitation was emailed two weeks later and included a link to the digital questionnaire. Invitations were addressed to practices. The reader was asked to distribute the invitation to individual midwives in the practice, as more than one midwife per practice were welcome to participate. After three weeks, a reminder was sent to the practice via email. To reach as much midwives as possible we also invited midwives to participate through the June 2012 newsletter of the KNOV, monthly digitally distributed amongst their members. Members of the KNOV include about 2600 practising midwives⁴³ and could be located in any region in the Netherlands. An explanation of the study was given in the announcement and midwives were invited to participate. A reminder notice with an invitation was placed in the subsequent issue. The link to the questionnaire was included in both these announcements. Participation was regarded as consent and the survey was anonymous.

Because of the exploratory character of the study, a sample size calculation was not required⁴⁴. The data were collected during the summer and we therefore anticipated a minimum of one response for each practice, with an upper limit of three responses per practice. To raise the response rate, participants could opt to take part in a raffle of gift vouchers.

Instrument

A self-completion questionnaire was developed for the purpose of the study. The questionnaire contained demographic information, personal characteristics (*i.e. age, years of work experience, education*) and work related details (*i.e. practice size, caseload*). Items according to the expanded TPB model were included and grouped in three components: screening, support and collaboration. We measured the behavioural intention of each key component with one item as this makes the intention more concrete for the respondents⁴⁵. We calculated Cronbach's alpha coefficients to measure internal consistency for constructs containing three or more items: screening behaviour (4) $\alpha = .70$, personal norm screening (3) $\alpha = .79$, supportive behaviour (5) $\alpha = .69$, attitude support (4) $\alpha = .86$, self-efficacy support (8) $\alpha = .76$, personal norm support (3) $\alpha = .84$, barriers support (3) $\alpha = .67$, collaborative behaviour (9) $\alpha = .70$, attitude collaboration (3) $\alpha = .83$, self-efficacy collaboration (3) $\alpha = .70$, personal norm collaboration (3) $\alpha = .81$, barriers collaboration (4) $\alpha = .69$. Internal consistency was acceptable for the constructs with a Cronbach's alpha coefficient of $>.60$. Corrected Item-Total correlation of the constructs were all $>.3$, increasing reliability⁴⁶.

A unipolar 7-point Likert response scale (1 – 7) was used with the extremes labeled 'I never do this – I always do this' (behaviour), 'strongly disagree – strongly agree' (self-efficacy, barriers), 'very unimportant – very important' (attitude, personal norm), 'definitely not effective – definitely

effective' (attitude), and 'I definitely intend not to – I definitely intend to' (intention). We hypothesised *a priori* that midwives with negative and limited experiences with maternal distress would have less positive answers. An increased number of response categories as a 7-point response scale, increases reliability of the scale used ⁴⁷.

To ensure validity, the questionnaire was pre-tested by practising midwives ($n = 7$) and midwifery lecturers ($n = 7$) using cognitive interviewing ⁴⁸. They applied the following criteria: (i) relevance of items to antenatal management of maternal distress, (ii) importance of items to antenatal management of maternal distress, (iii) the focus of items, and (iv) comprehensibility. Pre-testing resulted in deletion of repetitive and inaccurate questions, the rephrasing of ambiguous and inarticulate questions, revisions in wording and question ordering. The emerging questionnaire was checked and approved by the midwives who had pre-tested the questionnaire. This resulted in minor amendments of wording. Ten fourth-year midwifery students, pilot tested the questionnaire for wording, question order, and time for completion. Minor adjustments of wording and question ordering took place after we regarded the questionnaire as final. The questionnaire took 15 minutes (range 10-20 minutes) to complete. The questionnaire is available in English from the corresponding author.

Data analysis

For our analysis we used the questionnaires filled out by the midwives. Data entry and analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 19.0. Mean sum scores were computed for two or more items belonging to the same construct. We calculated descriptive statistics for individual and summed items and for the demographic information, personal characteristics, and work-related details. Normality of distribution was visually interpreted with the graphical tests: histograms and Q-Q plots. A total number of sixteen items showing a visual non-normal distribution were removed for analysis: four items from the 'screening' component, five from 'support', and seven from 'collaboration'. This resulted in one remaining item for perceived knowledge, attitude and self-efficacy for the component screening, and one item for perceived knowledge for the components support and collaboration. There was multicollinearity ($r > .9$) ⁴⁶ between age and years of work experience ($r = .908$ $p < .001$). We decided to include years of work experience as an independent variable rather than age. We measured the degree of relationship between screening behaviour, supportive behaviour and collaborative behaviour, and the matching intentions with Pearson's correlations (two-tailed): screening ($r = .34$ $p < .001$), support ($r = .24$ $p = .012$), and collaboration ($r = .24$ $p = .013$). $P < 0.05$ was accepted as statistically significant.

As the variables were continuous, multiple linear regression analysis was used to examine the relationship between the dependent variable and the multiple independent variables, in order to make assumptions about the factors predicting behavioural intentions of antenatal management of maternal distress ⁴⁶. We conducted three separate analyses for the key components screening, support and collaboration with the behavioural intention of each construct as dependent variable. The independent variables were operationalised using the following variables: perceived knowledge, barriers, attitude, self-efficacy (perceived control) and personal norm in relation to screening, support and collaboration and work-experience and attitude towards maternal distress (maternal distress is a problem; interesting topic and; a complex issue). Figure 1 shows the variables included in the analyses.

RESULTS

A number of 118 midwives responded and completed the questionnaire of which 112 completed questionnaires were included. Six of the questionnaires were completed by hospital-based midwives and were excluded. We explored midwives' intentions of antenatal management of maternal distress and examined the underlying influencing factors.

Characteristics of the respondents

The mean age of the respondents was 36.12 ($SD = 10.03$) ranging from 22 to 62. The mean years of working experience was 11.76 ($SD = 9.44$) ranging from half a year to 41 years of experience. The average annual caseload per midwife was 82.29 ($SD = 21.18$) ranging from 40 to 150. Most midwives worked in a practice with three to four midwives ($n = 54/48.2\%$) compared to practices with five or more midwives ($n = 35/31.3\%$), duo practices ($n = 15/13.4\%$) and solo practitioners ($n = 8/7.1\%$). Most midwives ($n = 46/41.1\%$) identified work-experience as the main knowledge source for maternal distress opposed to seminars and congresses ($n = 39/34.8\%$), pre-registration education ($n = 20/17.9\%$), and experiences in personal life ($n = 7/6.3\%$). In table 1 descriptive statistics are given of the constructs included in the analyses.

Table 1. Descriptive statistics of the variables of the components screening, support and collaboration

VARIABLE	Mean ($\pm SD$)
SCREENING	
Intention screening (use of screening instrument) for maternal distress	3.46 (± 1.8)
Attitude value screening	4.13 (± 1.6)
Self-efficacy screening	3.07 (± 1.84)
Personal norm screening	5.39 (± 1.12)
Barriers screening	5.31 (± 1.11)
Feeling knowledgeable about screening for maternal distress	5.08 (± 1.37)
SUPPORT	
Intention supporting women with maternal distress	4.63 (± 1.57)
Attitude value support	5.65 (± 0.93)
Self-efficacy support	5.35 (± 0.74)
Personal norm support	5.43 (± 1.2)
Barriers support	4.34 (± 0.86)
Feeling knowledgeable about supporting women with maternal distress	5.41 (± 0.96)
COLLABORATION	
Intention to collaborate with other healthcare professionals about maternal distress	4.63 (± 1.57)
Attitude value collaboration	5.21 (± 1.34)
Self-efficacy collaboration	5.5 (± 0.93)
Personal norm collaboration	5.41 (± 1.14)
Barriers collaboration	5.74 (± 0.73)
Feeling knowledgeable about collaboration for maternal distress	5.58 (± 1.16)
ATTITUDE MATERNAL DISTRESS	
Maternal distress is a problem	6.17 (± 0.89)
Maternal distress is an interesting topic	5.75 (± 1.23)
Maternal distress is a complex issue	5.98 (± 1.0)

Note: 1 reflects a negative value, 7 reflects a positive value, 4 is the neutral value

Multiple linear regression analyses

Three separate multiple linear regression analyses were performed per key component: screening,

support and collaboration. The multiple linear regression analysis performed to examine the factors that predict the behavioural intention to *screen* for maternal distress showed four significant determinants that had a positive relationship to the intention. These determinants were years of work-experience ($B = .035$, $p = .028$), finding maternal distress an interesting topic ($B = .383$, $p = .005$), attitude toward screening ($B = .326$, $p = .002$) and self-efficacy ($B = .248$, $p = .004$) (Table 2).

The multiple linear regression analysis performed to explore the factors that predict the behavioural intention to *support* women with maternal distress showed two significant determinants with a positive relationship to this intention. These were finding maternal distress an interesting topic ($B = .637$, $p = <.001$) and attitude toward support ($B = .523$, $p = .017$) (Table 3).

The multiple linear regression analysis performed to explore the factors that determine the behavioural intention to *collaborate* with other healthcare professionals with regard to maternal distress showed two significant determinants with a positive relationship. These determinants were years of work experience ($B = .042$, $p = .017$) and finding maternal distress an interesting topic ($B = .455$, $p = .002$) (Table 4).

Table 2. Multiple linear regression analysis of the intention to *screen* for maternal distress (MD)

Factors	B	t	p -value	95,0% Confidence Interval for B	
				Lower Bound	Upper Bound
(Constant)	-1.660	-1.107	.271	-4.634	1.315
Work experience (in years)	.035	2.226	.028*	.004	.065
MD is a serious problem	-.086	-.494	.622	-.430	.259
MD is interesting	.383	2.851	.005*	.117	.649
MD is complex	-.050	-.346	.730	-.335	.236
Attitude screening	.326	3.216	.002*	.125	.528
Feeling knowledgeable to screen	-.043	-.381	.704	-.265	.180
Self-efficacy screening	.248	2.982	.004*	.083	.413
Personal norm screening	.132	.769	.443	-.209	.474
Barriers screening	.132	.916	.362	-.154	.418

Dependent variable: Intention screening for maternal distress

$R^2 = 0.385$

Note: * significance at $p < .05$

Table 3. Multiple linear regression analysis of intention to *support* women with maternal distress (MD)

Factors	B	t	p -value	95,0% Confidence Interval for B	
				Lower Bound	Upper Bound
(Constant)	-1.959	-1.158	.250	-5.314	1.397
Work experience (in years)	.023	1.525	.130	-.007	.053
MD is a serious problem	-.019	-.121	.904	-.327	.289
MD is interesting	.637	4.568	.000*	.360	.913
MD is complex	.045	.325	.746	-.231	.322
Attitude support	.523	2.438	.017*	.097	.949
Feeling knowledgeable to support	-.151	-1.341	.183	-.375	.072
Self-efficacy support	-.218	-.805	.423	-.754	.319
Personal norm support	.103	.570	.570	-.256	.463
Barriers support	.154	.954	.343	-.167	.475

Dependent variable: Intention supporting women with maternal distress

$R^2 = 0.337$

Note: * significance at $p < .05$

Table 4. Multiple linear regression analysis of the intention to *collaborate* with other healthcare professionals for maternal distress (MD)

Factors	<i>B</i>	<i>t</i>	<i>p</i> -value	95,0% Confidence Interval for <i>B</i>	
				Lower Bound	Upper Bound
(Constant)	-3,190	-1,857	.066	-6,597	.217
Work experience (in years)	.042	2.428	.017*	.008	.076
MD is a serious problem	.225	1,247	.215	-.133	.582
MD is interesting	.455	3,174	.002*	.171	.740
MD is complex	.020	.133	.894	-.283	.324
Attitude support	.097	.546	.586	-.255	.448
Feeling knowledgeable to support	.034	.209	.835	-.286	.354
Self-efficacy support	.038	.171	.865	-.402	.478
Personal norm support	.312	1.538	.127	-.090	.715
Barriers support	.039	.203	.839	-.344	.423

Dependent variable: Intention collaboration with other healthcare professionals for maternal distress

$R^2 = 0.275$

Note: * significance at $p < .05$

DISCUSSION

Our study explored the behavioural intentions of midwives for the antenatal management of maternal distress, including screening, support and collaboration, and explored the factors that predict those intentions by performing multiple linear regression analyses. On average the intention of midwives in our study to implement screening was below the neutral score whereas the intentions for support and collaboration of women with maternal distress were above average. We found that ‘finding maternal distress an interesting topic’ is a determinant that was positively related to the behavioural intentions of all three components screening, support and collaboration. Interest is regarded to be vital for engagement in clinical practice and explicitly to antenatal screening of maternal distress⁴⁹. Interest can predict motivation and willingness, long-term involvement but also the intensity of performing clinical practice and the development of skills and professional commitment⁵⁰.

The low scores of intention of midwives in our study to implement screening suggest that Dutch midwives are not currently motivated to begin screening for maternal distress. Similarly, self-efficacy for screening was on average below the neutral score of 4, and the midwives’ attitude to screening was only marginally above neutral. We know that self-efficacy and attitude toward screening are significant predictors of the intention to screen for maternal distress. Midwives’ perceived low confidence in their ability to use a screening instrument for maternal distress and their perception of the difficulty of using a screening instrument for maternal distress, compromises their motivation to screen^{31,49,51,52}. Self-efficacy and attitude are appointed as influential factors to motivation and willingness⁵⁰, which seems to be congruent with our findings of behavioural intention towards screening.

Our findings also showed that midwives felt fairly knowledgeable about screening. Although it has been suggested that knowledge about screening enhances self-efficacy and has a positive impact on midwives’ attitude to screen during the antenatal period^{27,30-32,52}, this was not confirmed in our findings. Screening for maternal distress is often not part of the curriculum of midwifery education²⁶ and midwives may overestimate their knowledge about screening for maternal distress or lack a realistic view of that knowledge because of the deficit in education for the detection of maternal distress^{26,31}. The absence of Dutch guidelines could also explain why the intention to screen and attitude and self-efficacy with regard to screening are low^{30,49}.

The low scores of the intention to screen, in contrast to support and collaboration, may be explained by the fact that the extended public health role of the midwife is not yet fully accepted by midwives. Midwives in our study reported fairly high scores of self-efficacy and attitude to support and collaboration. It is plausible that midwives who completed the survey perceived themselves to be more competent in supporting women experiencing maternal distress, and in collaboration with other healthcare professionals than midwives who did not participate in the survey. Although risk selection seems to be a core competency for midwives ²¹, our findings suggest that screening for maternal distress seems a relatively new and poorly developed skill. It could be that low scores of the intention to screen can be partly explained by limited experiences of midwives with screening, as we *a priori* hypothesised.

Number of years of work experience was a positive predictor for the intention to screen and to collaborate with other healthcare professionals. In our sample, the average age of the participants was 36 years; most had worked as a midwife for many years and indicated that work experience served as their main source of knowledge about maternal distress. It has been suggested that midwifery education does not provide sufficient knowledge and skills to care for women with maternal distress ²⁶, which seems congruent with the fact that the midwives in our study described work experience as their main source of knowledge. Years of work experience showed a relationship with the individual midwife's management of care for women with maternal distress with regard to detection and follow up care ⁴⁹. This is also congruent with our findings. The fact that years of work experience played a significant role may be explained by the way a newly qualified midwife develops as a professional. The development of practical competencies with regard to the woman's and babies physical wellbeing, likely has priority above the woman's emotional wellbeing for newly qualified midwives ⁵³. In our study the midwives had an average of almost 12 years of work experience. In a study with a similar number of years of work experience it was reported that, regardless of the years of practice, training was needed to be able to recognise and detect maternal distress, to provide adequate and up-to-date care and for a good understanding of referral pathways ³¹. It is unknown what younger, less experienced midwives who may have had more recent up-to-date education, would have reported; our sample was too small to analyse this group separately.

The explanatory strength of the regression models for screening and support were rather high and for collaboration the explanatory strength was moderate. This implies that the variables chosen are very likely to predict behavioural intentions of midwives with regard to care for women with maternal distress ⁴⁶. The behavioural intentions in our study were partly predicted by factors included in our *a priori* expanded TPB model. A recent survey found that TPB is able to explain intention but that relevant expansion of the existing TPB model allows an even better understanding of behavioural intentions, and how this can subsequently influence behaviour change ³⁵.

It seems that if we want midwives to provide the complete package of antenatal management of maternal distress, this implies efforts to change the intention to screen and to sustain or improve midwives' intentions to support women with maternal distress and to collaborate with other healthcare professionals. In order to influence intentions their significant predictors need to be addressed. To influence attitude, interest and self-efficacy, education of theory and skills training of screening, and the evaluation of practical requirements to provide antenatal management of maternal distress, can be recommended ^{25,32,54}. Years of work experience itself can not be influenced but sharing experiences of maternal distress with less experienced midwives through discussion of clinical cases and evaluating the curricula of pre-registration and on-going midwifery education, considering implementation of practice experience in the mental health area to increase experience,

can be recommended ^{25,54,55}.

Limitations of our study are associated with the questionnaire, sampling and generalisability. The questionnaire was developed for the purpose of this study and thus had not been validated previously. The questionnaire showed robustness as we used an *a priori* model based on theory, grouped into three conceptually meaningful components: screening, support and collaboration ³⁵. Deletion of items as a result of non-normal distribution resulted in single item constructs. Although Cronbach's alpha coefficients of the multiple item constructs were acceptable, single items affect reliability ⁵⁶. Although reliability and validity have been assessed, we did not know if the items included for analyses reflected the full context of the components. We did not have enough respondents for factor analysis to assess if the items of the components screening, support and collaboration measured the same underlying dimension ⁴⁶. Findings should therefore be interpreted with caution and repeated use of the questionnaire in larger samples, including factor analysis to determine dimensionality of the items is recommendable.

The sample was smaller than originally anticipated. It is plausible that midwives who completed the survey had a particular interest in the emotional aspects of care and might have possessed positive attitudes towards maternal distress. The midwives in our study were slightly older, had slightly more work experience and a smaller caseload than the average practising Dutch midwife ⁵⁷. Non-responders may have differed in their intentions, attitude to maternal distress, attitude to screening, support and collaboration, self-efficacy and personal norm from midwives who responded and therefore including larger samples can be recommended. Findings of this study may not accurately represent the general population of midwives. Data are not available on midwives who did not participate. Nevertheless, despite these limiting effects most of our results are in line with findings of prior studies.

Acknowledgements

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CHAPTER 6

Using Intervention Mapping for systematic development of a midwife-delivered intervention for prevention and reduction of maternal distress during pregnancy

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ABSTRACT

The authors describe how Intervention Mapping was used to develop a midwife-led intervention to prevent or reduce maternal distress during pregnancy. An extensive needs assessment showed that both pregnant women and midwives needed to be taught to recognise the vulnerability for developing maternal distress during pregnancy and how to identify maternal distress when it occurs. In addition to these mutual learning needs, women needed to learn to disclose their problems, how to handle maternal distress in their daily lives, and the value of seeking help when necessary. Midwives needed to prepare themselves to provide (collaborative) care for maternal distress. Screening and psycho-education were pathways to support self-disclosure, self-management, mobilizing support and treatment of maternal distress. Theory-based methods – such as tailoring, communicative support, individualization, advance organisers, cultural similarity, consciousness raising, elaboration, and cue altering – were built into a web-based tailored program for women. Information processing, intergroup dialogue training, verbal persuasion, providing cues, facilitation of means, and structural organization were the theory-based methods that were built into a training program and a toolbox for the midwife-delivered program. The program was introduced by means of the training given to midwives from 17 midwife-led practices in the Netherlands. Finally, process and effect evaluations were planned.

INTRODUCTION

Maternal distress is a major concern for perinatal health in the Netherlands ¹ and elsewhere ². We define maternal distress as a spectrum consisting of a variety of psychological constructs that occur during the antenatal period, including depression, anxiety in general and specifically related to pregnancy, and excluding psychiatric pathology ³. Maternal distress can be the result of pregnancy or birth or other non-pregnancy related experiences in a woman's past or present life ⁴⁻⁷. It varies in severity from stress, worry, and concerns to more serious feelings of unhappiness, anxiety and/ or depression ⁸. Maternal distress has shown to have adverse consequences for women, children and their families, including obstetric complications, severe long-term maternal mental health problems and neuro-behavioural and cognitive development problems in children ^{2,9,10}. The worldwide prevalence of maternal distress varies, depending on definition, from 10 to 41% ¹¹. Given the prevalence and severe consequences of maternal distress it is imperative that caregivers have an effective strategy for managing maternal distress.

A recent meta-analysis of antenatal interventions to reduce maternal distress showed that only a few were effective ³. The meta-analysis included both preventive interventions ($n = 6$) and treatment interventions ($n = 3$) of moderate quality, according to Cochrane standards for quality assessment ^{3,12}. The results showed that preventive interventions targeted at pregnant women without symptoms of maternal distress did not have a significant effect in reducing maternal distress. This was in line with the review of interventions that was done to underpin the NICE guideline for management of antenatal and postnatal mental health ¹³. However, the meta-analysis showed small but significant effects for interventions that aimed at women suffering from maternal distress ($n = 270$; SMD -0.29; 95% CI -0.54 to -0.04). Women that were more vulnerable for maternal distress as a result of predisposing factors such as low socio economic status or low self-esteem were also helped by an intervention ($n = 1410$; SMD -0.25; 95% -0.37 to -0.14) ³. These findings suggest that future interventions must consider screening methods to target women that are more prone to develop or already suffer from maternal distress, as opposed to a population approach that is known to generate only little influence on the improvement of health ¹⁴. Given the paucity of effective interventions, we have begun to work on developing an evidence-based intervention focused on screening and support of pregnant women in midwife-led care more likely to develop or experiencing maternal distress. In the Netherlands the primary caregiver for most pregnant women is the midwife: in 2013 85% of pregnant women started their care with midwives in primary care ¹⁵.

We used 'Intervention Mapping' (IM) - a stepwise approach for theory and evidence-based program development, implementation, and evaluation - to guide the development of our intervention. Intervention Mapping combines theoretical evidence with practical information from stakeholders (e.g. pregnant women, midwives, psychologists) ¹⁶. The great advantage of this procedure is that program materials are not only tailored to the target group (pregnant women), but also to the needs, abilities and possibilities of the program implementers (midwives) ¹⁷. This seems especially important since midwives differ in willingness and perceived self-efficacy regarding management of maternal distress. In a previous study we showed that midwives were less willing to screen for maternal distress than they were to provide support to women experiencing maternal distress ¹⁸.

Intervention Mapping ¹⁶ consists of six steps, starting with a needs assessment that offers an extensive description of the problem (step 1). This first step describes the health problem, impact on

quality of life, behavioural and environmental causes, and the determinants of these causes. In the second step the target groups are identified and important and changeable objectives are determined. This results in the creation of matrices of change objectives that define the aims and the content of the intervention at the level of the determinants. Step 3 identifies the behavioural and environmental change methods and operationalizes them by developing practical applications that fit both the context and the target population. In the fourth step, program materials are produced and pre-tested among relevant stakeholders. To optimize adoption and implementation, steps 2 and 3 are repeated with a specific focus on the objectives and determinants of implementation. The result of step 5 is a theory-informed implementation plan. Finally, in step 6, an evaluation plan is designed. While it is presented as a linear six-step model, Intervention Mapping is an iterative and dynamic process where new insights may require a reassessment and adaptation of previous steps.

In this article we describe the systematic development of *WazzUp Mama?!* , an intervention for the prevention and reduction of maternal distress among pregnant women in midwife-led care. Midwife-led care in the Netherlands is offered to women with healthy pregnancies with a minimum of health and/ or obstetric risks that do not require specialized medical care. We present the content of each of the steps, describing how we carried out the development of the *WazzUp Mama?!* intervention.

INTERVENTION MAPPING STEPS 1-6 IN THE DEVELOPMENT OF *WazzUP Mama?!*

Step. 1 Needs Assessment

A needs assessment is the first step in the development of an intervention. There are two ways to accomplish this: the expansionist and reductionist. The first approach is used when the health problem is identified and its relation with quality of life has been assessed. In this case, the aim of a needs assessment is to gain insight into the factors that influence the health problem being addressed. When little is known about the health problems that influence the target's population's quality of life, the reductionist approach to needs assessment is used ¹⁹.

Application

In our study, the expansionist approach was used, since the health problem 'maternal distress' was already well identified. We conducted the needs assessment using an integrative review and two additional studies exploring (1) occurrence and vulnerability of maternal distress, and (2) midwives' behavioural intentions regarding management of maternal distress.

The integrative review was conducted using the PRECEDE-phases of the PRECEDE-PROCEED model as a guide, as described in detail elsewhere ²⁰. PRECEDE is an acronym for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation. It includes four phases focusing on a social and epidemiological assessment (phase 1 & 2), an aetiological assessment (phase 3) and an educational and ecological assessment (phase 4) ¹⁹. The review showed that maternal distress is a multi-dimensional concept that refers to a range of psychological complaints and symptoms during pregnancy, birth and the postnatal period ²⁰. Levels of maternal distress vary from daily worries and mild psychosocial disharmony to disturbed psychosocial functioning ^{8,21,22}. The most often mentioned constructs used to assess maternal distress were depression, stress, anxiety and pregnancy-related anxiety ⁸. This definitional variety makes it difficult to acquire prevalence rates that specifically focus on maternal distress.

In order to measure prevalence rates, we conducted a cross-sectional survey among

pregnant women eligible for midwifery care ⁷. A total of 458 women (response rate 85%) filled out a questionnaire focusing on the occurrence and vulnerability to maternal distress. Using Dutch translated versions of the Edinburgh Depression Scale ²³, State-Trait Anxiety Inventory ²⁴, and the Pregnancy Related Anxiety Questionnaire ²⁵ assessed maternal distress. A score above cut-off points - based on Dutch validation studies ²⁶⁻²⁸ - on one or more than one of these measures was considered as heightened levels of maternal distress. Using this measure, we found that 21.8% of the respondents had heightened levels of maternal distress. We studied women's vulnerability to maternal distress, and gained insight into aetiological (personal characteristics, history and personal circumstances, behaviour, and environment), and educational and ecological factors (predisposing, reinforcing and enabling), derived from PRECEDE phases 3 and 4 that resulted from the preceding integrative review ²⁰.

Because our aim was to develop an intervention for women with healthy pregnancies in midwife-led care, it was necessary to study the factors among a representative sample of Dutch pregnant women. In our study ⁷ we identified the following factors as predictors of maternal distress: history of psychological problems, having young children, daily stressors, avoidant coping, somatisation, and negative feelings towards upcoming birth. Self-disclosure, acceptance of the situation, and help-seeking were identified as effective coping-styles in preventing maternal distress.

When developing an intervention to address maternal distress, it is necessary to understand the behaviour of those who deliver care ^{16,29}. In the Netherlands the primary and most important caregiver in pregnancy is the midwife ¹⁵. Therefore, we began with semi-structured interviews among a sample of midwives ($n = 6$) giving us preliminary insight in the beliefs of Dutch midwives with regard to maternal distress ³⁰. The results from these interviews, together with a literature review, served as a basis for a subsequent survey among 112 Dutch midwives, exploring their behavioural intentions regarding antenatal management of maternal distress and the factors influencing those intentions. According to existing guidelines ^{13,31,32} management of maternal distress consists of three components: screening (using a measurement instrument), support (informational and emotional), and collaboration (consultation, communication, and referral to other healthcare professionals) ^{33,34}. We assessed these three components separately. The constructs intention, attitude, self-efficacy (perceived control), and personal norm, drawn from the Theory of Planned Behaviour (TPB) ³⁵ were used to identify the factors that influence the use and extent of screening, support and collaboration. These were further expanded to include years of experience, attitude towards maternal distress (maternal distress is interesting, is a problem and, is complex) and perceived knowledge and barriers. The results showed that midwives' interest in maternal distress and their years of work experience played a significant role in the management of maternal distress ¹⁸. These studies ^{7,18} helped us to identify factors relevant for screening for maternal distress, and factors related to midwives' screening behaviour, both of which needed to be addressed by the intervention.

As recommended by the Intervention Mapping protocol ¹⁶ a consortium or project group was initiated at the start of the project, comprised of representatives of professionals that are involved in the care for women suffering from maternal distress (e.g. midwives, psychologist). Results of every Intervention Mapping-step were discussed with the members of this group to gain further insight in the problem and solutions. Bringing together both program developers and implementers of the intervention from the start ensured that commitment remained strong during the development of the intervention, and that intervention components were acceptable for implementation in practice

¹⁶.

Step 2. Define Program Goals by Specifying Performance and Change Objectives

The second step of Intervention Mapping is the determination of who and what will change as a result of the intervention. This includes an explicit description of the target population's preferred behaviours, stated in 'performance objectives', and the personal and external determinants of those behaviours. Identification of what the target group needs to learn - regarding every determinant – is used to create 'change objectives'. The result of this step is a matrix of change objectives specifying how the environment will be changed and what individuals need to learn in order to change their current behaviour ¹⁶.

Application

For the overall program objective, prevention and reduction of maternal distress during pregnancy, specific performance objectives (POs) were formulated at two different levels: the individual level (*pregnant woman*) and the interpersonal level (*midwife-pregnant woman*). We differentiated between women that are more prone to develop maternal distress and those already suffering from maternal distress. In order to access both categories of women, all pregnant women need to be targeted. Women in these two categories have different needs and we wanted to address these needs with the intervention. Therefore we stated POs for all pregnant women that focused on 'detection of symptoms' and 'preventive actions' (see table 1) and we included POs especially for women suffering from maternal distress (see table 2). These latter objectives focus on 'reducing maternal distress'.

The consideration of determinants was based on our needs assessment combined with relevant determinants specified in general behavioural change theories. Three different matrices of change objectives were developed. The first and second reflected what needed to change in knowledge, attitude, risk perception, self-efficacy (perceived control), and social influence on the individual level (*pregnant woman*) in order to accomplish the performance objectives. The third focused on the interpersonal level (*midwife-pregnant woman*) where POs were related to (a) promoting self-disclosure of pregnant women, (b) supporting self-management of maternal distress and (c) monitoring and coordinating the support and care for women suffering from maternal distress. Specific POs for midwives were related to preparation for the implementation of (collaborative) care. Based on the needs assessment, the determinants knowledge, attitude, self-efficacy (perceived control) in screening, skills management, and social norm were considered relevant for midwives (see table 3).

Table 1. Change objectives for all pregnant women (universal/ selective prevention)

	Knowledge	Attitude			Risk-perception	Self-Efficacy	Social Influence		
		General	Self-disclosure	Help-seeking			Social support	Professional support midwife	Social norm
PO1. Pregnant women detect signs or symptoms of MD* during pregnancy	<p>Explain that pregnancy is accompanied by (hormonal) mood swings</p> <p>Explain that short periods of worrying, anxiety and uncertainty (not disturbing daily functioning) are pregnancy-related</p> <p>Explain that if these feelings effect daily and/or social functioning, these can be signs of MD</p> <p>Explain signs and symptoms of MD</p> <p>Report the existence of instruments to screen for MD</p>	<p>Express the importance of detecting sings and symptoms of MD</p> <p>Express the importance of knowing the difference between physiological pregnancy-related symptoms and signs of MD</p>	<p>Express that talking about MD is important to help in adequate detection of symptoms</p>		<p>Explain that pregnancy is an emotional period that can trigger MD</p> <p>Explain that 'overlooked' MD during pregnancy leads to increased risks in developing psychological problems post partum</p> <p>Explain that 'overlooked' MD during pregnancy can have negative effects on the emotional and cognitive development of their baby</p>	<p>Express confidence in detecting signs and symptoms of MD</p>	<p>Express feeling supported by their friends and relatives in detecting signs and symptoms of MD</p>	<p>Identify the midwife as a trustworthy professional to consult regarding signs and symptoms of MD</p> <p>Identify the midwife as a trustworthy professional source of information regarding signs and symptoms of MD</p>	<p>Explain that detection of MD is a task of the midwife</p>
PO2. Pregnant women identify factors that trigger MD	<p>Point out which factors can trigger MD</p>	<p>Express that personal life issues can have an impact on emotional wellbeing during</p>			<p>Explain which factors in their personal life (can) trigger MD during pregnancy</p>	<p>Express confidence in identifying factors in their life that trigger MD</p>	<p>Express feeling supported by their friends and relatives in identifying factors in their life that trigger MD</p>	<p>Identify the midwife as a trustworthy professional to consult regarding factors that trigger MD</p> <p>Identify the midwife</p>	<p>Explain that identifying pregnant women that are at-risk for MD is a task of the midwife</p>

		pregnancy						as a trustworthy professional source of information regarding factors that trigger MD Express feeling supported by the midwife in identifying factors that trigger MD in their own life	
PO3. Pregnant women undertake preventive actions to optimize their emotional wellbeing during pregnancy	Report different preparations they can undertake (e.g. birth, (transition to) parenthood) can optimize emotional wellbeing Explain that physical wellbeing enhances emotional wellbeing Explain that sense of purpose/meaningfulness can contribute to emotional wellbeing	Explain the importance of expressing emotions Explain the importance of minimizing stressors Explain the importance of effective coping with stressors	Express the importance of discussing situations that are accompanied by stress, uncertainty or anxiety with others	Express the importance of identifying (significant) others to discuss stress, uncertainty or anxiety provoking situations with		Express confidence in taking preventive actions to optimize their psychosocial wellbeing	Express feeling supported by their friends and relatives and report how they can mobilize their support Express that social support from friends and relatives suffices in optimizing their psychosocial wellbeing	Express feeling supported by the midwife in optimizing their psychosocial wellbeing	Explain that coaching pregnant women in preventing MD is a task of the midwife Explain that educating pregnant women in preventing MD is a task of the midwife

* MD: Maternal Distress

Table 2. Change objectives for pregnant women experiencing MD* (indicated prevention)

	Knowledge	Attitude			Risk-perception	Self-Efficacy	Social Influence		
		General	Self-disclosure	Help-seeking			Social support	Professional support midwife	Social norm
PO1. Pregnant women decide to express that they experience MD (self-disclosure)	<p>Explain that self-disclosure can reduce MD during pregnancy</p> <p>Report that having a sense of meaning/purpose can contribute to self-disclosure of MD during pregnancy</p>	Express that their own wellbeing, that of their baby and family, are meaningful reasons to disclose to others when experiencing MD	Report the importance of sharing problems and signs and symptoms of MD with others	Report that professional help as a consequence of self-disclosure is positive	<p>Report the positive and negative consequences of self-disclosure</p> <p>Report personal reasons to self-disclose</p>	Express confidence in disclosing to others when experiencing MD	Express feeling supported by their friends and relatives in disclosing to them when experiencing MD	Express feeling supported by the midwife in disclosing to her when experiencing MD	Explain that encouraging women in talking about MD is a task of the midwife
PO2. Pregnant women actively handle MD in their daily life (self-management)	<p>Explain effective and ineffective coping mechanism to deal with MD during pregnancy</p> <p>Report that having a sense of purpose can contribute to self-management of MD during pregnancy</p>	Express the importance of effective coping (skills) with MD during pregnancy	Report the importance of sharing problems and symptoms and signs of MD with others	<p>Report the importance of asking for support</p> <p>Express that support in coping with MD is positive</p>		Express confidence in self-managing/coping with MD	Express feeling supported by their friends and relatives in coping with MD	Express feeling supported by the midwife in coping with MD	Explain that coaching women in the self-management of MD is a task of the midwife
PO3. Pregnant women seek professional support for MD when needed (help-)	<p>Report the availability of different screening instruments to determine appropriate support for MD</p> <p>Explain different professional support options and resources</p>			<p>Express positive aspects of seeking professional support for MD</p> <p>Express the importance of seeking</p>	Report whether professional support involves positive and/or negative consequences for MD and their daily	Express confidence in finding appropriate professional support for MD	<p>Express feeling supported by their friends and relatives in seeking appropriate professional support for MD</p> <p>Express that</p>	<p>Express feeling supported by the midwife when discussing professional support for</p> <p>Express feeling supported by the midwife when</p>	Explain that advising pregnant women about professional support of MD is a task of the midwife

seeking)	for MD Report that having a purpose can contribute to self-disclosure			professional support for MD	functioning		their personal environment provides support when seeking professional support	exploring appropriate professional support for MD	Explain that referring pregnant women suffering from MD to other caregivers is a task of the midwife
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* MD: Maternal Distress

Table 3. Change objectives for midwives

	Knowledge	Attitude	Self-efficacy in screening for MD	Skills Management	Social norm
PO1. Midwives prepare for implementing care (including screening) for MD*	<p>Report prevalence (range of 5%) and risk factors for MD</p> <p>Report five negative consequences of MD for the pregnant women, her child, and her family</p>	<p>Express that care regarding MD is an important task of a midwife</p> <p>Express their willingness to organize care regarding MD within their midwifery care practice</p> <p>Express positive feelings towards the implementation of care regarding MD</p>		<p>Identify gaps in knowledge and skills regarding providing optimal care regarding MD</p>	<p>Acknowledge that health promotion regarding MD belongs to the midwife's scope of practice</p> <p>Acknowledge that the implementation of screening for MD is part of the midwife's role as manager and as innovator</p>
PO2. Midwives prepare for inter-professional collaboration regarding (follow-on) care for MD	<p>Report relevant sources of information about MD (websites etc.) for pregnant women</p> <p>Report (local) self-help organizations and resources for women suffering from MD</p> <p>Report local individual healthcare professionals for MD</p> <p>Report relevant national organizations for MD</p> <p>Report appropriate thresholds for consultation and referral to other healthcare professionals</p>	<p>Express their willingness to work inter-professionally and share responsibilities with other healthcare professionals regarding MD</p> <p>Express the relevance of having a professional healthcare network that contribute to care regarding MD</p>		<p>Demonstrate how to construct a map of (local) healthcare (related) resources and professionals regarding MD</p> <p>Demonstrate acquiring contact information for all local (healthcare) resources and healthcare professionals relevant for MD</p>	<p>Acknowledge their role of referent to other healthcare professionals in inter-professional management of care regarding MD</p>
PO3. Midwives start psycho-education regarding MD	<p>Describe the content of psycho-education about MD</p> <p>Report that psycho-education promotes self-disclosure of MD</p>	<p>Express their motivation for psycho-education regarding MD</p> <p>Argue the importance of psycho-education for MD as</p>		<p>Demonstrate psycho-educating pregnant women about MD</p> <p>Demonstrate correct timing in pregnancy to psycho-</p>	<p>Acknowledge that psycho-education is part of the midwife's role as coach and counsellor and as advisor</p>

(to promote self-disclosure)	<p>Report different ways of executing psycho-education for MD</p> <p>Report appropriate times for psycho-education for MD during antenatal care</p>	<p>part of antenatal care</p> <p>Argue that psycho-education is an appropriate tool for promoting self-disclosure of MD</p>		<p>educate women about MD</p> <p>Demonstrate different methods in psycho-education women about MD</p>	
PO4. Midwives utilize assessment (including screening) of MD (to promote self-disclosure)	<p>Define maternal distress</p> <p>Define psychopathology</p> <p>Report that assessment of MD promotes self-disclosure of pregnant women</p> <p>Report the barriers that affect the midwife's approach in assessment of MD</p> <p>Report risk groups for MD (within their population)</p> <p>Report the appropriate times for screening for MD within antenatal care</p> <p>Report methods to screen for MD during pregnancy</p> <p>Report how screening results must be interpreted</p> <p>Define which screening parameters are relevant for consultation or referral to other healthcare professionals</p> <p>Report the risk factors in a woman's (medical) history or current personal circumstances for developing MD</p>	<p>Express their motivation regarding assessment and screening of MD</p> <p>Argue the relevance of (selective and indicative) prevention regarding assessment and screening of MD</p> <p>Argue that midwives are the appropriate caregivers for MD assessment and screening</p> <p>Argue that pregnancy is a 'window of opportunity' to assess and screen for MD</p> <p>Express the importance of assessment and screening of MD in order to adequately refer to other healthcare professionals</p>	<p>Express confidence in assessment and screening of MD</p> <p>Express competence in assessment and screening of MD</p> <p>Express competence in asking the right questions in assessment of MD</p> <p>Express that their experience in assessment increases their confidence in asking the right questions</p> <p>Express competence in managing care for women that self-disclose after assessment or screening</p>	<p>Demonstrate assessment and screening for MD</p> <p>Demonstrate correct interpretation of the screening results</p> <p>Demonstrate when consultation or referral is indicated based on assessment or screening results</p> <p>Demonstrate discussing the answers regarding MD and the results of MD screening with pregnant women</p>	Acknowledge that assessment and screening is part of the midwife's role as coach and counsellor and as medical professional

	<p>Report the risk factors during pregnancy and birth for developing MD</p> <p>Report which personality traits are risk factors for developing MD</p>				
PO5. Midwives advice women in coping with MD	<p>Report the effect of advising women in coping with MD</p> <p>Report the three effective coping mechanisms (self-disclosure, acceptance, help-seeking)</p> <p>Report the three ineffective coping mechanisms (avoidance, drinking, smoking)</p> <p>Report a minimum of 5 practical tips for pregnant women aimed at coping with MD in daily life</p>	<p>Express their motivation to advice women in coping with MD</p> <p>Report the relevance to advice women in coping with MD</p> <p>Report the importance to advice women in coping with MD</p>		<p>Demonstrate advising women experiencing MD how to influence stress-factors</p> <p>Demonstrate advising women experiencing MD how to positively cope with MD</p>	<p>Acknowledge that advising women in dealing with MD is part of the midwife's role as coach and counsellor and advisor</p> <p>Acknowledge their position involving confidentiality</p> <p>Acknowledge their non-judgmental position regarding MD</p>
PO6. Midwives support women at risk for MD or experiencing MD in mobilizing social support	<p>Report the relevance of a supportive social network for women at risk for or suffering MD</p> <p>Report that peer support promotes self-management</p> <p>Reports pros and cons of different forms of peer support (e.g. internet, self-help groups)</p>	<p>Express their motivation to support women at-risk for or suffering MD in mobilizing social support</p>		<p>Demonstrate supporting women to identify the need for social support</p> <p>Demonstrate supporting women to mobilize support from their social network</p> <p>Demonstrate mobilizing social support through self-help groups or peer support together with the pregnant women</p>	<p>Acknowledge that supporting women to mobilize social support is part of the midwife's role as coach and counsellor</p>
PO7. Midwives support pregnant	<p>Report the effect of supporting pregnant women in seeking self-help initiatives and professional support for MD</p>	<p>Express their motivation to guide pregnant women in finding self-help initiatives and professional support for MD</p>		<p>Demonstrate informing pregnant women in finding self-help initiatives and professional support for MD</p>	<p>Acknowledge that guiding pregnant women using self-help initiatives and professional support for MD is part of the midwife's role as coach and counsellor and as advisor</p>

women in finding self-help initiatives and professional support for MD	Report the local self-help initiatives and resources for professional support for MD (including content and scope)	Report that supporting pregnant women in finding self-help initiatives and professional support promotes reduction of MD		Demonstrate constructing a map of local self-help initiatives and resources for professional support for MD Demonstrate correct thresholds when to support pregnant women in choosing self-help initiatives and professional support for MD	
PO8. Midwives monitor the care processes for women experiencing MD		Express their motivation to monitor the care for pregnant women with MD Argue the relevance of one caregiver responsible for monitoring the care for pregnant women with MD		Demonstrate discussing progress in coping with MD with pregnant women Demonstrate discussing progress in coping with MD with involved healthcare professionals Identifies which midwife is responsible for monitoring care processes for each pregnant women within their practice	Acknowledge that monitoring the care processes regarding MD is part of the midwife's role as case manager
PO9. Midwives refer pregnant women experiencing MD for professional support	Describe the boundaries of the midwifery profession in management of MD Report different professional support options for MD Report different parameters that influence the choice for professional support of MD Report reimbursements of health insurances for different professional support options Report the relevance of adequate transfer of client information between professionals	Express their motivation for referral to other professionals Argue the relevance of creating a professional network regarding MD		Describe a map of local self-help initiatives and professional support for MD Demonstrate shared decision making in planning support for MD Demonstrate coordination of care in (non-) urgent referral to other professionals Demonstrate coordination of care when referring active users of antidepressants (SSRIs) Demonstrate coordination of care in case of expected post partum issues related to MD	Acknowledge that referral is part of the midwife's role as coach and counsellor, as case manager, and as medical professional Acknowledge that collaboration with other professionals is part of the midwife's role as case manager, and as medical professional Acknowledge that development, management and evaluation of care pathways is part of the midwife's role as manager and innovator

	<p>Report parameters for (non) urgent referral to other professional for management of MD</p> <p>Report the care pathway for (non-) urgent management of MD</p> <p>Report the care pathway for active users of antidepressants (SSRIs) in pregnancy</p>			(based on screening and course of pregnancy and childbirth)	
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*MD: Maternal Distress

Step 3. Theory-based intervention strategies

The focus of this third step is to match theory-based methods to the change objectives of step 2 in order to formulate practical applications¹⁶. A theory-based method is a theoretically and empirically supported process for effecting behavioural change in individuals, groups or social structure³⁶. The meaning of the respective theories is explained in tables 4 and 5.

Application for pregnant women

Computer tailoring is a method rooted in several theories, including Social Cognitive Theory (SCT) and the Trans Theoretical Model (TTM)¹⁶. We used this approach as a basic method for change that we found suitable for (almost) all of the relevant determinants of behaviour¹⁶. Tailoring is prescribed when information given is matched to previously measured characteristics, individual problems, feelings and emotions, experiences, wishes, needs and abilities of the woman³⁷. It provides opportunities for women to have their personal questions answered and to receive advice that aligns with their individual progress³⁷. In order to fulfil this need pregnant women frequently use the Internet as virtual support and as a source for antenatal advice³⁸.

Combining computer tailoring with professional face-to-face contact showed positive results in pregnant women in earlier studies³⁹. Therefore our second general method involved 'communicative support', derived from the Problematic Integration Theory (PIT)⁴⁰. Communicative support with the midwife influences the way women appraise their uncertainties and desires during pregnancy and facilitates effective coping⁴⁰.

We chose 'advance organizers' and 'elaboration', derived from Theories of Information Processing (TIP)¹⁶, to improve women's understanding of the complex nature of maternal distress and to enable them to access relevant information¹⁶. Women select a (pre-defined) situation, like feeling emotionally unbalanced, which is then followed by a tailored response generated with a 'narrative advance organizer'. The organizer sequentially introduces the context, setting and the recognition of the experience to women, allowing them to understand and recall information by seeing how it fits within the larger structure of maternal distress. This process helps women relate the information to their personal life⁴¹. Using sequential pathways like these is an effective way to encourage to life style changes⁴².

To alter women's knowledge of and attitude toward self-disclosure and help-seeking we chose 'elaboration'. Elaboration is taken from the Elaboration Likelihood Model (ELM) and it intends to increase women's motivation to process information and adds meaning to the information¹⁶. We encouraged women to identify present or past sources for maternal distress (e.g. miscarriage, negative birth experience) and guided them through the experience by asking how they felt, the coping mechanisms they used (e.g. self-disclosure, worrying, help-seeking) and then linking the information by rehearsing and summarising the previous information. We used 'imagery' in the pictures of pregnant women to create stronger memories¹⁶.

To target risk-perception we chose 'consciousness raising', derived from Precaution-Adoption Process Model (PAPM)¹⁶. Risk-perception involves increased awareness about one's vulnerability to, the consequences of, and the solutions for maternal distress¹⁶. Using an inventory of risk factors for maternal distress (e.g. past history of psychological problems, daily hassles) and applying scores for impact and perceived burden of these risk factors, women verbalized their personal risk(s) and gained new insight into their severity. The use of an inventory was followed immediately by evaluative and descriptive advice based on a woman's reported severity. Immediate

feedback is important for women to affect their motivation and ability to change ⁴³.

To enable women to identify risk situations for maternal distress in advance of exposure to them we chose 'cue altering', taken from Theories of Goal Directed Behaviour (TGDB) ¹⁶. Cue altering increases self-efficacy of mothers who tend to relapse into inadequate coping. Women had to outline their usual coping responses to difficult situations (e.g. *"my response to daily hassles is to worry about them"*), and were provided with practical advice to anticipate and adequately respond to risk situations. In this way we addressed the mothers' confidence and sense of control, both of which serve a protective function for maternal distress ⁴⁴.

To influence both attitude and self-efficacy we chose 'cultural similarity', a feature of the Communication-Persuasion Matrix (CPM) ¹⁶. Since pregnant women identify with other pregnant women and are more receptive to their experiences ⁴¹ we used images of pregnant women from various cultures and in various states of mind. Furthermore we used stories (narratives) of 'everyday' women reflecting variations of maternal distress.

Finally 'individualization', derived from the Trans-Theoretical Model (TTM) was selected to change risk-perception, attitude and social influence ¹⁶. Individualization is concerned with providing opportunities for personalised answers or to receive instructions that are paced with individual progress ¹⁶. As part of the tailored advice, for example, we asked women about personal circumstances and issues in their lives. Advice given reflected their need for support and included self-management, practical help, self-disclosure to a friend or midwife and professional support. We offered a range of supportive resources on both individual and group level, depending on the woman's individual wishes. Table 4 presents the methods and explains the theories and strategies used for the development of the *WazzUp Mama?! program* for pregnant women.

Table 4. Theoretical Methods and Practical Strategies for pregnant women for the *WazzUp Mama?! intervention*, specified by determinant

Determinant	Theoretical Method	Strategies	Conditions
	Advance Organisers	Encourage the pregnant woman's comprehension and ability to access and retrieve relevant information on maternal distress	Requires that pregnant women are able to identify the content and concepts to what is applicable to her personal situation
	Elaboration	Stimulate the pregnant woman to identify the personal relevance of the information with regard to causes, feelings and emotions and consequences of, coping mechanisms, environmental resources, and support for maternal distress	Requires messages that are personally relevant, repeated, self-pacing, easily understandable, and include direct instructions
Risk perception	Consciousness raising	Encourage women to evaluate and reflect on their personal life and situation, to create insight into the behavioural chain of behaviour and consequence	Requires face-to-face contact and openness from the woman, to reach a new understanding of past experiences and current situations, to identify risk factors, usable coping responses, and access to support
	Communicative support*	Encourage and stimulate women to disclose private and sometimes sensitive information	Requires a relationship of trust and supportiveness with the midwife
Self-efficacy	Cue altering	Set up tools for recognition of risk factors and provide advice in advance about adequate coping responses for the if-then process, in order to be more able to positively response to situations or to be prepared; building on self-confidence	Requires commitment to the intention, an intention that is positive and feasible within the woman's skill set, and access to feedback. The goals must be expressed in terms of coping responses, not outcome
Attitude	Cultural similarity	Enhance receptivity with use of surface characteristics of other pregnant women with images and story telling (narratives)	Requires the possibility of access of the information
	Tailoring*	Tailor information to the woman's needs and her actual situation: Offer important general knowledge about the situation. Let the woman link the general knowledge to maternal distress	Requires that information is responsive to the woman's needs, concerns personal factors that are relevant to her and her situation, and relates to behaviour.
Social influence	Individualization	Acknowledge the woman's perceptions on her needs and wishes with regard to support from her social environment, including the midwife	Requires dialogue with the woman
<p>SCT Social Cognitive Theory: This theory explains how people acquire and maintain certain behavioural patterns</p> <p>TTM Trans Theoretical Model: A behaviour change theory focussing on assessing an individual's readiness to act on a new (healthier) behaviour</p> <p>PIT Problematic Integration Theory: A theory of communication that addresses the processes and dynamics of how people assess and evaluate probabilities</p> <p>TIP Theories of Information Processing: A cognitive approach to how people convey information</p> <p>ELM Elaboration Likelihood Model: A general theory of attitude change acknowledging that people differ in the ability and motivation for thoughtful information processing</p> <p>PAPM Precaution-Adoption Process Model: A behaviour change theory focussing on stages and transitions of changing awareness of risk</p> <p>TGDB Theories of Goal-Directed Behaviour: A model developed to gain a better understanding of cognitive and affective decision making processes focusing on the personal goals of people that represent desired states or outcomes to be achieved or avoided</p> <p>CPM Communication-Persuasion Matrix: A step-based model to persuade people to change behaviour</p>			

*General methods

Application for midwives

To enable midwives to (a) promote self-disclosure of pregnant women, (b) support self-management, and (c) coordinate care for women suffering from maternal distress we called upon several methods. 'Information processing' was chosen as a general method, derived from Diffusion of Innovation Theory (DIT) ¹⁶. It was used to address all identified determinants of midwife behaviour. Information processing helps midwives learn about the relevance of the intervention, the functioning principles behind the intervention, and how to use the intervention, all of which increase the likelihood of adopting the innovation ⁴⁵. Because it is important for learners to identify with the educator ⁴⁶ we chose for a practising midwife to lead the training session.

In the training session we used 'intergroup dialogue training', drawing on elements of the human relations approach and social reconstructionism ⁴⁷ to address social norm and skills management. In addition, we discussed the midwife's role, competencies and tasks in relation to maternal distress and the Dutch profile for midwives ⁴⁸. It is important to create common ground when working on an issue that affects the professional responsibility of a midwife ⁴⁹. In our case we were strengthening the role of the midwife as a promoter of public health with regard to maternal distress.

'Facilitation of means', an aspect of Social Cognitive Theory (SCT) ¹⁶ allowed us to address the self-efficacy and management of skills needed to create a change in practice, and to reduce the barriers to action. Midwives feel inadequate to screen for maternal distress when they do not know when to refer and which professional is most appropriate to a woman's specific needs ⁵⁰. Therefore we provided midwives with a practical guideline for screening, a clinical pathway for care, and an overview of regional healthcare providers for consultation and referral.

In the training session we used 'verbal persuasion', drawn from Theories of Self-Regulation (TSR) to convince midwives that they are capable to screen for maternal distress ¹⁶. Midwives are familiar with screening for various risk behaviours (e.g. smoking) and are aware that addressing sensitive psychosocial issues (e.g. domestic violence, sexual abuse) is part of their scope of practice ^{48,49}. However, they need to realize that they can apply their existing screening abilities to a new area of health behaviour within midwifery practice i.e. maternal distress.

'Providing cues' – a feature of Theories of Information Processing (TIP) ¹⁶ – was used to remind midwives of the content of the training session. They received a set of pocket cards with information that was coloured coded per topic, similar to the topics discussed in the training, to use as an 'aid' during their daily practice.

Finally we used 'structural organization' taken from Organizational Development Theory (ODT) ¹⁶ as a method for helping midwives to share client information with other professionals in a clear, complete, concise and structured format, all of which improve communication efficiency and accuracy. In addition this approach enhances the use of structural organization to improve a midwife's management of skills. Table 5 presents the methods and explains the theories and strategies with regard to midwives.

Table 5. Theoretical Methods and Practical Strategies for midwives for the *WazzUp Mama?!* intervention, specified by determinant

Determinant	Theoretical Method	Strategies	Conditions
Social norm	Intergroup dialogue training	Emphasize common midwifery values and destinies and the personal association of individuals as functional equals, on a common task jointly accepted as worth while with regard to maternal distress	Requires working together as a group, having a mutual objective
Attitude	Verbal persuasion	Encourage and convince midwives that they can screen for maternal distress	Use of credible sources; the more reliable the more impact on attitude
	Providing cues	Remind midwives to ask relevant questions and provide the correct information with regard to maternal distress	Requires a visual reference with useful description of risk indicators, rating factors
Self-efficacy	Facilitation of means	Support self-confidence in abilities to screen pregnant women for maternal distress	Requires recognisable resources supporting the midwife to screen and refer
Knowledge	Information processing*	Provide midwives with awareness-knowledge, how-to knowledge and principle-knowledge about maternal distress	Requires information that is responsive to the midwives' level of explicit and tacit knowledge and practical needs
Skills management	Structural organization	Encourage midwives to communicate with other healthcare professionals in a prompt and appropriate way with regard to maternal distress	Requires a format for inter-colleague team meetings/ client discussion, interdisciplinary consultation and referral
	Intergroup dialogue training	Stimulate to share experiences, which permit the interplay of character and personality and recognising the benefits to provide care for maternal distress.	Requires a relationship of openness, trust and supportiveness among colleague midwives
<p>DIT Diffusion of Innovation Theory: The process of how messages that are perceived as new ideas are communicated among members of a social system</p> <p>SCT Social Cognitive Theory: This theory explains how people acquire and maintain certain behavioural patterns</p> <p>TSR Theories of Self-Regulation: A social cognitive theory emphasizing goal setting, goal operating, and goal monitoring</p> <p>TIP Theories of Information Processing: A cognitive approach to how people convey information</p> <p>ODT Organizational Development Theory: A theory focussing on the process of continuous diagnosis, action planning, implementation and evaluation, with the goal of transferring knowledge and skills to organizations to improve their capacity for solving problems and managing future change</p>			

* General methods

Step 4. Program production

This planning step combines the practical strategies in a program and develops materials that guide the program production. In our case we organized the strategies described above into a deliverable program with specified components, designing a concrete plan for the production and delivery of the program, and producing program materials. In this process we also pre-tested the program and materials to ensure that they were comprehensive, understandable, and acceptable to the implementers and the participants ¹⁶.

Application for pregnant women

The title of our program *WazzUp Mama?!* reflects our interest in how a pregnant woman feels, both positively and negatively. *Wazzup?!* - meaning: how are you? - was officially added to the Dutch dictionary in 2013 ⁵¹ and we used this Dutch neologism to emphasize the importance of a mother's experiences of pregnancy. Our program was developed in three steps. First, all of our strategies were put together in a structured program plan. Second, the materials were developed in close collaboration with a consortium of 12 members that included midwives, a psychologist, a woman's counsellor, and public health professionals. Finally, *Wazzup Mama?!* 's different components were pre-tested for user friendliness, design, understandability and comprehensiveness among pregnant women, young mothers, practising midwives, midwifery lecturers, psychologists, scholars, and student midwives. When necessary we adapted program elements. It is important to note that among the pregnant women and young mothers who helped with the pre-test were women who (had) experienced maternal distress during pregnancy.

The program has two parts: one for pregnant women and one for midwives. The program part for women aims to identify the vulnerability of, or the presence and severity of maternal distress during pregnancy. When maternal distress is absent or vulnerability is identified, the program is designed to prevent it from developing. When maternal distress is present, the program aims to reduce it. The program included a web-based tailored program, consisting of (i) a homepage, (ii) a process for collecting personal information including first name, residence, midwifery practice, and the results of screening tests addressing personal history and circumstances, emotional wellbeing, emotional stamina or perceived burden, maternal distress and coping mechanisms, and (iii) personalized feedback based on the data collection in ii.

The homepage provides information about the targets of intervention and what the respondent will receive from the program and directs the respondent to the data collection aspect of the program. The screening tests use three self-directed pathways. Each pathways addresses a different topic of emotional wellbeing: (i) mood changes as a result of pregnancy, (ii) mapping your life by identifying factors that unbalance and disturb emotional wellbeing, and (iii) identification of (levels of) maternal distress. Self-direction is based on recognition of a situation presented at the starting point. Each pathway starts with an introduction to inform the respondent about what the respective starting point encompasses.

The first pathway focuses on the signs and symptoms of maternal distress and determines if the respondent's emotions belong to the physiological process of pregnancy or if they are a deviation from that process. The respondent is asked to score the burden of her emotions on a visual analogue scale from 0 to 10, increasing in severity, in order to identify the level of severity of their burden. Scores above set cut-off points in the program lead to the second pathway. The second pathway focuses on identifying (potential) stress factors, problems or difficult situations in the past or present that may contribute to the development of maternal distress. The respondent is asked to score their

level of emotional stamina on a visual analogue scale from 0 to 10, increasing in level of difficulty of coping with the situation. Scores above set cut-off points lead to the third pathway. We used visual analogue scales in these first two pathways as an accurate way to rule out women for maternal distress and to find that larger proportion of women who are struggling with emotional complications that would otherwise go undetected ^{52,53}. Cut-off points for these scales were based on the 'Distress thermometer' and these cut-off points indicated women's needs for self-management and for additional support ⁵⁴. The third pathway is a measurement of maternal distress operationalized by means of the Edinburgh Depression Scale (EDS) ²³. Scores above defined cut-off points identified the severity of maternal distress ^{26,55} and were used as indicators for support. The Edinburgh Depression Scale was incorporated because this is validated to measure depression and anxiety simultaneously ⁵⁶ and is recognised for its user-friendliness and compact size ⁵⁷.

The personalized feedback from the screening tests include (i) advice for everyday life in giving respondents a variety of practical tips and tricks ⁵⁸ and relaxation exercises, (ii) advice about positive ways of coping and alternative ways of effective coping, based on most frequently used coping styles ^{59,60}, and (iii) sources for self-management and local possibilities for lay, professional and alternative local group and individual support. Finally, a synopsis of all the advice given was presented to the respondent, who was encouraged to print it out and discuss it with her healthcare provider or use it as a reminder when necessary. The tone of voice of the personalized feedback was non-judgmental and reflective. Women were addressed by their first names in the tailored feedback, and feedback was made personal by women's self-reported reasons for change. Different mood states included different images of women reflecting that particular mood. Narratives supported the different mood states of maternal distress.

Application for midwives

Because midwives appreciate clear guidelines and supportive material and are, in general, willing to provide care for maternal distress ¹⁸ the program part for midwives included a toolkit with six elements that were delivered in a recognizable *WazzUp Mama?! box*. The program part for midwives provides a format for the implementation and coordination of care for maternal distress and supports self-disclosure and self-management of pregnant women who are dealing with maternal distress.

The toolkit included the following content:

- (i) A guideline including a clinical pathway for consultation and referral, in the same format as existing Dutch guidelines. The guideline included case-finding questions to be used throughout the whole antenatal care period. The clinical pathway was based on the scoring system of perceived burden or emotional stamina using the same cut-off points as the web-based program for women;
- (ii) A regional healthcare map including all relevant caregivers and health initiatives aimed at psychological and emotional wellbeing in the midwives local area of practice;
- (iii) Posters advertising the tailored website and cards to hand out to clients with the URL of the web-based tailored program;
- (iv) A set of pocket cards including the information about the guideline and clinical pathway in a functional format and convenient size, including a card to write down relevant phone numbers;
- (v) A USB stick allowing digital access to educational materials and all elements of the toolkit; and
- (vi) A format for team meetings/ client discussion, consultation and referral in recognition that women benefit from structured communication by their involved healthcare professionals ⁶¹. All materials were designed to be recognizable parts of the *Wazzup Mama?! program* and were

introduced by means of an accredited training.

Step 5. Program implementation

Step 5 of the Intervention Mapping protocol focuses on adoption and implementation of the intervention. This step is intended to influence the behaviour of individuals who will make the decision about adopting and implementing the intervention. Therefore, the production of the intervention must be closely linked to the implementation planning ¹⁶.

Application

Use of the above-described consortium in program development improved commitment between program developers and implementers, and ensured that intervention components were acceptable and workable for implementation in practice. Since the effectiveness of the intervention must be demonstrated before broad implementation could be considered, the *WazzUp Mama?! intervention* was implemented in a pilot-study among 17 midwifery practices. Representatives of 3 midwifery practices were members of the consortium and they each recruited 6 midwifery practices for the pilot study. The participating midwives received a financial reimbursement for time spent delivering the intervention and accreditation for the professional quality register (i.e. continuing education credits) after they had attended the training on how to use the intervention. Therefore – even though our study of midwives’ intentions to manage maternal distress revealed issues related to implementation (e.g. limited motivation to screen for maternal distress ¹⁸) - we had little difficulty convincing midwives to adopt and implement the intervention.

Step 6. Design a plan for Evaluation

The final step of the Intervention Mapping protocol is developing an effect evaluation plan, looking at the evaluation process as an opportunity to improve implementation. Development of the measurement instruments can be based on the information gathered in all previous steps of Intervention Mapping ¹⁶.

Application

The effect of the program was evaluated among 17 participating midwifery practices in using a non-randomized pre-post intervention study design with a sequential control and experimental group. Midwives were asked to recruit at least 10 pregnant women eligible for midwifery care at booking in the period April – August 2013 (control condition) and again in the period April – August 2014 (experimental condition). These women were asked to fill out a questionnaire before their first visit with the midwife and again at 36 weeks of gestation. The control group received care-as-usual, while the experimental group was exposed to the *Wazzup Mama?! intervention*. Midwives were trained (April - June 2014) after the last respondent in the control condition filled out the 36-weeks questionnaire. Dutch versions of the *Edinburgh Depression Scale* ²⁶, *Trait Anxiety Inventory* ²⁸ and the *Pregnancy Related Anxiety Questionnaire* ^{25,27} were used to assess the outcome variable, maternal distress.

Process evaluation enables correct interpretation of findings from effect studies ^{16,19} and can be used to identify key facilitating and hindering factors for future program implementation and dissemination. To evaluate the implementation during the pilot-study, process evaluation questionnaires were developed for the midwives and included questions regarding the quality of the training, fidelity and dose of the components delivered, dose of the components received, usefulness

of intervention components (resources) and barriers for use ^{62,63}. Pregnant women were also asked to evaluate the components of the intervention and to indicate dosage received ⁶³.

DISCUSSION

In this paper we described the use of the Intervention Mapping protocol to develop the *Wazzup Mama?! intervention* for pregnant women eligible for midwife-led care. Intervention Mapping provided a valuable protocol to guide program planners through the structured development of the intervention. In addition, our extensive needs assessment, performed to provide the building blocks for the intervention, has added to the body of knowledge regarding maternal distress ⁸.

To our knowledge this is the first study that fully describes the development of an antenatal intervention for maternal distress. A strength in applying Intervention Mapping in this study was that quantitative information from pregnant women ^{7,20} and quantitative ¹⁸ and qualitative information from midwives ³⁰ were systematically collected and combined with expert validation ²⁰, and with behavioural change theories to develop an intervention tailored to the needs of the target groups and implementers. Including both midwives and other healthcare professionals involved in the psychosocial wellbeing of women in the consortium was also a strength, since it provided insight into the clinical relevance of the practical strategies we used.

A major limitation of applying the Intervention Mapping protocol is the time it requires. Also in multi-faceted problems such as maternal distress where multiple behavioural and environmental factors are involved and that all must be translated into the program objectives, can result in overwhelming matrices of change objectives that are impossible to address completely. We have incorporated all determinants that have emerged from our quantitative and qualitative data. The positive effect of the current matrices of change objectives is that these are likely to be complete. However, in future projects evaluation of program objectives and determinants that are essential for program development could lead to a more parsimonious list and more efficiency in steps 3-6. When we have more insight into the results of the process evaluations of both women and midwives involved in the intervention, we can refine the selection of relevant program objectives and determinants and adapt the intervention for future use.

The fact that we used only midwives who were part of the project group to assist in the Intervention Mapping process is a limitation of our study. These midwives chose to be involved and are probably among the early adopters ⁴⁶ regarding management of emotional wellbeing in pregnant women. Therefore a higher compliance of these three midwifery practices and those that were recruited by them is expected. However, the Diffusion of Innovation model makes clear that early adopters are required to initiate a new intervention ^{16,46}. In addition, women in our studies represented a healthy population, where women were predominantly Dutch and fairly affluent. Midwives were practising in midwife-led care, which is not common practice in other countries. These characteristics may mean that the women as well as midwives' needs are different for women and midwives in other countries or other settings. Therefore, as specified by intervention mapping, a maternal distress intervention should start with a need assessment in the specific setting.

Conclusion

This study demonstrated that Intervention Mapping is a useful tool to apply to the development of an intervention in the complex area of emotional wellbeing during pregnancy. Applying Intervention Mapping and involving stakeholders from the start of the project do not only tailor the intervention

tailored to the needs of pregnant women, but also to the abilities and possibilities of the midwives as implementers. By combining evidence from theory and practice an intervention for handling maternal distress with the potential for broad dissemination was developed.

Our goal was to make the development of our intervention more transparent in order to enable other program planners to identify and retain crucial elements when translating the intervention to other populations and settings. We strongly encourage future program planners in the field of midwifery to do so.

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CHAPTER 7

The effect of *Wazzup Mama?! An antenatal intervention to prevent or reduce maternal distress in pregnancy*

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ABSTRACT

Background

Maternal distress in pregnancy is a concern in maternal and child healthcare. In order to prevent or reduce maternal distress during pregnancy the antenatal intervention *WazzUp Mama?!* has been developed.

Aim

To evaluate the effect of the intervention *WazzUp Mama?!* on maternal distress during pregnancy among Dutch healthy pregnant women receiving midwife-led care.

Methods

A non-randomized pre-post intervention study including two cohorts of healthy Dutch-speaking women from 17 Dutch midwifery practices. The control group ($n = 215$) received antenatal care-as-usual and the experimental group ($n = 218$) received the intervention *WazzUp Mama?!* . Data were collected at the first and third trimester of pregnancy in two serial cohorts: first among the control group and subsequently among the experimental group. Socio-demographic characteristics were obtained. Maternal distress (MD) was measured with the Edinburgh Depression Scale (EDS), State-Trait Anxiety Inventory (STAI), and Pregnancy Related Anxiety Questionnaire (PRAQ). Multivariate repeated measure analysis examined within-group changes in maternal distress scores among pregnant women who received antenatal care-as-usual and pregnant women who received the intervention. ANCOVA evaluated the between-group differences.

Results

In the control group mean EDS, STAI and MD scores significantly increased from first to third trimester of pregnancy (EDS $p < .001$; STAI $p < .001$; MD $p < .001$), mean pregnancy-related anxiety (PRAQ) scores increased, but did not show statistical significance ($p = .12$), the proportion of scores above cut-off level of EDS, STAI and PRAQ significantly increased from first to third trimester of pregnancy (EDS $p < .001$; STAI $p = .045$, PRAQ $p = .03$), and the proportion of MD scores above cut-off level increased, but did not show statistical significance ($p = .13$). Within the experimental group the mean STAI, PRAQ and MD scores significantly decreased from first to third trimester (STAI $p = .001$; PRAQ $p < .001$; MD $p < .001$), the EDS mean scores decreased but not significantly ($p = .13$), proportions of scores above cut-off level for PRAQ and MD significantly decreased from first to third trimester of pregnancy (PRAQ $p < .002$; MD $p = .009$), the proportions of EDS and STAI scores above cut-off level decreased but not significantly (EDS $p = .4$; STAI $p = .4$), and there was a moderate significant positive main effect of *WazzUp Mama?!* on the MD scores $F(1.43) = 27.05$, $p < .001$, $d = .5$.

Conclusion

The results provide support for the effectiveness of the intervention *WazzUp Mama?!* as an opportunity to prevent or reduce maternal distress during the antenatal period in a healthy population of pregnant women.

Keywords

Antenatal intervention, maternal distress, depression, anxiety, pregnancy-related anxiety

INTRODUCTION

Maternal distress refers to a spectrum of different psychological difficulties occurring during pregnancy, most commonly identified as depression and anxiety in general or specifically related to pregnancy. While these difficulties are associated with different signs and symptoms they are significantly correlated^{1,2} and they have in common that women perceive and describe a sense of emotional burden³. Levels of maternal distress vary, ranging along a continuum that extends from daily worries to major symptoms of mental strain^{3,4}. It is difficult to report exact prevalence rates of maternal distress because it is a complex phenomenon⁵ that is ill-defined with no validated psychometric tool for measurement⁶. Using a maternal distress score compiled from different one-dimensional psychological constructs, we found a prevalence rate of 22% in a Dutch population of women with healthy pregnancies².

There is increasing evidence that maternal distress measured by either one-dimensional or combined psychological constructs among otherwise healthy pregnant women can be a predictor for negative birth outcomes, including reduced birth weight. Maternal distress is associated with maternal short and long-term (chronic) postnatal mental health problems, including post partum depression. Maternal distress is also associated with the physical, neurobehavioral and cognitive development of the child^{1,7-11}.

Despite the development of various interventions to reduce maternal distress, including mind-body therapies during pregnancy, antenatal education, group antenatal care and mentoring programs¹²⁻¹⁶, the weight of current evidence suggests that antenatal programs have limited success in preventing or reducing maternal distress. This lack of effectiveness may be the result of inadequate development, inadequate application, inappropriate context or population, or inappropriate design of trials testing the intervention^{17,18}.

Maternal distress is a complex concept¹⁹ requiring an intervention based on a systematic and evidence-based understanding of the underlying problem, its context, and the processes used to intervene^{5,20}. Within the project “Promoting Healthy Pregnancy”^a we developed *WazzUp Mama?!*, an intervention offered during midwife-led care to prevent or reduce maternal distress among healthy pregnant women.

We used Intervention Mapping as the framework for intervention development and implementation, and drew on theoretical models to identify strategies to address the behaviour of both the women receiving, and the midwives delivering the intervention²¹. During the development of the intervention we consulted with a consortium of 12 experts in midwifery and mental health. These experts validated the results from the studies that were performed as part of the project, assessing their clinical relevance for midwifery practice. The members of the consortium were also involved in the introduction of the *WazzUp Mama?!* intervention among practising midwives. The systematic process of the intervention development and production of *WazzUp Mama?!* has been

^a “Promoting Healthy Pregnancy” project is, in part, a response to the concerns of the Dutch Department of Health regarding the limited attention within maternal care regarding emotional wellbeing in pregnant women²² and is focussed on health promotion in Dutch midwifery. The project also addresses midwives’ reported insufficient awareness and understanding of maternal distress and uncertainty about their specific role and responsibilities in providing responsive care for women with maternal distress within midwife-led care. Midwife-led is offered to women with healthy pregnancies with a minimum of health and/or obstetric risks who do not require specialized medical care²³.

described elsewhere ²⁴.

In accordance with our framework ²¹ we conducted several studies ^{2,19,25,26} before we developed the antenatal intervention. To understand where and how to intervene with maternal distress we began with a concept of maternal distress that focused on context ¹⁹. We then developed measures to assess the extent of maternal distress, identify women most at-risk for maternal distress, and uncover the key modifiable determinants of maternal distress ².

In the course of our work we found important parallels in the key components of the behaviour of women and the midwives' management of antenatal care, which allowed us to target issues related to risk factors that appeared amenable to change. Where women needed to self-disclose about the signs and symptoms of maternal distress and about the triggers for maternal distress ², midwives needed to screen for those triggers and the presence of maternal distress, and to educate women about signs, symptoms, and triggering factors of maternal distress ²⁶. Where women needed to cope with maternal distress in their daily life ², midwives needed to advise, guide and support women in their efforts to cope ²⁶. Where women needed to be able to seek help ², midwives needed to know how and when to refer to the appropriate healthcare professionals ²⁶. It was evident that in order to prevent or reduce maternal distress a *collaborative* intervention between the expectant mother and the midwifery healthcare provider was required. Thus we needed to engage women as well as midwives in the intervention ⁵.

In this paper we assess the effect of the intervention *WazzUp Mama?! on antenatal maternal distress by examining the changes across time in maternal distress among healthy pregnant women who received the antenatal intervention WazzUp Mama?! and healthy pregnant women who received antenatal care-as-usual and the differences between these groups.*

METHODS

Design and sample procedure

When we drew the project plan we considered conducting a randomized controlled trial with two-stage cluster sampling to test the effect of the intervention. Power calculation showed that a minimum of 46 midwifery practices would be necessary to conduct the study. We considered a likelihood of recruiting that number of midwifery practices and decided that it was more feasible to conduct a non-randomized pre-post intervention study with a sequential control and experimental group. Using the design we needed a more manageable number of midwifery practices, 16, to detect a small effect.

In our quasi-experimental study we included two cohorts of healthy Dutch-speaking women in midwifery-led care. Women with (pre-) existing medical conditions at the point of registration, requiring secondary or tertiary medical and/ or obstetric care were excluded. Two cohorts of pregnant women from 17 midwifery practices, situated in the Southern, Mid-Eastern and Northern regions of the Netherlands were recruited for the study. Midwifery practices were recruited using convenience sampling carried out by the members of the consortium group.

Recruitment of the participants and data collection for the control and experimental group were carried out in two sequential time periods in the participating practices, between 24 April 2013 to 7 March 2014 for the control group, and between 14 April 2014 to 9 March 2015 for the experimental group (Figure 1). The control group received antenatal care-as-usual, provided by the midwifery practices. In the Netherlands, there is no standard care routine for maternal distress ^{26,27}.

Midwives were trained for *WazzUp Mama?!!* prior to recruitment of participants for the experimental group, but not before all data were collected from participants of the control group. The data for both cohorts were collected during the first trimester of pregnancy (T1) and during the third trimester (T2). T1 was at 7 (SD \pm 2.2, range 4-14) weeks gestation, before women had their first physical appointment (a booking appointment and/ or scan) with their midwife. T2 took place at 37 (SD \pm 1.53, range 35-42) weeks gestation. Each questionnaire was followed-up by two reminders with one week interval for each reminder.

Midwives or practice assistants approached women about the study during women's registration telephone call. Women were verbally informed about the topic of the study and were told that their involvement would consist of filling out two questionnaires at two time points during pregnancy. If women were willing to participate, their email addresses were forwarded to the researcher (Y.F.). Additional information about the study and an invitation to participate in the first questionnaire were then digitally distributed to the women; this information explained the background and purpose of the study and the procedures involved. Women were reassured that their decision to participate in the study would not affect the level of care they would receive and that they could withdraw from the study at any point, without affecting their care. Participants digitally consented to participate before they were able to fill out the first questionnaire. The researcher approached midwifery practices, either midwives or practice assistants, prior to sending out the second questionnaires to inquire about women who had experienced pregnancy losses. Those women were not approached for the second questionnaire ($n = 26$ in control group; $n = 32$ in experimental group). Women who did not respond to the second questionnaire were approached by email to ask their reason for non-responding.

Ethical approval was obtained by the Medical Ethical Committee Atrium-Orbis Medical Centre Zuyd (registration no. 13-N-45 (11-N-101)/11-4-2013). The study was registered with the Dutch Trial Registration (TC 4688).

Figure 1. Flowchart Study Population



'WazzUp Mama?!'

The program has two parts: one for pregnant women and one for midwives. The program part for women aims to identify the vulnerability of, or the presence and severity of maternal distress during pregnancy. When maternal distress is absent or vulnerability is identified, the program is designed to prevent it from developing. When maternal distress is present, the program aims to reduce it. The program included a web-based tailored program, consisting of (i) a homepage, (ii) a process for

collecting personal information including first name, residence, midwifery practice, and results of screening tests addressing personal circumstances and history, emotional wellbeing, emotional stamina or perceived burden, maternal distress and coping mechanisms and (iii) personalized feedback based on the data collection in (ii). The screening tests used three self-directed pathways. The first pathway focused on the signs and symptoms of maternal distress and the identification of whether the respondent's mood state belongs to the physiological process of pregnancy or deviates from that process. The second pathway focused on identifying (potential) stress factors, problems or difficult situations in the past or present that may lead to, or contribute to, the development of maternal distress. The third pathway focused on the measurement of maternal distress, operationalized using the Edinburgh Depression Scale. Scores above defined cut-off points identified the level of severity of maternal distress and the consequent advice on self-management and support. When women identified stress factors or the presence of problems or difficulties, they were asked to score their perceived burden or emotional stamina on a scale from 0 to 10. Cut-off points indicated women's need for self-management or for additional (professional) support.

The personalized feedback from the screening tests included (i) advice for everyday life in order to provide respondents with a variety of practical tools to choose from, including relaxation, (ii) advice about positive ways of coping and offering alternative approaches to effective coping, and (iii) resources for self-management, and information about local lay workers, support groups and individual regular and alternative (local) healthcare for psychological and emotional help and support. Finally, a synopsis of all the advice given was presented to the woman, who was encouraged to print it out and discuss it with her midwife.

The program part for midwives provided a format to support pregnant women's self-disclosure and self-management with regard to maternal distress and for the implementation and coordination of care for maternal distress. The program included an educational part and a toolkit. The toolkit contained (i) a guideline including a clinical pathway for consultation and referral, (ii) a regional healthcare map including all relevant caregivers and health initiatives aiming at psychological and emotional wellbeing in the midwives' local area of practice, (iii) a format for team meetings/ client discussion, consultation, and referral. The guideline used case-finding questions consistently asked throughout antenatal care and the clinical pathways used the scoring system of perceived burden or emotional stamina with the same cut-off points as the web-based program for women.

Prior to using the toolkit, midwives were trained how to use the tools. Midwives were also provided with posters advertising the tailored website and with cards to hand out to clients with the URL of the web-based tailored program. Development and implementation of the program is described extensively elsewhere ²⁴.

Measures

Our data were collected using a self-reported questionnaire. We collected socio-demographic information and personal details and we used Dutch versions of the following psychometric measures: *Edinburgh Depression Scale* (EDS) ²⁷, *State-Trait Anxiety Inventory* (STAI) ²⁸, and the *Pregnancy Related Anxiety Questionnaire* (PRAQ) ²⁹. To our knowledge there is no existing psychometric measurement tool to measure maternal distress as a multidimensional concept of different pregnancy specific mood states and mood states that are not pregnancy or birth-related ⁶. Therefore we chose to simultaneously measure depression, anxiety and pregnancy-related anxiety as we did in a previous study ². Focusing on only pregnancy-related anxiety during pregnancy may

overestimate the impact of maternal distress that is caused by the temporary state of pregnancy and fail to depict women's pre-pregnant feelings of anxiety and depression that are likely to continue during pregnancy.

Edinburgh Depression Scale (EDS)

We used the EDS, a 10-item questionnaire developed to screen for the likelihood of antenatal Depression³⁰. Cronbach's alphas at T1 in the control and experimental group were α .83, .84 and at T2 α .94, .88. The EDS shows high reliability and validity in pregnant populations⁶. We asked participants to reflect on their feelings and thoughts of the last seven days. Responses are scored 0, 1, 2 or 3 in seriousness of symptoms. The total score ranges from 0 to 30. In this study we used a cut-off score of 11 or more for women in the first trimester and 10 or more for women in the second and third trimester to measure depression. Cut-off scores were based on a Dutch validation study of the EDS among pregnant women in the Netherlands. These cut-off scores appear adequate and balance sensitivity, specificity, and positive predictive value per trimester³¹.

State-Trait Anxiety Inventory (STAI)

To identify feelings of anxiety we employed the Trait scale of the STAI³². Trait-anxiety is viewed as anxiety proneness, a relatively stable personality characteristic. The Trait scale shows high concurrent validity in the pregnant validation sample⁶. Cronbach's alphas at T1 in the control and experimental group were α .93, .92 and at T2 α .96, .98. We asked participants to describe how they generally felt during the past year. The Trait scale contains 20 items and uses a 4-point rating scale to measure anxiety (1 'not at all'; 4 'very'). Scores vary between 20 and 80. Women with scores of 41 and higher are perceived to have high levels of anxiety. This cut-off point has been validated in pregnant Dutch women²⁸.

Pregnancy Related Anxiety Questionnaire (PRAQ)

We measured pregnancy-related anxiety with the 10-item PRAQ²⁹. Cronbach's alphas at T1 in the control and experimental group were α .82, .85 and at T2 α .88 for both groups. The questionnaire consists of three subscales measuring: fear of giving birth, fear of bearing a physically or mentally handicapped child and concern about own appearance. We asked women which score reflected their emotions and thoughts the most. The PRAQ uses a 5-point rating scale to measure fear and worries (1 'not at all'; 5 'very'). Scores vary between 10 and 50. Based on an earlier Dutch study¹¹ we used the 90th percentile of the T1 PRAQ total scores to identify women scoring high on pregnancy-related anxiety at T1 and T2. The PRAQ scores have shown predictive validity³³.

Maternal Distress (MD)

Compiling scores of different constructs measured at the same time provides a more complete and clear picture of maternal distress and provides more stable data³⁴. We chose to define the measure of Maternal Distress (MD) as the sum of the different individual measures of the EDS, STAI and PRAQ. When participants scored above the cut-off level on one or more of the respective individual measures, participants were rated as having heightened levels of maternal distress.

Data analysis

Power calculation was based on a 1:1 ratio between control and experimental group, a hypothesised 10% decrease of heightened scores of maternal distress, 80% power and α level of $< .05$. To achieve

this, 149 women were required in each arm. Data from all participants were evaluated for completeness. Normality of distribution was visually interpreted with the graphical tests - histograms and Q-Q plots - and deemed to be satisfactory. Crude data were used for descriptive analysis. Mean sum scores were calculated for depression (EDS), anxiety (STAI), pregnancy-related anxiety (PRAQ) and maternal distress (MD). To justify our multi-dimensional approach we measured the degree of relationship between the EDS, STAI and PRAQ scores with Pearson's correlation coefficient (one-tailed), which showed significant moderate to very strong positive correlations (Table 1). We calculated descriptive statistics for the socio-demographic factors and personal characteristics. We compared socio-demographic, personal characteristics and the baseline maternal distress scores between the two groups, using Chi-square tests for categorical variables and Analysis of Variance (ANOVA) for continuous variables. We conducted logistic regression to evaluate the factors that are related to responding and non-responding participants in both groups. We used the observed data for the comparison of baseline characteristics and for comparison of responders and non-responders.

Table 1. Pearson's correlation coefficient (one-tailed) for EDS, STAI and PRAQ scores

	EDS & STAI	EDS & PRAQ	STAI & PRAQ
Control T1	$r = .75 \, p = <.001$	$r = .32 \, p = <.001$	$r = .36 \, p = <.001$
Control T2	$r = .89 \, p = <.001$	$r = .65 \, p = <.001$	$r = .68 \, p = <.001$
Experimental T1	$r = .79 \, p = <.001$	$r = .42 \, p = <.001$	$r = .49 \, p = <.001$
Experimental T2	$r = .86 \, p = <.001$	$r = .6 \, p = <.001$	$r = .66 \, p = <.001$

To handle the at random missing values in the response process of our study we imputed missing values using maximum likelihood methods (Expectation Maximisation) ³⁵. In addition we performed a multivariate repeated-measures design to examine the within-group changes of maternal distress among pregnant women who received antenatal care-as-usual (control group) and women who received the intervention *WazzUp Mama?! (Experimental group)*. The conjunction of these methods is fully consistent with intention-to-treat (ITT) ³⁶.

Our effect analyses focused on the within-group and between-group differences of MD scores in change from baseline (T1) to post-intervention (T2), to describe and compare the change of direction in both groups and to assess the between-group difference. We examined the within-group changes by comparing baseline (T1) and post-test (T2) means for EDS, STAI, PRAQ and MD scores within both the control and experimental group with multivariate repeated measure analysis. We compared the proportion of women with scores above the cut-off levels of the respective measures using Chi-square tests ³⁵ in both the control and experimental group at T1 and T2. We used the cases with MD scores above cut-off level to establish the composited prevalence rate of MD.

To select the dependent variable to determine the effect of the intervention without losing statistical power, we checked the assumptions for multicollinearity with Pearson's correlation coefficient (two-tailed) between MD and EDS, STAI and PRAQ ³⁵. As expected, there were very strong positive Pearson's correlations between MD and the respective measures depression ($r = .802, p = <.001$), anxiety ($r = .925, p = <.001$) and pregnancy-related anxiety ($r = .718, p = <.001$). We therefore chose MD as our dependent variable and performed Analysis of Covariance (ANCOVA) to determine the effect of the intervention and significance of differences between the control and experimental group for the post-test MD scores. We entered the baseline MD scores and parity, planned pregnancies, life-events one year prior to pregnancy, history of miscarriage, income, use of medication and history of psychological/ psychiatric problems as covariates to control for initial

between-group differences. Covariates were chosen based on the findings of earlier studies ^{2,19} and expert judgment. Effect sizes were calculated using Cohen's *d*. A value of $p < .05$ was considered statistically significant. Data entry and analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 22.0.

RESULTS

Participants

Figure 1 shows the flowchart of the participants in both control and experimental group. Baseline characteristics of the participants from both control and experimental group are presented in Table 2. There were no significant differences between the participants in the control and experimental group. Reasons for non-responses are presented in Figure 1. Logistic regression was conducted to evaluate which independent baseline variables were predictors for responding to both questionnaires at T1 and T2 (see ^a in Table 2). Analysis showed that the having a planned pregnancy significantly predicted responding at T1 and T2. Having an unplanned pregnancy showed decreased likelihood to responding at T2 (OR .26, 95% CI .12 - .55, $p = < .001$).

Table 2. Characteristics and baseline maternal distress scores control and experimental group

	Control Group N=215		Experimental Group N=218			
	Mean (SD ±)	N (%)	Mean (SD ±) range	N (%)	F	X ²
Age in years ^a	29.98 (±3.71) 18-42		30.11 (±4.09) 21-42		.117	
Gestational age in weeks	7.18 (±2.3) 3-15		6.93 (±2) 4-14		1.36	
Parity ^a						.385
Nulliparous		105 (48.8)		103 (47.2)		
Multiparous		110 (50.2)		115 (52.8)		
Partnered		215 (100)		218 (100)		Constant
Ethnicity respondent ^a						1.982
Respondent born in the Netherlands		211 (98.1)		212 (97.2)		
Respondent born in other Western country		3 (1.4)		2 (0.9)		
Respondent born in non-Western country		1 (0.5)		4 (1.8)		
Ethnicity mother respondent						4.429
Mother respondent born in the Netherlands		210 (97.7)		205 (94)		
Mother respondent born in other Western country		4 (1.9)		7 (3.2)		
Mother respondent born in non-Western country		1 (0.5)		6 (2.8)		
Ethnicity father						4.089
Father respondent born in the Netherlands		211 (98.1)		207 (95)		
Father respondent born in other Western country		3 (1.4)		5 (2.3)		
Father respondent born in non-Western country		1 (0.5)		6 (2.8)		
Level of income ^a						4.081
Income above average (€ 33.000/ annum)		69 (32.1)		82 (37.6)	136	
Income below average (€ 33.000/ annum)		146 (67.9)		136 (62.3)		
Working (paid) job ^a		205 (95.3)		202 (92.7)		3.090
Level of education ^a						3.395
Low level of education		16 (7.4)		24 (11)		
Medium level of education		89 (41.5)		74 (34)		
High level of education		110 (51.1)		118 (55)		
Smoking during pregnancy ^a	2.92 (±1.25) 1-10 sig/day		3.4 (±1.35) 2-6 sig/day	10 (4.6)		.458

Alcohol use during pregnancy ^a	none	0	none	0		
Planned pregnancy ^a		193 (89.8)		195 (89.4)		.012
History of miscarriage ^{1,a}		40 (18.6)		42 (19.3)		.031
Life events in year prior to pregnancy ^a		101 (47)		93 (42.7)		.815
Current domestic violence ^a		none		2 (0.9)		1.982
History of psychological problems ^a		47 (21.9)		59 (27.1)		1.585
Family with current or a history of psychological problems ^a		35 (16.3)		34 (15.6)		.038
Current medication use (prescribed) for psychological problems ^a		5 (2.3)		9 (4.1)		1.693
EDS (range 0-30)	4.48 (± 3.5) 0-20		4.55 (± 3.52) 0-18		.05	
EDS score 11 or more		15 (7)		17 (7.8)		.034
STAI (range 20-80)	28.9 (± 9.38) 20-62		28.72 (± 9.58) 22-60		.067	
STAI score 41 or more		29 (13.5)		30 (13.8)		.284
PRAQ (range 10-50)	18.59 (± 7.07) 10-42		18.58 (± 7.01) 10-42		.311	
PRAQ 1 (fear of giving birth) (range 3-15)	5.43 (± 3.3) 3-15		5.8 (± 3.37) 3-15		.231	
PRAQ 2 (fear of bearing a handicapped child) (range 4-20)	7.66 (± 3.69) 4-20		7.5 (± 3.43) 4-20		.210	
PRAQ 3 (concern own appearance) (range 3-15)	5.4 (± 3.08) 3-15		5.28 (± 3.11) 3-15		.265	
PRAQ total scores >90 th percentile		22 (10.2)		25 (11.5)		1.54
MD ^a	17.32 (± 6.65) 0-62		17.28 (± 6.64) 0-60		.001	
Heightened levels of MD ⁴		45 (20.9)		49 (22.5)		.477

* $p < .001$

¹Previous miscarriage, ectopic pregnancy, surgical/ pharmaceutical abortion

²During the past month, have you often been bothered by feeling down, depressed, or hopeless?

³During the past month, have you often been bothered by little interest or pleasure in doing things?

⁴Heightened scores on one of more levels of EDS ≥ 11 , STAI ≥ 41 and/or PRAQ >90th percentile

^aEntered in logistic regression

Changes in maternal distress scores within control and experimental groups

The within-group changes are reported in Table 3. In the control group the mean EDS, STAI and MD scores significantly increased from baseline (T1) to post-intervention (T2) ($p < .001$, $p < .001$, $p < .001$). Mean PRAQ scores increased but did not reach statistical significance ($p = .12$). The proportion of EDS, STAI and PRAQ scores above cut-off level significantly increased from baseline (T1) to post-intervention (T2) ($p < .001$, $p = .045$, $p = .03$). The MD scores above cut-off level increased but not significantly ($p = .13$). There was 5.6% increase in the proportion of MD scores above cut-off level from T1 to T2.

In the experimental group, the mean EDS scores decreased at T2 compared to T1 but did not reach statistical significance ($p = .13$). The mean STAI, PRAQ and MD scores in the experimental group were significantly lower at T2 compared to T1 ($p = .001$, $p < .001$, $p < .001$). The proportion of PRAQ and MD scores above cut-off level were significantly lower at T2 compared to T1 ($p = .002$, $p = .009$). The EDS and STAI scores above cut-off level decreased, but this did not reach statistical significance ($p = .4$, $p = .4$). There was 9.2% decrease in the proportion of MD scores above cut-off level from T1 to T2.

Effect of the intervention WazzUp Mama?!

Mean MD scores in the control group significantly increased from 17.32 to 19.41 from T1 to T2, and significantly decreased from 17.28 to 15.32 in the experimental group. The proportion of MD scores above cut-off level in the control group significantly increased with 5.6% from first to third trimester

while these significantly decreased with 9.2% in the experimental group. The total difference of the proportions of scores above cut-off levels between the control and experimental group was 13.2%, taking the difference at baseline between the two groups into account.

ANCOVA was conducted to evaluate the effectiveness of the intervention *WazzUp Mama?!* after controlling for baseline MD scores, parity, planned pregnancies, life-events one year prior to pregnancy, history of miscarriage, income, use of medication and history of psychological/psychiatric problems. There were no covariate outliers and relationships between maternal distress and the respective covariates were linear, increasing explanatory power of the model ³⁵. Significant between-group MD changes were observed between the control and the experimental group. There was a moderate significant main effect of *WazzUP Mama?!* on the MD scores ($F(1.43) = 27.05$, $p = < .001$, $d = .5$). The covariates showed no impact on the post-test MD scores. There was no interaction between MD and the covariates hence the assumption of homogeneity of regression slopes was not violated, which means that the model was accurate ³⁵.

Table 3. Changes within experimental and control group from first trimester (T1) to third trimester (T2)

Measure	Control group (n = 215)								
	T1 (baseline)			T2 (post)					
	Mean	SD (±)	N (%)	Mean	SD (±)	N (%)	F (4.21)	X ²	p
Depression (EDS) (0-30)	4.48	± 3.5, 0-20		7.21	± 4.69, 1-26		70.23		<.001
Above cut-off level EDS			15(7)			42 (19.5)		14.74	<.001
Anxiety (STAI) (20-80)	28.9	± 9.38, 20-62		31.6	± 10.17, 20-72		16.6		<.001
Above cut-off level STAI			29 (13.5)			43 (20)		3.27	.045
Pregnancy-related anxiety (PRAQ) (10-50)	18.59	± 7.07, 10-42		19.43	± 7.17, 10-42		1.47		.12
PRAQ 1 (3-15)*	5.43	± 3.3, 3-15		6.1	± 2.67, 3-14				
PRAQ 2 (4-20)*	7.66	± 3.69, 4-20		7.68	± 3.54, 3-18				
PRAQ3 (3-15)*	5.4	± 3.08, 3-15		5.65	± 2.85, 3-15				
Above cut-off level PRAQ			22 (10.2)			37 (17.2)		4.42	.03
Maternal Distress (MD) (0-80)	17.32	± 6.65, 0-62		19.41	± 7.34, 1-72		11.94		<.001
Above cut-off level MD ¹			45 (20.9)			57 (26.5)		1.55	.13
	Experimental group (n = 218)								
	T1 (baseline)			T2 (post)					
	Mean	SD (±), range	N (%)	Mean	SD (±), range	N (%)	F (4.21)	X ²	p
Depression (EDS) (0-30)	4.55	± 3.52, 0-18		4	± 3.4, 0-24		6.32		.13
Above cut-off level EDS			17 (7.8)			14 (6.4)		.313	.4
Anxiety (STAI) (20-80)	28.72	± 9.58, 22-60		26.93	± 9.85, 20-63		11.1		.001
Above cut-off level STAI			30 (13.8)			27 (12.4)		.182	.4
Pregnancy-related anxiety (PRAQ) (10-50)	18.58	± 7.01, 10-42		15.04	± 6.42, 10-41		47.4		<.001
PRAQ 1 (3-15)*	5.8	± 3.37, 3-15		4.68	± 2.83, 3-15				
PRAQ 2 (4-20)*	7.5	± 3.43, 4-20		6.05	± 3.19, 3-17				
PRAQ 3 (3-15)*	5.28	± 3.11, 3-15		4.31	± 2.52, 3-15				
Above cut-off level PRAQ			25 (11.5)			8 (3.7)		9.48	.002
Maternal Distress (MD) (0-80)	17.28	± 6.64, 0-60		15.32	± 6.55, 0-63		28.69		<.001
Above cut-off level MD ¹			49 (22.5)			29 (13.3)		6.25	.009

*Not included in multivariate repeated measure analysis

¹Heightened scores on one of more levels of EDS ≥11 (T1)/ ≥10 (T2), STAI ≥41 and/or PRAQ >90th percentile

DISCUSSION

We evaluated the effect of the intervention *WazzUp Mama?! on antenatal maternal distress by examining and comparing the changes in maternal distress among pregnant women after receiving the antenatal intervention WazzUp Mama?! compared to women receiving antenatal care-as-usual. Levels of maternal distress of the participants in the control group significantly increased from first trimester to the third trimester of pregnancy. This was in contrast with the decrease in maternal distress scores from first to third trimester for women in the experimental group. There was a significant within-group difference in the control group as well as in the experimental group in opposed directions. In the experimental group the within-group difference was in the positive direction (i.e. reduction in maternal distress scores) and we reached the hypothesized 10% decrease of heightened levels of maternal distress after receiving the intervention. Receiving the intervention had a significant moderate positive effect on maternal distress when compared to those not receiving the intervention. The scores of the control group suggest that an expected maternal distress pattern during pregnancy is an increase from first to third trimester ^{37,38}. Taking this into account, the effect of the intervention is even higher.*

Maternal distress as used in our study is a composite score of the one-dimensional constructs depression, anxiety and pregnancy-related anxiety. The three components depression, anxiety and pregnancy-related anxiety have been measured with analogous psychometric metrics. Interrelations between depression, anxiety and pregnancy-related anxiety have been documented ^{2,39}. In this study we measured moderate to very strong positive relationships between the scores of the EDS, STAI and PRAQ metrics, which indicates that the metrics are measuring common aspects of maternal distress ^{40,41}. The correlations between EDS and PRAQ and STAI at T1 were relatively lower compared to T2. This may be explained by the fact that PRAQ included questions regarding the forthcoming birth. As birth was not imminent at T1, these questions may be less relevant in early pregnancy.

The STAI and PRAQ scores in our study showed larger standard deviations than the EDS scores, which suggests that these mean scores are likely to be weighted more in our compiled score maternal distress ⁴². This could have been adjusted by compositing a unit-weighted score ⁴². By standardizing the metrics, instead of summing the scores, scores would be averaged and would affect the distribution of differences of the scores above cut-off levels that we used to assess the presence of heightened levels of maternal distress ^{40,42}. We would have been able to compare the mean scores of the different psychometric measures but would have lost the meaningfulness of the scores ⁴³.

It is of interest to contemplate whether the intervention has an effect on the onset or duration of maternal distress or on the reduction of existing emotional symptomatology prior to pregnancy. The fact that the post-test scores of the experimental group were lower than the baseline scores in both control and experimental group may indicate that symptoms that would have occurred without the intervention did not develop or increase as a result of *WazzUp Mama?!.*

Our study included two time measurements. Our measurements in the control group suggest an upward slope in maternal distress between the first measurement at 7 weeks gestation and the second measurement at 37 weeks gestation. Because we did not include an additional mid-term measurement or multiple regular measurements throughout gestation, we can make no conclusions about the changes across time in the control and experimental groups. Some studies suggest that the course of maternal distress can fluctuate and includes transient signs and symptoms ^{44,45} or follow a non-linear changing course ⁴⁵.

The characteristics of our sample are fairly representative for the average healthy Dutch pregnant population, apart from level of income in the experimental group and ethnicity ⁴⁶⁻⁴⁸, thus our findings are generalizable to similar populations of pregnant women.

Limitations of the study

Our study has limitations. Midwifery practices were recruited by means of convenience sampling, which may have led to participating midwives having affinity with maternal distress. It is known that the more interested midwives are in maternal distress or the more they believe that an intervention will be beneficial, the more they engage with maternal distress ^{26,49}, resulting in selection bias. However, midwives participated in both control and experimental conditions, diminishing possible selection bias.

Women were approached for participation by midwifery practices. It is unknown if midwives and practice assistants consciously and selectively approached certain women to participate creating the possibility of selection bias and threatening internal validity. Women's decision to participate could have been influenced by self-recognition of maternal distress and consequently have led to self-selection. Self-selection could have led to a higher prevalence of maternal distress.

Non-responders were more likely to have an unplanned pregnancy. Having a history of psychological problems, inadequate finances and a low level of education are known reasons that women drop out of studies during pregnancy that focus on affected moods in pregnancy ⁵⁰. This is however not consistent with the characteristics of the non-responders in our study. It is known that an unwanted pregnancy is a predictor of maternal distress in pregnancy ^{45,51}, so prevalence of maternal distress might have been higher than reported in our study.

There were no systematic differences between the characteristics of participants of the control and experimental group. Although we did not randomize our participants, the similarities in characteristics indicate that it is unlikely that selection bias has occurred ⁴⁹. We have also run both ANOVA of change and ANCOVA analyses resulting in consistent findings between both analyses, indicating that we have taken appropriate measures to reduce bias ⁵².

We used lower cut-off points for EDS compared to international studies ⁵³. Our cut-off levels were based on populations with similar culture and ethnic background ^{31,53} as our study population. This might have led to (over)pathologising maternal distress ⁵⁴. Finally, we lack a standard to test the validity of the maternal distress measure.

We have to consider the mechanism of the effect of the *WazzUp Mama?!* . There is the possibility that intervention effects were simply due to the extra time and attention paid to the experimental group as opposed to the control group. We are also unaware if women sought additional advice or help not mentioned in the intervention that could have influenced the outcomes ³⁹. In our intervention development and implementation we have adhered to a systematic approach according to the framework Intervention Mapping, which is likely to have contributed to the effectiveness of *WazzUp Mama?!* ^{5,21}. Because maternal distress is a complex phenomenon the reduction of maternal distress requires a complex intervention, making it more difficult to explain the overall effect of *WazzUp Mama?!* effect with a one-size-fits-all answer ⁵.

Recommendations for research

In our study there was no random assignment to the intervention but we used a pre-test and comparison group. If wider implementation of the intervention were to be considered, it would be advisable to repeat the study with random assignment of the intervention to avoid threats to

internal validity, preferably with larger sample sizes to take account of extra variability^{5,20}. Future research should also build on our work, examining and constructing the measure maternal distress. Improvements in women's mood and reduction of distress during pregnancy have value in their own right. However, obviously the hope is that the benefit of *WazzUp Mama?!* will extend into the postnatal period and thereafter. We measured maternal distress only during pregnancy. It would be of great interest to public health to consider the sustainability of the positive outcomes in the first year after birth and thereafter. Long-term follow-up may be needed to determine whether the changes that occurred during pregnancy persist or have long-term effects on mothers and children⁵⁵. A possibility is to extend the evaluation of *WazzUp Mama?!* with a retrospective post partum time measure. Additionally, a process evaluation will provide valuable information to understand the causal mechanism of the intervention and the contribution of the separate components of the intervention, both of which will optimize the intervention for future implementation.

We have studied the effect of *WazzUp Mama?!* in an on average healthy population of pregnant women receiving midwife-led care. The results are therefore not generalizable to pregnant women in other clinical settings. It would be of interest to study the effect of the intervention in obstetric care settings, as it has been suggested that high-risk women have other emotional health needs⁵⁶ and they may benefit from the intervention as well.

Recommendations for practice

Given the positive effect of *WazzUp Mama?!* we advise use of the intervention in midwifery practice. Implementation of the intervention would require additional training and support for midwives. Practising midwives need to be informed about the intervention and encouraged to think of strategies to implement the intervention to build on their core role, and to refocus their current role¹⁸. It is advisable to implement the interventions as a whole, containing both the parts for women and for midwives. Because the intervention contained several interacting components, it is possible that separate components variably contributed to the overall effect of *WazzUp Mama?!* . The structure and content of the two parts enhance each other and the various features of the two program parts are likely to have an interchangeable intervention effect. Individual women might respond or benefit differently to separate intervention parts or components. Because of the tailoring and self-management aspects of the intervention, women are able to choose what suits them best. Midwives need to be aware that antenatal care is the period of most intensive contact with women during pregnancy and provides a considerable opportunity to prevent or reduce maternal distress¹⁸.

CONCLUSION

Our non-randomized pre-post intervention study showed that the intervention *WazzUp Mama?!* had a significant effect on maternal distress. In the control group measuring depression, anxiety and pregnancy-related anxiety moved in the negative direction while in the experimental group these scores moved in the positive direction. *WazzUp Mama?!* has a promising effect on maternal distress when carried out by midwives among healthy pregnant women.

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CHAPTER 8

General discussion

The general aims of this thesis were:

- To better understand the needs of healthy pregnant women with regard to antenatal maternal distress and to investigate the factors that influence the occurrence of antenatal maternal distress.
- To gain insight into the effectiveness of existing antenatal interventions
- To examine the current midwifery management of care for maternal distress in daily midwife-led practice.
- To translate this information into an intervention to optimise maternal emotional wellbeing during pregnancy.
- To test the effectiveness of the developed intervention.

We first explored the scientific literature for the health needs of pregnant women that should be considered when developing an intervention to optimise antenatal maternal emotional wellbeing (chapter 2). Subsequently, we studied these needs more specifically among Dutch women with healthy pregnancies (chapter 3). We also looked at existing interventions to prevent and reduce maternal distress and examined their effectiveness (chapter 4), and we studied midwives' intentions to provide antenatal care with regard to maternal distress (chapter 5). Using this preparatory research, we systematically developed the intervention *WazzUp Mama?! (Chapter 6)* and then studied the effect of the intervention among pregnant women in midwife-led care (chapter 7).

MAIN FINDINGS

As a result of our integrative review (chapter 2) we learned that the prevention and reduction of antenatal maternal distress require a focus on a number of factors, including women's personal characteristics, their past and present circumstances, their coping behaviour, and certain environmental factors. Midwives should discuss these multiple factors with women in order to assess a woman's vulnerability for maternal distress during pregnancy.

In our cross-sectional study (chapter 3) we identified the specific factors that had a linear association with maternal distress in a population of Dutch women with healthy pregnancies. As a result of this analysis we concluded that in order to identify women that are more vulnerable to have or develop maternal distress, midwives need to address issues such as a personal and family history of psychological problems, the existence of current daily stressors, and how women perceive the forthcoming birth. Women who have children, women who tend to avoid problems in their life, and women who translate emotional problems into somatic complaints are more likely to experience maternal distress. Women are able to reduce maternal distress when they have the opportunity to self-disclose about what is bothering them and when they learn how to accept troubling circumstances, and personal issues of concern in their lives.

The findings of our systematic review and meta-analysis (chapter 4) indicated that universal preventive strategies (interventions that are offered to all women with a healthy pregnancy) do not reduce maternal distress. However, our findings did show that preventive strategies that are offered to a selected sample of pregnant women with characteristics that make them more vulnerable to develop maternal distress (selective prevention) do have a small but significant effect on the reduction of maternal distress. Treatment strategies for women with maternal distress (indicative prevention) also have a significant reducing effect on maternal distress.

In our exploratory survey among a sample of Dutch midwives (chapter 5), we found that midwives are less inclined to screen for maternal distress among their clientele than they are to offer support to women with maternal distress, and to collaborate with other healthcare professionals in order to help women with maternal distress. We also found a positive and linear association between a midwife's interest in maternal distress and her intention to screen for maternal distress, to support women, and to collaborate with other healthcare professionals. The intention to screen for maternal distress was positively related to years of work experience, and to having a positive attitude toward, an interest in, and a sense of self-efficacy (perceived control) for antenatal screening of maternal distress. Our meta-analysis (chapter 4) showed that screening and assessment of signs and symptoms of, and vulnerability for maternal distress to be a vital component of midwifery antenatal care. Screening and assessment allows midwives to select those women that are currently experiencing distress or who are likely to develop maternal distress during pregnancy. Asking women how they feel, how they perceive, or how they experience certain aspects of their life stimulates self-disclosure. In our cross-sectional study among pregnant women (chapter 3) we found self-disclosure to be beneficial for the reduction of maternal distress.

Our integrative review (chapter 2) showed that maternal distress is a complex concept with a number of underlying issues, requiring an intervention with multiple interacting components. The results, described in chapter 2 to 5, provided evidence for an intervention that included an individual component (*for the pregnant woman*) and an interpersonal component (*between the midwife and the women*). The systematic process of designing this intervention, using steps 1 to 5 of the Intervention Mapping process, is described in chapter 6. In our intervention we differentiated between women who experience mood changes as a result of pregnancy, women who are more likely to develop maternal distress during pregnancy because of certain risk factors in their life, and women who are experiencing maternal distress.

The *WazzUp Mama?!* included an education program and a 'toolbox' for midwives to address midwives' needs, a tailored web-based program for women, and professional face-to-face contact between women and midwives. To address pregnant women's knowledge, attitude, risk perception, self-efficacy and social influences, our main strategies were tailoring and communicative support. Information processing was the main strategy we used to enhance midwives' knowledge, attitude, self-efficacy screening and skills management.

In our non-randomized pre-post intervention study – comparing maternal distress scores of women who received the intervention (experimental group) with the scores of women who received care-as-usual (control group) (chapter 7) - we found a significant effect of the intervention *WazzUp Mama?!* . In the control group mean maternal distress scores, and scores above cut-off level increased from first trimester to the third trimester of pregnancy. This was in contrast with maternal distress in the experimental group, where the scores decreased during this time period. *WazzUp Mama?!* appears to have a promising effect on the prevention and reduction of maternal distress when carried out by midwives among healthy pregnant women.

The main findings of this thesis indicate that maternal distress is a multi-factorial and multi-dimensional health problem that can be positively influenced by the timely detection of potential predisposing factors, the identification of vulnerability for maternal distress, and the assessment of emotional wellbeing in the antenatal period, by either the midwife or the woman herself. Vulnerability for maternal distress was associated with a woman's personal history and her personal circumstances. The extent of maternal distress was associated with positive and negative coping

styles of women. Tools for midwives - to screen for maternal distress, to sustain or improve midwives' intentions to support women with maternal distress, as well as their intentions to collaborate with other healthcare professionals - play a crucial role in helping midwives prevent or reduce maternal distress. Personalized guidance that creates awareness of factors that can unbalance and disturb emotional wellbeing during pregnancy, together with individualized advice on how to maintain or optimize emotional wellbeing, will help to prevent or to reduce maternal distress during pregnancy.

REFLECTION ON THE FINDINGS

"For something so natural, why does it sometimes have to be so difficult?"

This is a remark a pregnant woman made to me a couple of years ago, referring to the emotional aspects of pregnancy and motherhood. This remark has stayed with me. As a result of my research, I am now able to help her to understand why *it* is sometimes so difficult.

Reflection on the main findings of this thesis focus on the key elements that are relevant for understanding the complexity of maternal distress and the mechanism of the intervention *WazzUp Mama?!*.

We started the study by defining maternal distress as being emotionally unbalanced or experiencing emotional strain during pregnancy as a response to pregnancy or to non-pregnancy related issues ¹, that is manifested by different signs and symptoms of psychological distress ². In the literature review (chapter 2) we showed that depression and anxiety are the most frequently occurring serious psychological complaints during pregnancy and we described the differences between trait-anxiety and pregnancy-related anxiety. With this knowledge, we created a measure for maternal distress that combined the scores of psychometric measures related to different one-dimensional psychological constructs: EDS for depression, STAI for trait-anxiety and PRAQ for pregnancy-related anxiety. Women who had elevated scores on one or more of these psychological constructs were defined as having heightened levels of maternal distress.

Our multi-dimensional approach led us to this combined score of psychometric measures to assess maternal distress. It can be argued that we have constructed a catch-all term by using the term *maternal distress*. We do not share this opinion. In chapters 3 and 7 we established the correlations between the psychological constructs depression, anxiety and pregnancy-related anxiety, acknowledging their inter-relation ³. Maternal distress as used in this thesis (chapter 3, 4 and 7) is a combined score of one-dimensional constructs. In chapter 3 and 7 maternal distress is a combination of a specific pregnancy-related component, like pregnancy-related anxiety or fear of childbirth with a more transient character, and other components with more enduring symptomatology belonging to psychological characteristic traits, like depression and anxiety ⁴.

Women enter pregnancy with existing psychological complaints and also develop problems during pregnancy. Had we prioritised or restricted measurement of maternal distress to a single psychological construct, the degree of distress women experience during pregnancy would likely have been under-represented. Focusing on a specific pregnancy-related psychometric tool that measures only pregnancy-related constructs of maternal distress may overestimate the impact of maternal distress that is caused by the temporary state of pregnancy and fail to depict women's anxious or depressive personality traits ⁵. Anxieties such as fear of childbirth, intrusive thoughts of the baby being harmed or dying, or losing control in labour are relatively specific anxiety

presentations in the antenatal period that are not relevant in the general population ⁶ and not included in screening using general anxiety measures. Therefore, the use of only general anxiety measures may limit the accurate detection of pregnancy-related anxiety. We are not only interested in the affected emotions that result from pregnancy, we are interested in how a woman feels during pregnancy, regardless of whether the origin of her distress is pregnancy or non-pregnancy related. This is exemplified in the name of our intervention: *WazzUp Mama?!*.

Given the groundbreaking nature of our work, it is useful to address a few important issues about the concept of maternal distress and how this concept can be useful for further research, and for those providing antenatal midwifery care ⁷. Throughout the course of this project we began to better understand the concept of *maternal distress*. Therefore we revisit the notion of maternal distress in this general discussion, adding to the existing body of knowledge about maternal distress ¹ and refining its context and meaning. We will reflect on the following questions: What is the precise meaning and essence of maternal distress? Is there a 'physiological' aspect to maternal distress during pregnancy, and if so, when does vulnerability to maternal distress change into psychopathology? How does *WazzUp Mama?!* address the multi-factorial and multi-dimensional character of maternal distress in antenatal midwifery care? We consider these questions below.

Maternal + Distress = Maternal distress?

Distress is defined as psychological tension ⁸ manifesting in the difficulty or inability to cope with, or to adapt to, a demanding situation while maintaining social functioning ^{1,2,9}. The word *distress* includes the word *stress*. Stress is a physical or emotional response to any kind of event that puts a demand on a person ².

The literature differentiates between general psychological distress and maternal distress ⁶. When we compare the concept analyses of general psychological distress ² and maternal distress ¹, both describe the mechanisms of distress as internal and external responses to antecedents of distress being in events of significance, accompanied by challenging changes and demands in one's life. The antecedents of general distress are any number of multifactorial (life) events ² while the antecedents of maternal distress are specifically related to the life-event and transitional process of childbearing ¹.

The word *maternal* describes motherhood and the enactment of mothering. Maternal is related to the continuous relationship across time between mother and child: expecting or having children, the physical and emotional experience of childbearing, becoming a mother and being a mother ^{1,10,11}. The word maternal describes the unique capacity of the female body to provide sustenance for another body and human being ^{11,12}. Maternal expresses the dynamic relation, interaction, connectedness, closeness and interdependency between mother and child ^{11,12} and is associated with the maternal role, which is, in turn determined by a woman's individual, historical, societal, cultural, ethnic, demographic, and intergenerational values and inheritance ^{10,11,13,14}. In the context of our current risk-society, the meaning of maternal has expanded to include the protection of children from all harm and from every potential damage ¹⁴⁻¹⁹.

When combined, the words *maternal* and *distress* describe a woman who experiences psychological tension and who has psychosocial difficulties while coping with gestation, having children, or raising children. Emmanuel and St John's ¹ definition indicates that maternal distress is specifically related to

the transitional period during the childbearing process, but maternal distress clearly extends beyond the period of pregnancy and childbirth. Maternal distress during pregnancy, as conceptualized in this thesis, is perhaps more accurately articulated as *antenatal maternal distress*.

Explaining the meaning of the two components that make up maternal distress and identifying the interrelation between them makes the concept more transparent and clear, but maternal distress is more than just semantics.

What is the essence of maternal distress?

When we compare the elements of psychological distress and maternal distress ^{1,2}, the underlying mechanism of maternal distress seems consistent with that of psychological distress. Although the context of distress is different (i.e. multifactorial (life) events *versus* the process of pregnancy and birth), the mechanism remains unchanged. But are there specific elements that are unique to maternal distress?

The literature described in chapter 2 described the connection between mother and child, embodied by the feto-placental transfusion of stress hormones ²⁰⁻²⁴. The findings of chapter 2 also showed that as result of maternal distress during pregnancy the infant and child's functioning and physical and neuro-behavioural development can be affected during pregnancy, post partum and while growing up ^{21,23,25,26}. These findings acknowledge the transmission of the mother's emotions to the child ²⁷⁻²⁹. Equally, and in addition to these findings, this transmission also occurs in the opposite direction from child to mother: there are reports of how the child's health or behaviour can provoke maternal distress or synchronously fluctuates with maternal distress during the years of childrearing ³⁰⁻³³. These dual transmissions align with descriptions of maternal distress in relation to the mother-child dyad over the course of maternal life ^{32,33}.

Reflecting on these findings, we conclude that the *mother-child relationship* is the foundation of maternal distress. Maternal distress is evident in the relationship between maternal psychological functioning and wellbeing and the child's behaviour, functioning, and health or wellbeing, as expressed in the connection, rapport, interaction, and bond between mother and child. The essence of maternal distress is that mother and child are both affected by their *interactions* ^{34,35}.

Another essential aspect of maternal distress is that it occurs in the *broader context* of the woman and child's life ³⁶ and is not limited to the distinct period of pregnancy through one-year post partum ¹. There is no distinct and limited time frame for maternal distress to occur.

The experience of maternal distress is unique to each woman who experiences this. As we have seen in our integrative review (chapter 2) and cross-sectional study (chapter 3), each woman has a personal reason for why and when maternal distress occurs and each woman has different signs and symptoms of maternal distress. Our findings showed that causes for maternal distress relate to personal characteristics and circumstances, behaviour and the environment. Various predisposing, reinforcing and enabling factors in turn, influence coping with maternal distress and the woman's environment. Different causes influence the character and occurrence of maternal distress ³⁷. We often assume as healthcare professionals that the more difficult a situation is, the more impact this will have on a woman's emotional wellbeing. It is, however, the woman's perception of these events, her mood, feelings, and emotions that determine her level of maternal distress and colour the impact of the quality of her life. Thus only the woman can determine and report the seriousness and the burden she is experiencing. Women themselves give meaning to past and present situations and

weigh their severity and impact on their life. Our findings in chapter 3 also confirmed that levels of severity of maternal distress differ, as do the strategies a woman uses to cope with it. The variety of women's responses to the different predisposing factors for maternal distress underscores the *individuality* of maternal distress.

Reflecting on these findings, we conclude that the *experience* of maternal distress is *unique* to each woman who confronts this condition.

The course of maternal distress during pregnancy

Acknowledging the individuality of women's experiences, maternal distress does fit with a more universal course or perhaps even a recognized 'physiological' course of pregnancy and motherhood. The prevalence of maternal distress seems to be characterized by a U-shaped curve, with the prevalence decreasing from the first trimester to second trimester of pregnancy and then increasing again in the third trimester^{38,39}. The deepest prevalence point is between 23 and 24 weeks of pregnancy³⁸. Third trimester maternal distress seems to be strongly correlated with first trimester maternal distress^{40,41}. There are logical reasons during pregnancy that may cause the increased maternal distress in the first trimester, including the risk for miscarriage⁴² and physical complaints like fatigue, morning sickness, nausea, and vomiting^{43,44}. Maternal distress during the third trimester may be increased as birth and, for some the beginning of motherhood is closer¹. There are more and greater physical issues towards the end of pregnancy like fatigue and lack of sleep that can cause physiological maternal distress^{1,3,38}. The second trimester seems to be associated with relative stability of emotions^{38,39}. The U-shaped curve may well be considered a 'physiological curve' of maternal emotional wellbeing during pregnancy.

The prevalence of maternal distress in the control group of our quasi-experimental study (chapter 7) showed a rise towards the end of pregnancy that was similar to rates found in other studies with healthy pregnant women from similar backgrounds²². Because we did not have a mid-pregnancy point of measurement, we did not find a U-shaped curve in the maternal distress scores of the participants in our control group.

Studies that have not found this U-shaped curve are those where procedures such as prenatal testing during pregnancy have been introduced to women. These studies show that information about, and the uptake of, prenatal screening tests between 11 and 14 weeks gestation are associated with increased maternal distress. The level of distress declines after testing but does not completely abate⁴⁵. Women who undergo prenatal diagnostic tests after 16 weeks gestation or have an anomaly scan at 20 weeks gestation have higher levels of maternal distress compared to women who had not undergone these tests⁴⁶. Maternal distress also appears to be increased by the booking scan at approximately 10 weeks gestation to determine gestational age⁴⁷.

Moreover, it is important to note that the women in our studies live in a 'risk-society', with an ever-present emphasis on control, safety, protection, an emphasis that ironically increases uncertainty and fear^{17,48}. A focus on the reduction of risk and the avoidance of adverse outcomes has influenced various aspects of current midwifery care^{48,49} with consequences for maternal emotional wellbeing⁵⁰. Persistent attention to risk will likely affect the U-shape curved of maternal distress, deviating from the physiological course of maternal distress during pregnancy and shifting its pattern⁵¹.

Fluctuations in the course and severity of maternal distress are caused by individual circumstances and characteristics. We have seen in our integrative review and cross-sectional study that pregnancy is a vulnerable state where a woman's past and current experiences, emotions, and a

transition to a different phase in life converge. It is interesting to explore why this vulnerability affects some women more severely than others.

Crossing the line between physiological and pathologic maternal distress

There is healthy stress, stress, and distress. For some women vulnerability in pregnancy is a physiological phenomenon leading to healthy stress but for others it goes beyond the expected normal stress of pregnancy and leads to distress. Healthy stress represents the physiological challenges that a woman is faced with while being pregnant. Stress or short episodes of moderate maternal distress can facilitate mother-child bonding and interaction and have positive consequences for the infant's post partum growth and development. As we suggested above, this can be labeled physiological maternal distress⁵². Mild distress is a bit of a grey area creating confusion among healthcare practitioners who are uncertain if this level of distress is a part of the physiological process of pregnancy. Mild distress is reported as moderate distress and is considered as a physiological state and part of normal life, which does not interfere with normal social functioning^{1,9}. Moderate distress does not interfere with the maintenance of psychosocial homeostasis, although a woman may experience symptoms such as worry, irritability, tension and / or sleeping problems⁹. However, longer periods of moderate maternal distress are known to have short and longer-term effects^{20,53}. On the other hand, severe maternal distress^{20,53} interferes with a woman's bio-psychosocial homeostasis and impairs her social functioning⁹ and can also have short and longer-term effects^{20,53}. Both moderate and severe maternal distress can be identified using established cut-off point of psychometric scales^{8,42}.

In our thesis we selected cut-off points that allowed us to differentiate between low and high levels of maternal distress, implying that scores below the cut-off point indicated maternal distress, manageable by the woman herself⁵⁴. Our web-based tailored intervention used the Edinburgh Depression Scale to assess maternal distress. The Edinburgh Depression Scale was chosen because this is validated to measure depression and anxiety simultaneously⁵⁵ and is recognised for its user-friendliness and compact size⁵⁶. We advised women to revisit the website after two weeks and to do the test again when they had moderate scores, just below the cut-off point of high levels of maternal distress^{42,57}. We advised women to contact their midwife or seek professional support when their scores were above the cut-off point. However, it is relevant to ask: Are we as healthcare practitioners in a position to decide what is healthy, low, moderate or severe maternal distress? Do scores on a scale accurately reflect how women subjectively feel?

As we have seen in chapter 2 and 3, the causes, factors, and circumstances that make women vulnerable for maternal distress vary in their extent and their level of seriousness. Different women respond differently to the same situations and evaluate their condition based on their unique experiences and values³⁷. This implies that midwives cannot offer a definitive determination of a woman's burden. Furthermore, midwives are unable to determine whether a woman's level of emotional stamina will allow her to cope with or handle the situation⁵⁰. Because midwifery care affords the opinion and values of a woman are great respect, a woman's own evaluation of her life will figure prominently in assessing maternal distress. Therefore, midwives depend on a woman's self-disclosure, which means we can only address maternal distress if we ask the right questions and map the critical circumstances that make a woman more vulnerable for maternal distress⁵⁸. This means that we are unable to rely on routine antenatal risk scores and maternal distress scores for identification of maternal distress, but must also consider a woman's individual views, meaning and experiences. This approach to identification is not possible without a woman-centered approach

where a midwife values and respects the unique characteristics of the woman she is caring for ⁵⁹.

In chapters 3 and 7 we included women with healthy pregnancies. Women from Dutch origin, in their late twenties, in a relationship, with on average 2 children, and a good level of education and income characterized our samples. In chapters 2 and 4 we included samples of women with similar characteristics. We can assume that most of these women are in a fairly stable and comfortable position in life, and on face value in untroubled conditions ⁶⁰. In chapters 3 and 7 (control group) the proportion of women scoring above the cut-off points for maternal distress, varied between 20.9% and 26.5%. In comparison with psychological distress outside pregnancy, CEMACH ⁶⁰ reported that it is women in this 'untroubled' group that seem to be very vulnerable to develop maternal distress, and even being more at-risk for suicide within the first year post partum. These are, however, British data, and we lack this information on a national Dutch level ⁶¹ but underscores the fact that healthcare professionals may not 'label' at-risk women, based on observations or assumptions. As these 'everyday women' are part of midwives' caseloads, it is important that midwives are aware that vulnerable women can be found among populations where distress is least expected. Again, midwives must depend on a woman's self-disclosure and a mutual relationship of trust, approaching women from a woman-centered perspective.

Our intervention *WazzUp Mama?!* uses an approach that identifies a combination of antenatal risk scores, maternal distress scores, and is woman-centered. Our intervention draws on the concept of salutogenesis, emphasizing the importance of strengthening the individual woman's own resources and her sense of coherence including (self)manageability, comprehensibility and meaningfulness.

Addressing complexity with WazzUp Mama?!

Throughout this thesis we have described maternal distress as a multi-dimensional concept associated with multiple causative factors. To address the complexity of maternal distress, we have developed an intervention with several interacting components. This type of complex intervention ⁶² is best understood from the perspective of complexity theory ^{48,49}, which points to the need for a wide range of features in an intervention that hopes to reduce the occurrence and severity of maternal distress.

The effect of our intervention is not the simple result of the sum of its separate components. It is rather the result of an approach that integrates several features to address maternal distress and considers women and their environment as a complex adaptive system ⁴⁹. Women using the intervention are recognised as having personal histories and differing initial conditions. A pregnant woman is not an isolated human being but is part of a larger network of people with whom she interacts, and with whom she is connected. Being a mother is a major social role, most often played out in relationship with a co-parent, in a family structure and in a community ⁶³⁻⁶⁵. In our web-based tailored program, women are advised to seek interconnectivity with others in order to facilitate feedback on their emotional wellbeing and their coping behaviours. This approach, together with the interconnectivity established between women and their midwives in the interpersonal (face-to-face) intervention component, works to initiate positive change in women's lives.

During pregnancy a woman's personal situation can change and her emotional balance can fluctuate resulting in unsettled feelings. Women in our experimental group had unlimited access to our web-based tailored program and were able to log in when their situation or emotions changed, supporting them in adapting to new situations or periods of turbulence. In line with the recently

updated NICE guidelines⁶⁶ we assessed maternal distress at each antenatal visit in order to pick up changes. Maternal distress can emerge in any trimester, making a one-time screening at any one antenatal visit as insufficient for identifying the problem⁴².

In order to address maternal distress, a woman does not have to make big changes in her life. Small changes can have large effects on a woman's coping behaviour and her environment. It is difficult to determine what aspect of the intervention works for a woman at a particular moment in time during her pregnancy. The utility of the intervention may depend on when she accesses the intervention or when she is able to take advice or support and act upon it. The structure and content of the two parts of the intervention enhance each other and it is likely that various features of the two parts of the program have an interchangeable effect. Individual women may respond to, or benefit from, different components of the intervention. We know the intervention was effective, but we do not know which aspects of the intervention are responsible for preventing or reducing maternal distress during pregnancy.

Informed by complexity theory, our intervention recognizes that women follow their own unique path in (self) managing maternal distress, using whatever lies within their abilities and whatever addresses their individual needs⁴⁹. Our intervention responds to the complexity of maternal distress but the complex nature of the intervention makes it difficult to identify which specific component helped which women in the prevention or reduction of maternal distress. But we do know that the intervention succeeded in reducing new or present psychological and emotional complaints of pregnant women.

The long-term effects of WazzUp Mama?!

We measured characteristic trait aspects of maternal distress such as depression and trait anxiety and we measured the more transient component of maternal distress (i.e. pregnancy-related anxiety) at the beginning of pregnancy and end of pregnancy. Does the reduction of maternal distress associated with our intervention persist after pregnancy and birth? It appears obvious that pregnancy-related anxiety experienced during pregnancy, will dissipate after birth. It is likely that depression and anxiety, more persistent personality traits, will continue to exist and likely negatively affect the post partum period². We cannot presume that a reduction of maternal distress at the end of pregnancy will persist after pregnancy and birth and provide a protective effect. On the other hand, women did receive tailored feedback from the web-based component of our intervention: feedback that focused on practical tools for everyday life, advice about positive and effective ways of coping and sources for self-management, and instruction for finding professional support. This tailored advice offers an opportunity to incorporate these strategies after pregnancy and birth, allowing them to become a part of the coping mechanisms used throughout motherhood and life.

If *WazzUp Mama?! prevents or reduces maternal distress during pregnancy*, it has the potential to reduce the longer-term effects of maternal distress. Exposure to maternal distress during pregnancy, are associated with elevated risks and consequences for mothers and children^{20,21,27,34,52,53,67,68}. This evidence, however, is correlational and therefore not proof of causation. Thus altering the course of maternal distress during pregnancy does not automatically imply that we reduce the long-term effects of maternal distress that occurs during pregnancy. Overall, lacking longitudinal and follow-up data we cannot conclude that our intervention during pregnancy automatically improves long-term health and quality of life. Exposure to maternal distress during different trimesters of pregnancy (i.e. first, second, third) interferes with different long-term health outcomes^{20,21,34,67}. However, we do not know what particular aspect or aspects of our intervention in

which specific trimester of pregnancy was most effective, as we measured maternal distress only at the beginning and at the end of pregnancy and we lack information on the use of the intervention during the respective trimesters.

STRENGTHS AND LIMITATIONS

A strength of this thesis is its systematic approach. We did an extensive needs assessment for the development and implementation according to the Intervention Mapping protocol ^{62,69} and we provided a transparent description of the development process used to create *WazzUp Mama?!.* We systematically collected quantitative and qualitative evidence and combined this scientific evidence with behavioural change theories to develop an intervention that is tailored to the needs of the target group and the implementers of the intervention. Involving both midwives and other healthcare professionals concerned with the emotional wellbeing of women in a consortium of experts at each step in the Intervention Mapping process, is another strength of this thesis. This provided insight into the practical strategies for, and the clinical relevance of, the intervention. In accordance with Intervention Mapping we applied theories and models such as the Theory of Planned Behaviour for questionnaire development in our surveys of women and midwives, we used the PRECEDE model for our needs assessment, and we followed the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions for our review and meta-analysis. We used existing validated questionnaires such as the EDS, STAI, and PRAQ in our cross-sectional and quasi-experimental study, and the COPE-Easy questionnaire in our cross-sectional study. We used the modified version of the Oxford's Centre scale (OCEBM) and the Association of Women's Health Obstetric and Neonatal Nurses (AWHONN) tool to determine the level of evidence in our integrative review. We also used the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) in our systematic review. We used a variety of research methods to study maternal distress. Combining elements of quantitative and qualitative methods contributes to the breadth and depth of understanding of a complex phenomenon ⁷⁰. The real value of *WazzUp Mama?!.* is therefore represented by a broad theoretical framework with a tight linkage of theories, models and strategies that includes tested methods and validated procedures, all of which were operationalized for their utility and not just for research ^{71,72}.

To our knowledge no intervention for maternal distress has been developed in this rigorous systematic and transparent manner. Other novel components of this thesis include its definition of maternal distress as a spectrum and its use of a broad approach to maternal distress by compiling different psychological constructs. A broad approach more truly appreciates a woman's mood state or psychological nature during pregnancy as it consists of state *and* trait components, acknowledging the transitory state of pregnancy and the woman's emotional characteristics ^{4,73}. This approach has not been used before and could provide a new way of thinking about maternal distress. A broad approach offers a unique opportunity to widen the concept of maternal distress by combining constitutional and transient psychological components, both of which present simultaneously during pregnancy ^{5,73}, thus providing a more complete picture of the woman's emotional wellbeing in all its complexity ⁷⁴.

Limitations of this thesis are related to recruitment and the sampling of midwifery practices, individual midwives, and women. Midwifery practices in our cross-sectional study and quasi-experimental study, and the individual midwives were recruited by means of convenience sampling.

This could have led to participating midwives having a special interest in maternal distress, resulting in selection bias. Women were approached for participation in our cross-sectional and quasi-experimental study by midwifery practices, either by midwives or practice assistants, depending on the organization of practice. It is unknown if midwives and practice assistants consciously approached *all* eligible women to participate thereby avoiding selection bias. Women's decision to participate could have been influenced by self-recognition of maternal distress, also creating selection bias.

We used lower cut-off points for EDS in our cross-sectional and quasi-experimental study compared to international studies ⁷⁵. Our cut-off levels were based on populations with similar cultural and ethnic backgrounds ^{75,76}. This may have led to (over)pathologising maternal distress ⁵⁷. However, we used studies among Dutch populations with similar cut-off points ^{6,23,77}, providing us with the opportunity to compare our findings to those in these studies. We did not use diagnostic instruments, which imply that we identified only those women who are *more likely* to develop maternal distress ⁵⁷. The number of women in our studies who are more likely, or at higher risk for, maternal distress, does not necessarily represent women being diagnosed with maternal distress ^{3,73}. Again, this might have led to higher numbers of women with maternal distress.

In this thesis we focused on women with healthy pregnancies. The midwifery practices in our cross-sectional and quasi-experimental study and the individual midwives in our exploratory survey were recruited among primary care practices providing midwifery-led care. This limits the generalizability of our findings to women and maternity care providers in midwife-led care. The samples of women in our cross-sectional and quasi-experimental study included mostly well-educated women with on average a good level of income. Most women were in a relationship and were born in the Netherlands. Midwives in our exploratory survey were slightly older, had slightly more work experience, and had smaller caseloads than the average practising Dutch midwife. Generalisability of our findings to a broader population must therefore be done carefully.

This thesis predominantly includes studies with a quantitative design. We did conduct semi-structured interviews among a sample of midwives to gain preliminary insight into the beliefs of Dutch midwives with regard to maternal distress. The results from these interviews contributed to the basis for the subsequent questionnaire development for the exploratory survey. Other qualitative elements can be found in our use of the consortium members, with whom we discussed the relevance and clinical importance of research findings. We used focus groups and interviews with women, (student) midwives and other healthcare practitioners to pre-test the intervention. Although qualitative research methods and components were included in this thesis, there is an emphasis on quantitative research design. A more equal balance between both designs may have added to an even deeper understanding of maternal distress and what prevents midwives from screening for maternal distress ⁷⁰.

RECOMMENDATIONS FOR FUTURE RESEARCH

In this thesis we approached maternal distress as a spectrum of various but frequently occurring psychological constructs. The concept analysis of maternal distress, done by Emmanuel and St John ¹, limits the condition to the period of pregnancy, while we believe that maternal distress extends further and broader into a woman's life. A new and advanced concept analysis or concept evaluation should be done ⁷ in order to correct or refine the concept *maternal distress* ⁷⁸.

In this thesis we have focused on the prevalence and the extent of maternal distress in pregnancy in our cross-sectional and quasi-experimental study. We have studied the effect of *WazzUp Mama?! during the period of pregnancy. We have only measured maternal distress during pregnancy while the event of birth was still to come. We should investigate if the beneficial effect of WazzUp Mama?! extends into the postnatal period and thereafter. It would be of great interest to public health to consider the sustainability of the positive outcomes in the first year after birth or thereafter. Long-term follow-up may be needed to determine whether the changes that occurred during pregnancy persist or have long-term effects on mothers and children. The advisable next step would therefore be the use of a longitudinal design examining the long-term effect of the intervention on maternal distress. It is also possible to extend the evaluation of WazzUp Mama?! with a retrospective post partum time measure.*

In our quasi-experimental study we did not use random assignment to the intervention but we used a pre-test and comparison group. If future continuation and wider implementation of the intervention is to be considered, it would be advisable to repeat the study with random assignment of the intervention to avoid threats to external validity, preferably with larger sample sizes to take account of extra variability. We have studied the effect of *WazzUp Mama?! in a healthy population of pregnant women receiving midwife-led care. The results are therefore not generalizable to pregnant women in clinical settings. It would be of interest to study the effect of the intervention in obstetric care settings, as it has been suggested that high-risk women have different emotional health needs*⁷⁹.

We measured the effectiveness of the intervention with maternal distress scores. We did not include changes of coping styles as an outcome measure in this thesis. We are also not aware if the intervention effect can be related to dose or intensity of use. An additional process evaluation might provide valuable information to understand the mechanism of the intervention effect on maternal distress or the contribution of separate components and to optimize the intervention for future implementation.

When midwives ask questions and provide information about sensitive topics such as smoking, drinking and domestic violence in pregnancy, women do not experience this as stigmatizing⁸⁰⁻⁸². In order to investigate women's experiences about being asked to report sensitive information about maternal distress, future studies should investigate how women perceive discussions of maternal distress, its causes, and possible consequences.

In this thesis we compiled the scores of most frequent psychological constructs during pregnancy: depression, anxiety and pregnancy-related anxiety. In light of the increasing evidence that women experiencing maternal distress report symptoms belonging to more than one construct, and the correlation between different constructs, several researchers have called for multi-dimensional measures of maternal distress^{51,55,73,83}. The scientific value or clinical meaning of our combined maternal distress score is as yet uncertain as it is has never been used in this way before⁸⁴. Future research should build on our work constructing, examining, and using validated instruments measuring different aspects of maternal distress, including coping.

RECOMMENDATIONS FOR PRACTICE

Given the positive effect of *WazzUp Mama?! it will be a useful intervention in midwifery practice. Because the intervention includes several components, it will be prudent to implement the intervention as a whole, using both parts of the program: the part intended for women and the part*

directed at midwives.

The findings of our study highlight the need for midwives to familiarise themselves with the personal history and life circumstances of their clients. Midwives need to be aware that antenatal care is a point of intensive contact with women during pregnancy and provides opportunities to prevent or reduce maternal distress and perhaps promote long-term emotional wellbeing ⁸⁵.

The implementation of *WazzUp Mama?!* has implications for the education of midwifery students and for the life long learning of practising midwives. Our exploratory survey revealed that that screening for maternal distress is not an established and implemented procedure in midwifery-led antenatal care. Midwives' low confidence in their ability to screen for maternal distress limits the use of screening ⁸⁶. A solution to this problem may well be implementing universal screening. We are aware that a program of universal screening contradicts the findings of our meta-analysis, but we have reasons to assume that the routine use of case-finding questions, a feature of our intervention, improves midwives' self-efficacy (perceived control) and thus supports screening for women who are vulnerable to maternal distress. In our exploratory survey we also discovered that work experience was a main source of knowledge and skills regarding maternal distress. This suggests that sharing of expertise and practice experience will contribute to the knowledge and skills of newly qualified midwives and midwives with limited practice experience. The sharing of expertise should have a place in education and midwifery team meetings as it will encourage the use of screening by those with less experience and less confidence ⁵⁸.

It is predominantly female midwives - in the same age range as the pregnant women in our studies – that provide midwifery-led care. This implies that the midwives taking care of pregnant women who experience maternal distress are themselves susceptible to psychological distress. Exposure to self-disclosure of women about sensitive and emotional topics can also profoundly affect midwives. Safeguarding midwives' emotional wellbeing is therefore an issue that needs to be considered ⁸⁷. Peer support, debriefing, and external sources of supports are strategies that can help to reduce the impact of working with sensitive information of women ⁸⁷.

An issue of concern is how the midwife part of *WazzUp Mama?!* fits into the workload of midwives. The responsibilities of midwives have expanded and now include a public health focus with regard to issues such as smoking, drinking, weight gain, and domestic and sexual abuse ⁸⁸. In this case it may be wise to create environments and support systems that promote healthy women and by extension, healthy pregnancies and healthy children. The seeds of a healthy pregnancy are sown long before conception and are dependent on women's healthcare throughout life. Implementation of this perspective – i.e. seeing the prevention of maternal distress as part of preconception care - would lead to greater longitudinal and contextual integration of care that supports emotional health for mothers.

Finally, it is necessary to seek funding for further development of the intervention. In order to make the intervention sustainable, benefitting as many pregnant women as possible, it will be necessary to involve other healthcare practitioners, healthcare insurance companies, and the Dutch Royal Organization of Midwives (KNOV).

CONCLUSION

Maternal distress unchains a negative spiral of disturbed health and thus has a profound effect on public health. For mapping out the factors that contribute to maternal distress, pregnancy proved to be a practical place to begin developing a strategy to reduce the prevalence and severity of maternal

distress. The intervention *WazzUp Mama?!* described in this research is based on careful study of those factors and offers an effective intervention with a complex structure that corresponds with the complexity of maternal distress. The next step in improving maternal emotional wellbeing is to test the effectiveness of the intervention in a larger and more diverse population of mothers-to-be.

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SUMMARY

Pregnancy is not solely a physical process. The many emotional and social changes and the challenges and demands that accompany pregnancy mark it as a psychosocial process as well. These changes, challenges and demands can affect a woman's emotional wellbeing during pregnancy and for some women this effect is more profound than it is for others. Affected emotional wellbeing accompanied by psychological signs and symptoms during pregnancy is defined as maternal distress.

The "Promoting Healthy Pregnancy" project (2011 – 2015) was funded and launched as a response to the Department's of Health concerns about maternal distress and to midwives' uncertainty about their specific role and responsibilities in providing care for women with maternal distress. The Intervention Mapping protocol of Bartholomew's et al. (2011)* was used as a framework for the structure and content of the project. Intervention Mapping is a method for developing effective health behaviour change interventions that are underpinned by theory. In accordance with the Intervention Mapping protocol and the bottom-up approach that characterized the "Promoting Healthy Pregnancy" project, we involved experts in the field to help design and implement an intervention best adapted to the needs of pregnant women. Throughout the project we followed the six steps of Intervention Mapping process (needs assessment, programme objectives, theoretical methods and practical strategies, programme components and material, implementation, evaluation).

The aim of the "Promoting Healthy Pregnancy" project was to gather evidence that could be used to create an antenatal intervention for the prevention or reduction of maternal distress during pregnancy for women receiving midwife-led care, i.e. women with healthy pregnancies. The aims of this thesis are described in six research questions and included: 1) What health needs of pregnant women should be considered when developing an intervention for optimising the antenatal maternal emotional wellbeing of mothers-to-be? 2) What are the levels of maternal distress during pregnancy and which factors influence the occurrence of maternal distress? 3) Which effective evidence-based antenatal interventions are available for the reduction of maternal distress during pregnancy and for up to one-year postpartum? 4) What are midwives' behavioural intentions with regard to the antenatal management of maternal distress and what are the underlying factors that influence midwives' intentions to provide antenatal management of maternal distress? 5) How do we systematically develop an antenatal intervention for midwifery healthcare professionals capable of preventing and reducing maternal distress during pregnancy? 6) Does an antenatal intervention developed according to the Intervention Mapping have a positive effect on the prevention or reduction of maternal distress?

In this thesis we studied factors that make healthy pregnant women more vulnerable for maternal distress – specifically aetiological factors. We explored existing interventions with regard to their effectiveness in reducing maternal distress. Additionally, we gained insight into current midwifery-led practices for identifying and managing maternal distress. We translated this information into the intervention *WazzUp Mama?! in an effort to effectively address the problem of maternal distress in women with healthy pregnancies. Finally we evaluated the effectiveness of the intervention WazzUp Mama?! for the prevention and reduction of maternal distress.*

In **chapter 1** we describe how depression, anxiety and pregnancy-related anxiety contribute to affected emotional wellbeing during pregnancy. These are the most frequently occurring, and often co-occurring, psychological problems in pregnancy. Because the concept of disturbed emotional wellbeing during pregnancy has not been clearly articulated we adopted the term ‘maternal distress’ to describe our broad approach of the problem. The experience of maternal distress during pregnancy is associated with negative birth and health outcomes for both mother and child, including both short and long-term post partum health problems. In the Netherlands midwives are the main providers of antenatal care, making them the default healthcare practitioners for the identification of women who are at-risk to develop maternal distress or who experience maternal distress. A timely antenatal intervention in midwife-led care may prevent or reduce maternal distress. To prevent or reduce maternal distress an intervention must be based on an understanding of the factors that can promote positive change, factors that consider not only the situation of pregnant women, but also the abilities of the midwives who will have to provide the intervention.

In order to plan and develop our antenatal intervention we conducted a thorough needs assessment, which we describe in **chapter 2**. We searched the literature systematically and compiled evidence, relating to health needs of pregnant women with regard to maternal distress. After verification by experts in the field we compiled the evidence into a model of maternal distress using the PRECEDE¹ component of the PRECEDE-PROCEED planning model. The PRECEDE component includes a social and epidemiological assessment, an aetiological assessment, and an educational and ecological assessment. This strategy provided us with an in-depth and systematic understanding of the factors strongly associated with maternal distress and served as a guide in the development of the intervention *WazzUp Mama?!*.

Our literature review included 45 studies with samples of healthy pregnant women and with moderate to good levels of evidence. Aetiological factors for maternal distress included past and present circumstances related to both obstetric factors and the context of a woman’s life, including her coping behaviour and her social and professional support mechanisms. Limited knowledge of ways of coping with (maternal) distress was identified as a predisposing factor. Reinforcing factors – i.e. factors that promote coping - were relaxation, partner support, counselling experiences and positive interaction with the midwife. Among the conditions that favour coping - enabling factors - was the availability of a support network. The results suggested that maternal distress is a multi-factorial and multi-dimensional health problem that could be changed by women themselves with proper support and adaptation to their environment, and by using midwives as facilitators of change.

Further investigation of the past and present aetiological factors (personal characteristics, history and personal circumstances, behavioural and environmental factors) that make women vulnerable for maternal distress is presented in **chapter 3**. These factors were derived from PRECEDE, as described in chapter 2. However, the factors identified were not derived from a study of a population of Dutch women. Since the aim of the project is the development of an antenatal intervention for women with healthy pregnancies in *Dutch* midwife-led care, it was necessary to study the factors among a representative sample of Dutch pregnant women ($n = 458$). We found the following factors to be predictors of maternal distress: a history of psychological problems ($B = 1.071$; $p = .001$), having

¹ Acronym for: Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation

young children ($B = 2.998$; $p = .001$), daily stressors ($B = 1.304$; $p < .001$), avoidant coping ($B = 1.047$, $p < .001$), somatisation ($B = .484$; $p = .004$), and negative feelings towards the forthcoming birth ($B = .636$; $p < .001$). On the other hand, self-disclosure ($B = -.863$; $p = .004$) and acceptance of the situation ($B = -.542$; $p = .008$) were identified as effective coping-styles during pregnancy, helping to prevent or reduce maternal distress. These results helped us to identify the factors that are relevant for the screening of maternal distress.

Given the aim of our project - to develop an intervention to reduce and prevent maternal distress - we wanted to learn from what had been done in existing antenatal interventions. In **chapter 4** we report on our systematic review and meta-analysis of randomized controlled trials intended to reduce maternal distress. We found limited research ($n = 10$ studies) on the effectiveness of antenatal interventions for maternal distress: our meta-analysis included nine studies ($n = 3063$ participants) and the analyses were affected by small sample sizes. Taking the limitations of the meta-analysis into account, the results showed that universal preventive strategies, for a general sample of healthy pregnant women, have no observed beneficial effect in reducing maternal distress (six trials, $n = 2793$, standardized mean difference, SMD -0.06 ; 95% confidence interval, 95% CI -0.14 to 0.01). However, a subgroup analysis of a selected sample of pregnant women with characteristics that made them more vulnerable to develop maternal distress showed a small but significant reduction of maternal distress as a result of preventive strategies (three trials, $n = 1410$; SMD -0.25 ; 95% CI -0.37 to -0.14). Interventions for the treatment of existing maternal distress also showed a small but significant reduction of maternal distress (three trials, $n = 270$; SMD -0.29 , 95% CI -0.54 to -0.04).

When developing an intervention, insight into the behaviour of the most important intermediaries is essential. Given the significant role played by midwives, the prevention or reduction of maternal distress is likely to be associated with the midwife's willingness to provide antenatal screening and management of maternal distress. Therefore we began by conducting semi-structured interviews with a sample of midwives ($n = 6$) to gain preliminary insight in the beliefs of Dutch midwives with regards to maternal distress. The results from these interviews, together with a literature review, served as the basis for the subsequent exploratory survey described in **chapter 5**. We used the survey to explore midwives' behavioural intentions - and the determinants of those intentions - for the management of the antenatal care of women with maternal distress. Antenatal management of maternal distress consists of three components: screening (using a measurement instrument), support (informational and emotional) and collaboration (consultation, communication, and referral to other healthcare professionals). We assessed each of these components separately. Drawing on the Theory of Planned Behaviour (TPB) we used the constructs, intention, attitude, self-efficacy (perceived control), and personal norm to identify the factors that influence screening, support and collaboration. In addition to these TPB factors we also looked at how years of experience, attitude towards maternal distress (maternal distress is a problem, is interesting and, is complex) and perceived knowledge and barriers influenced midwives' intentions to screen and manage maternal distress.

The responses from midwives ($n = 112$) showed that the intention to screen for maternal distress (3.46 ± 1.8) on a scale of 1 to 7, was less strong than the intention to support pregnant women with maternal distress (4.63 ± 1.57), and the intention to collaborate with other professionals regarding maternal distress (4.63 ± 1.57). Furthermore years of work experience ($B =$

.035; $p = .028$), the midwife's interest in maternal distress ($B = .383$; $p = .005$), attitude about the value of screening for maternal distress ($B = .326$; $p = .002$), and self-efficacy with regard to screening for maternal distress ($B = .248$; $p = .004$) had a positive linear relationship with the intention to screen for maternal distress during pregnancy. Positive correlates of the intention to support pregnant women experiencing maternal distress were interest in maternal distress ($B = .637$; $p < .001$) and attitude towards supporting pregnant women with maternal distress ($B = .523$; $p = .017$) were identified positive correlates. Finally, the intention to collaborate was positively influenced by years of work experience ($B = .042$; $p = .017$) and the midwife's interest in maternal distress ($B = .455$; $p = .002$).

The results from chapter 2 to 5 provided an extensive needs assessment (*step 1, Intervention Mapping*) and helped us to identify factors for our intervention that are relevant for screening for the vulnerability of maternal distress. These factors are related to the woman's personal history and circumstances, her experiences of these factors, and her coping mechanisms. The factors related to midwives' behaviour that needed to be addressed by the intervention focus on screening for women's vulnerability and the assessment of maternal distress. In **chapter 6** we described the development of the *Wazzup Mama?! intervention* for pregnant women eligible for midwife-led care.

Behaviour that needs to change on an individual level (*pregnant woman*) includes the recognition of symptoms of maternal distress and one's personal vulnerability for maternal distress, together with self-management to prevent or reduce maternal distress. The determinants influencing these behaviours are knowledge, attitude, risk perception, self-efficacy and social influence. Behaviour that needs to change on an interpersonal level (*midwife-woman*) includes supporting the implementation of antenatal care for maternal distress, promoting self-disclosure on the part of pregnant women, supporting women in self-management of maternal distress, and coordination of the care for women suffering from maternal distress. Our needs assessment showed that these behaviours are determined by knowledge, attitude, and self-efficacy in screening, social norm and skills management. Using this information we described the pathways that specify what individuals need to learn in order to change their behaviours for every performance objective (*step 2, Intervention Mapping*).

We subsequently matched theory-based methods to the change objectives in order to formulate practical applications for fitting the intervention into the practices of pregnant women and midwives. We used the methods 'tailoring' and 'information processing' to create an intervention to address *women's* knowledge, attitude, risk perception, self-efficacy and social influence and to enhance *midwives'* knowledge, attitude, self-efficacy for screening and skills management and to address the social norm of maternal distress (*step 3, Intervention Mapping*). This was followed by organising the strategies into a deliverable program with specified components, designing a plan for the production and delivery of the program, and producing program materials (*step 4, Intervention Mapping*).

The program was called *WazzUp Mama?! intervention* and included two parts: one for pregnant women and one for midwives. The part for women was designed to identify the presence of or vulnerability for maternal distress during pregnancy and included a tailored web-based program. The part for midwives provided a format for the implementation and coordination of care for maternal distress and to support pregnant women's self-disclosure and self-management with regard to maternal distress, using the support of other professionals when necessary. This part consisted of a toolkit with a guideline and clinical pathway, a regional healthcare map and an aid for consultation and

referral. The program was introduced by means of an accredited training (KNOV continuing education credits) for midwives and practice assistants ($n = 72$) in 17 practices situated in the Southern, Mid-Eastern and Northern regions of the Netherlands (*step 5, Intervention Mapping*).

These 17 midwifery practices also took part in our non-randomized pre-post intervention study described in **chapter 7**. In this study we report the changes in maternal distress among healthy pregnant women after receiving the intervention *WazzUp Mama?! (n = 218)* as compared to women receiving antenatal care-as-usual ($n = 215$) (*step, 6 Intervention Mapping*). Mean depression (EDS), anxiety (STAI) and maternal distress (MD) scores within the control group significantly increased from the first to the third trimester of pregnancy in the control group (EDS $p < .001$; STAI $p < .001$; MD $p < .001$). Mean pregnancy-related anxiety (PRAQ) scores increased over the same time period, but the change was not statistically significant ($p = .12$). The proportion of scores above cut-off level of EDS, STAI and PRAQ significantly increased in the control group from the first to the third trimester of pregnancy (EDS $p < .001$; STAI $p = .045$, PRAQ $p = .03$). The proportion of MD scores above cut-off level increased, but did not reach statistical significance ($p = .13$). Within the experimental group the mean STAI, PRAQ and MD scores significantly decreased from the first to the third trimester (STAI $p = .001$; PRAQ $p < .001$; MD $p < .001$). The mean EDS scores decreased but not significantly ($p = .13$). The proportion of scores above cut-off level PRAQ and MD significantly decreased from first to third trimester of pregnancy within the experimental group (PRAQ $p = .002$; MD $p = .009$). The proportion of EDS and STAI scores above cut-off level decreased but not significantly (EDS $p = .4$; STAI $p = .4$). There was a moderate but significant main effect of *WazzUP Mama?! (n = 218)* on the decrease of MD scores during pregnancy ($F(1.43) = 27.05$, $p < .001$, $d = .5$). We concluded that the intervention *WazzUp Mama?! (n = 218)* provides an opportunity to prevent and reduce maternal distress during the antenatal period in a population of healthy population of pregnant women.

In **chapter 8** we present the main findings of our research, discuss the meaning of these findings, consider the strengths and weaknesses of our methods, address the implications of our findings for midwifery care and education, and give recommendations for future research.

Maternal distress

Maternal distress is a multi-factorial and multi-dimensional health problem that can be positively influenced by the identification of a woman's vulnerability for experiencing the condition or the presence of the condition. This can be done by detecting potential predisposing factors in a woman's individual circumstances, history or behaviour, and by assessing her emotional wellbeing in the antenatal period. The term maternal distress refers to psychological tension, difficulties, or the inability to psycho-socially cope with gestation, having children or raising children. The essence of maternal distress lies in the relationship and interaction between mother and child, it can occur in the broader context of a woman's life and is a unique experience for every individual woman.

Maternal distress manifests itself in healthy, mild and severe forms. The causes, factors and circumstances that make women vulnerable for maternal distress vary. Women respond differently to the same circumstances, experiencing identical situations differently. This implies that only the woman herself can determine her psychological burden and ability to cope, requiring the midwife to rely on a woman's report of how she feels. A systematic approach to self-disclosure requires a woman-centred approach and includes assessment of maternal distress and mapping the possible critical circumstances that make women more vulnerable for maternal distress.

WazzUp Mama?!

WazzUp Mama?! is a complex intervention addressing the complexity of maternal distress. The intervention components and features can work independent of each other or they may interact enhancing their effectiveness. Our data do not yet allow us to assess what aspect of the intervention is responsible for reducing maternal distress during pregnancy. We expect that the intervention works differently for each woman; it is likely that individual women respond or benefit differently to separate components of the intervention. Nevertheless, we believe that self-disclosure of women about their emotional state and about important individual issues in their lives together with the possibility of self-management of their distress are critical in the prevention and reduction of maternal distress. Future research will determine if there is a postpartum or long-term effect of the antenatal intervention WazzUp Mama?!.

Recommendations

Our study allows us to make several recommendations for midwifery practice, education and research. It is important that midwives familiarise themselves with women and their personal history and circumstances and screen for the existence of maternal distress. Midwives need to be educated in how to effectively screen for maternal distress and for vulnerability to maternal distress. Sharing expertise and practice experience with maternal distress among (student) midwives will contribute to the knowledge and skills for screening for maternal distress, supporting pregnant women and coordinating care for maternal distress.

To our understanding of maternal distress will benefit from a rigorous concept analysis of the condition. Measurement of the long-term effect of *WazzUp Mama?! will require a longitudinal design, an evaluation of our broad approach, and a qualitative follow up, all of which will reveal the beneficial mechanisms of the intervention.*

Conclusion

Taking on board the strengths (e.g. systematic approach) and limitations (e.g. possible selection bias of the studies), and with the caveat that *WazzUp Mama?! is still in an early phase, this thorough and systematically developed antenatal intervention for women receiving midwife-led care contributes to a more positive emotional wellbeing during pregnancy.*

* Bartholomew L, Parcel G, Kok G, Gottlieb N, Fernández M. Planning Health Promotion Programs. An Intervention Mapping Approach; 3rd edn. Jossey-Bass: San Francisco. 2011

SAMENVATTING

Door de emotionele en sociale veranderingen, uitdagingen, en persoonlijke behoeften is een zwangerschap niet alleen een lichamelijk veranderingsproces, maar ook een psychisch en sociaal proces. Deze veranderingen, uitdagingen en behoeften kunnen van invloed zijn op het emotionele welbevinden van vrouwen tijdens de zwangerschap en de ene zwangere heeft hier meer last van dan de andere zwangere. Wanneer een zwangere last ervaart van subjectieve negatieve gevoelens die gepaard gaan met psychische klachten en symptomen, spreken we van ‘maternale distress’.

De aanleiding voor het “Gewoon Gezond Zwanger” project (2011 – 2015) was de bezorgdheid over emotioneel welbevinden geuit door het ministerie van Volksgezondheid, Welzijn en Sport (VWS). Daarnaast meldden verloskundigen in het werkveld dat zij onzeker waren over hun rol en verantwoordelijkheid ten aanzien van het leveren van adequate zorg aan zwangeren met maternale distress. De structuur en inhoud van het project was gebaseerd op het Intervention Mapping protocol van Bartholomew et al. (2011)*. Intervention Mapping is een protocol waarmee empirische gegevens en theoretische inzichten bij het ontwikkelen van een gezondheid bevorderende interventie worden toegepast. Conform het Intervention Mapping protocol en het bottom-up perspectief van het “Gewoon Gezond Zwanger” project werden er professionals uit het werkveld betrokken bij de ontwikkeling en implementatie van de interventie om deze zo optimaal mogelijk te laten aansluiten op de behoeften van zwangeren in de hedendaagse eerstelijns verloskundige zorg. Gedurende het project zijn de zes stappen van Intervention Mapping gevolgd (behoefteraming, veranderingsdoelen, theoretische methodieken en praktische technieken, programmaontwerp en productie, implementatie en evaluatie).

Het doel van het “Gewoon Gezond Zwanger” project was om systematisch verkregen empirische en theoretische argumenten te vertalen in een prenatale interventie die bijdraagt aan de preventie en vermindering van maternale distress tijdens de zwangerschap bij vrouwen die onder controle zijn bij eerstelijns verloskundigen; dus vrouwen met een, over het algemeen, gezonde zwangerschap.

De gestelde doelen in dit proefschrift zijn geformuleerd in de zes volgende onderzoeksvragen: 1) Wat zijn de behoeften van zwangeren die ter overweging moeten worden genomen bij het ontwikkelen van een interventie om emotioneel welbevinden tijdens de zwangerschap te verbeteren? 2) In welke mate ervaren zwangeren maternale distress en welke factoren zijn hierop van invloed? 3) Welke bestaande prenatale interventies zijn effectief in de reductie van maternale distress tijdens de zwangerschap? 4) Wat zijn de intenties van verloskundigen om zorg omtrent maternale distress te verlenen en wat zijn onderliggende redenen die deze intenties beïnvloeden? 5) Hoe ontwikkelen we op systematische wijze een prenatale interventie voor verloskundige zorgverleners om maternale distress te voorkomen of te reduceren? 6) Heeft een prenatale interventie die volgens het Intervention Mapping protocol ontwikkeld is een positief effect op het voorkomen of reduceren van maternale distress?

In dit proefschrift hebben we de factoren bestudeerd die gezonde zwangeren kwetsbaar maken voor maternale distress, specifiek de etiologische factoren. Daarnaast hebben we zowel inzicht verworven in de effectiviteit van bestaande prenatale interventies voor maternale distress als in de huidige eerstelijns verloskundige zorg met betrekking tot de zorg voor maternale distress. De verkregen informatie is vertaald in de interventie *WazzUp Mama?! om op effectieve wijze te*

voorzien in de behoeften van zwangeren en verloskundigen in de eerstelijns zorg. Het effect van de interventie werd vervolgens onderzocht.

In **hoofdstuk 1** wordt beschreven dat depressie, angst en zwangerschap gerelateerde angst bijdragen aan een verminderd emotioneel welbevinden tijdens de zwangerschap. De prevalentie van deze meest voorkomende, en vaak naast elkaar bestaande, psychische klachten tijdens de zwangerschap varieert. Omdat het concept verminderd emotioneel welbevinden tijdens de zwangerschap nog niet duidelijk omschreven en gedefinieerd is, sluiten we ons aan bij de term maternale distress om vanuit een breed perspectief de verschillende psychische klachten die voorkomen tijdens de zwangerschap aan te duiden. Deze klachten kunnen zowel veroorzaakt worden door de tijdelijke situatie van de zwangerschap als door de emotionele karaktertrekken van de zwangere vrouw. Het ervaren van maternale distress tijdens de zwangerschap kan een voorspeller zijn voor geboorte- en gezondheidsproblematiek op korte en lange termijn voor zowel moeder als kind.

Prenatale zorg wordt in Nederland over het algemeen door verloskundigen verleend. Zij zijn de meest voor de hand liggende zorgverleners om vrouwen te identificeren die meer kwetsbaar zijn om maternale distress te ontwikkelen of te ondervinden tijdens de zwangerschap. Er wordt verondersteld dat maternale distress bij vrouwen in de eerstelijns prenatale verloskundige zorg voorkomen of verminderd kan worden door het aanbieden van een interventie. Om preventie of reductie van maternale distress daadwerkelijk te realiseren zullen we eerst inzicht moeten verkrijgen in de factoren die een vermindering van maternale distress kunnen bewerkstelligen. Daarin zijn zowel de omstandigheden en oorzaken die bij zwangeren een rol spelen belangrijk maar ook de mogelijkheden die verloskundigen tot hun beschikking hebben om de interventie te implementeren in hun zorg.

Om in te kunnen schatten welke ingrediënten nodig zijn om een prenatale interventie ter preventie of reductie van maternale distress te ontwikkelen zijn de zorgbehoeften van zwangere vrouwen verkend en uitgebreid in kaart gebracht (**hoofdstuk 2**). We onderzochten de literatuur en verzamelden op systematische wijze aanwijzingen en bewijs die verband hielden met deze zorgbehoeften. Professionals uit het werkveld beoordeelden het materiaal op klinische betekenis en relevantie. Vervolgens werd de PRECEDE¹ component van het PRECEDE-PROCEED planningsmodel gebruikt om de gegevens te bundelen en te structureren in een functioneel model dat een maatschappelijke, epidemiologische, etiologische, educatieve en ecologische analyse bevat van maternale distress tijdens de zwangerschap. Op deze manier verkregen we een systematisch overzicht van factoren, die een sterk verband vertonen met maternale distress en dat als leidraad kon fungeren in de ontwikkeling van de interventie *WazzUp Mama?!*.

Het literatuuronderzoek omvatte 45 studies met steekproeven uit populaties gezonde zwangeren. De kwaliteit van de studies varieerde tussen gemiddeld tot zeer betrouwbaar. De studies leidden tot inzichten in de nadelige gevolgen van maternale distress voor moeder en kind, de zogenaamde kwaliteit van leven factoren. Situaties en omstandigheden in het heden en verleden van de individuele vrouw, obstetrisch gerelateerd of gerelateerd aan haar persoonlijke levensomstandigheden, haar wijze van omgaan met problemen of moeilijkheden, en haar persoonlijke en sociale ondersteuning bleken de etiologische factoren die verband houden met

¹ Afkorting voor: **P**redisposing, **R**einforcing en **E**nabling **C**onstructs in **E**ducational **D**iagnosis en **E**valuation

maternale distress tijdens de zwangerschap. Vastgesteld werd dat beperkte kennis omtrent omgaan met problemen of moeilijkheden met (maternale) distress een predisponerende factor was - een factor die omgaan met problemen en moeilijkheden beïnvloedt - voor maternale distress. Ontspanning, ondersteuning door de partner, positieve ervaringen met begeleiding en hulpverlening, en een positieve interactie met de verloskundige bleken factoren te zijn die omgaan met problemen en moeilijkheden tijdens de zwangerschap ondersteunen. De aanwezigheid van ondersteunende netwerken draagt positief bij aan het omgaan met problemen en moeilijkheden.

De resultaten suggereren dat maternale distress een multifactorieel en multidimensionaal gezondheidsprobleem is. De mate waarin vrouwen maternale distress ervaren is voor een groot deel afhankelijk van hoe zij hier zelf mee omgaan, met ondersteuning en aanpassing van hun omgeving, waarin verloskundigen de aangewezen zorgverleners zijn om verandering in gedrag te faciliteren.

De etiologische factoren, die resulteerden uit het literatuuronderzoek in hoofdstuk 2, waren verkregen uit internationale studies die bestonden uit populaties met verschillende sociaal-culturele achtergronden. Om inzicht te krijgen in specifieke etiologische factoren (persoonlijke kenmerken, voorgeschiedenis en persoonlijke omstandigheden, gedrag en omgevingsfactoren) de kwetsbaarheid van zwangeren in de *Nederlandse* eerstelijns verloskunde voor maternale distress beïnvloedt, werd dit bestudeerd (**hoofdstuk 3**). Rekening houdend met de doelstelling van het project – het ontwikkelen van een prenatale interventie voor de Nederlandse eerstelijns verloskunde – onderzochten we de etiologische factoren in een representatieve steekproef van vrouwen in Nederland met een gezonde zwangerschap ($n = 458$). Psychische klachten in de voorgeschiedenis ($B = 1,071$; $p = ,001$), het hebben van kinderen ($B = 2,998$; $p = ,001$), het ervaren van dagelijks terugkerende stressfactoren ($B = 1,304$; $p = < ,001$), ontkennend gedrag ($B = 1,047$, $p = < ,001$), somatisering ($B = ,484$; $p = ,004$), en negatieve gevoelens ten aanzien van de komende bevalling ($B = ,636$; $p = < ,001$) vertoonden een positief lineair verband met maternale distress. Het uiten van emoties, gedachten en zorgen ($B = -,863$; $p = ,004$) en het kunnen accepteren van de situatie ($B = -,542$; $p = ,008$) bleken positieve manieren te zijn om problemen of moeilijkheden te benaderen en ermee om te gaan, ter preventie of reductie van maternale distress tijdens de zwangerschap. Deze resultaten helpen de factoren te identificeren die relevant zijn voor screening van maternale distress.

Gezien de doelstelling van het project, het ontwikkelen van een interventie ter preventie of reductie van maternale distress tijdens de zwangerschap, was het zinvol om de effectiviteit van bestaande prenatale interventies te bestuderen. **Hoofdstuk 4** beschrijft de systematische review en meta-analyse van gerandomiseerde gecontroleerde studies die zich richtten op de reductie van maternale distress. Uit de resultaten van de review bleek dat er weinig kwalitatief voldoende onderzoek beschikbaar was ($n = 10$ studies) dat de effectiviteit van prenatale interventies bestudeerde, en in de meta-analyse werden negen studies ($n = 3063$ participanten) geïnccludeerd. De meta-analyse werd beïnvloed door de kleine steekproefgroottes van de geïnccludeerde studies. De beperkingen van de meta-analyse incalculerend, bleek dat universele preventie – gericht op de gehele populatie zwangeren met een gezonde zwangerschap – geen significant effect had op de reductie van maternale distress (zes studies, $n = 2793$, gestandaardiseerd gemiddeld verschil, SMD $-,06$; 95% betrouwbaarheidsinterval, 95% BI $-,14$ tot $,01$). Maar een subgroep analyse van een geselecteerde groep zwangere vrouwen met verhoogde kwetsbaarheid voor maternale distress, vertoonde een klein significant reducerend effect op maternale distress ten gevolge van een preventieve interventie (drie studies, $n = 1410$; SMD $-,25$; 95% BI $-,37$ tot $-,14$). Geïndiceerde interventies (gericht op

gediagnosticeerde maternale distress) hadden ook een klein significant reducerend effect op maternale distress (drie studies, $n = 270$; SMD $-.29$; 95% BI $-.54$ tot $-.04$).

Inzicht verkrijgen in het gedrag van de belangrijkste interveniërende personen is belangrijk bij een interventie ontwikkeling. Omdat verloskundigen geïdentificeerd zijn als sleutelfiguren, is het aannemelijk dat preventie of reductie van maternale distress inherent is aan hun bereidheid om binnen hun zorg aandacht te besteden aan maternale distress. Om hier inzicht in te krijgen zijn twee samenhangende explorerende studies uitgevoerd middels interviews en een vragenlijst. Allereerst werden semigestructureerde interviews afgenomen met verloskundigen ($n = 6$) om een voorlopig inzicht te krijgen in de overtuigingen van Nederlandse verloskundigen over de zorgverlening rondom maternale distress. De resultaten uit de interviews samen met de bevindingen van een literatuurstudie vormden de basis voor de explorerende survey.

In deze survey onderzochten we de intenties van eerstelijns verloskundigen om prenatale zorg te verlenen aan zwangeren met maternale distress, inclusief de determinanten van hun intenties (**hoofdstuk 5**). Uit bestaande richtlijnen was naar voren gekomen dat de prenatale verloskundige zorg voor maternale distress drie niveaus kent: screening (met gebruik van een meetinstrument), ondersteuning (informatief en emotioneel), en samenwerking (consultatie, overleg met, en verwijzing naar andere zorgverleners). Om te bepalen welke overtuigingen een rol spelen bij de drie niveaus van zorgverlening werd het meetinstrument gebaseerd op de Theorie van Gepland Gedrag (Theory of Planned Behaviour – TPB), een gedragsverklaringmodel. Voor de TPB determinanten intentie, attitude, waargenomen gedragscontrole, en persoonlijke norm werd bepaald in hoeverre ze een betekenisvolle invloed hadden op de niveaus screening, ondersteuning en samenwerking. De TPB determinanten werden aangevuld met 'aantal jaren werkervaring', 'denkwijze over maternale distress' (maternale distress is een probleem, is interessant, is complex) en 'ervaren kennis' en 'belemmeringen ten aanzien van prenatale zorg aan zwangeren met maternale distress'.

De respons van de verloskundigen ($n = 112$) vertoonde een minder uitgesproken intentie tot screenen van maternale distress ($3,46 \pm 1,8$) vergeleken met de intentie om vrouwen met maternale distress te ondersteunen ($4,63 \pm 1,57$) en de intentie om samen te werken met andere zorgverleners ($4,63 \pm 1,57$) (allen gemeten op een schaal 1 – 7). Het bleek dat het aantal jaren werkervaring ($B = ,035$; $p = ,028$), de interesse van de verloskundige in maternale distress ($B = ,383$; $p = ,005$), een positieve attitude ten aanzien van screenen op maternale distress tijdens de zwangerschap ($B = ,326$; $p = ,002$), en waargenomen gedragscontrole ten aanzien van screenen ($B = ,248$; $p = ,004$) een positieve lineair verband vertoonden met de intentie tot screenen van maternale distress. De intentie tot het ondersteunen van zwangere vrouwen met maternale distress vertoonde een positieve lineair verband met de interesse van de verloskundige in maternale distress ($B = ,637$; $p < ,001$) en met een positieve attitude ten aanzien van het ondersteunen van zwangere vrouwen met maternale distress ($B = ,523$; $p = ,017$). Tot slot vertoonde de intentie tot samenwerken een positief lineair verband met het aantal jaren werkervaring ($B = ,042$; $p = ,017$) en wederom met de interesse van de verloskundige in maternale distress ($B = ,455$; $p = ,002$).

De resultaten van de hoofdstukken 2 tot en met 5 vormden een uitgebreide behoefteanalyse (*stap 1, Intervention Mapping*) en hielpen om de relevante factoren te bepalen voor identificatie van de kwetsbaarheid van vrouwen voor maternale distress. Deze factoren hebben betrekking op de zwangere haar voorgeschiedenis en persoonlijke omstandigheden, haar subjectieve ervaring van

deze factoren en de manieren hoe ze omgaat met problemen of moeilijkheden. Deze factoren zijn belangrijk voor de inhoud van de interventie. De relevante factoren voor de interventie gerelateerd aan het gedrag van verloskundigen richten zich op het herkennen van zowel de kwetsbaarheid van de zwangere voor maternale distress als ook de aanwezigheid van maternale distress. In **hoofdstuk 6** is de ontwikkeling van de interventie *WazzUp Mama?!* beschreven. Een interventie die ontwikkeld is volgens het Intervention Mapping protocol met als algemeen programma doel: preventie en reductie van maternale distress bij zwangere vrouwen in de eerstelijns verloskundige zorg.

Gedragdoelstellingen werden geformuleerd en gewenst gedrag werd expliciet beschreven voor allebei de doelgroepen. Gedragdoelstellingen geven weer wat er op het gebied van gedrag moet veranderen en wat geleerd moet worden. Gedrag dat op individueel niveau (*zwangere vrouwen*) moet veranderen betreft allereerst het herkennen van signalen en symptomen van maternale distress en eigen kwetsbaarheid voor maternale distress, maar ook het zelfmanagement van selectieve maatregelen ter preventie van maternale distress en zelfmanagement in het zoeken van hulp en ondersteunende middelen ter vermindering van maternale distress. Relevante gedragsdeterminanten zijn kennis en attitude over maternale distress, risico-perceptie ten aanzien van maternale distress, waargenomen gedragscontrole en sociale steun en invloed van de omgeving. Het gedrag dat op interpersoonlijk niveau (*verloskundige-zwangere vrouw*) moet veranderen betreft het bevorderen van het uiten van emoties, gedachten en zorgen van zwangere vrouwen, het bevorderen van zelfmanagement van zwangeren van maternale distress, en de coördinatie van zorg voor vrouwen die last hebben van maternale distress. Relevante gedragsdeterminanten zijn kennis en attitude over maternale distress, waargenomen gedragscontrole ten aanzien van het screenen van maternale distress, het beheersen van vaardigheden en de sociale normen binnen de verloskundige beroepsgroep. Een specifieke route die aangeeft wat zwangere vrouwen en verloskundigen moeten leren om hun gedrag te veranderen (veranderingsdoelen) werd voor iedere afzonderlijke gedragdoelstelling beschreven (*stap 2, Intervention Mapping*).

Vervolgens werden de veranderingsdoelen gekoppeld aan theoretische methodieken en werden de methodieken vertaald en geoperationaliseerd in praktische technieken, voor zowel zwangere vrouwen als verloskundigen. De belangrijkste technieken in de interventie om de determinanten bij zwangere vrouwen en verloskundigen te beïnvloeden waren ‘individuele afstemming’ (tailoring) en ‘informatie verwerking’ (*stap 3, Intervention Mapping*). Daarna werden de praktische technieken samengevoegd tot een coherent programma waarin de afzonderlijke onderdelen op een logische wijze werden gecombineerd en de programmamaterialen werden ontworpen, getest en geproduceerd (*stap 4, Intervention Mapping*).

Het interventieprogramma werd *WazzUp Mama?!* genoemd en bestond uit twee onderdelen: één voor zwangere vrouwen en één voor verloskundigen. Het programma onderdeel voor zwangeren had als doel om de aanwezigheid van maternale distress te signaleren met behulp van een ‘op maat’ geschreven E-health internet programma. Het programmaonderdeel voor verloskundigen bestond uit een concept voor de implementatie en coördinatie van zorg voor maternale distress en uit handvatten voor verloskundigen om zwangere vrouwen te ondersteunen in het uiten van hun emoties, gedachten en zorgen, en in hun zelfmanagement van maternale distress, al dan niet met professional hulp. Het verloskundige programmaonderdeel bevatte een toolkit met daarin een richtlijn en een stroomdiagram, een regionale sociale kaart en een hulpmiddel voor consultatie en verwijzing. Het programma werd binnen 17 eerstelijns verloskundige praktijken geïntroduceerd door een KNOV geaccrediteerde training (kwaliteitsregister) aan verloskundigen en

praktijkassistenten ($n = 72$). Deze praktijken waren gesitueerd in de zuidelijke, midden-oostelijke en noordelijke provincies van Nederland (*stap 5, Intervention Mapping*).

De 17 verloskundige praktijken namen ook deel aan een niet-gerandomiseerde evaluatieonderzoek met een pre-post interventie design, beschreven in **hoofdstuk 7**. In dit evaluatieonderzoek werden de veranderingen van maternale distress bestudeerd. Scores van maternale distress, gemeten in het eerste en derde trimester van de zwangerschap, van vrouwen die naast hun standaard verloskundige zorg de interventie kregen ($n = 218$) werden vergeleken met scores van vrouwen die standaard prenatale zorg ontvingen care ($n = 215$); experiment versus controle groep. (*stap 6, Intervention Mapping*).

De gemiddelde scores op de Edinburgh Depression Scale (EDS), State-Trait Anxiety Inventory (STAI) en Maternale Distress (MD) in de controle groep namen significant toe vanaf het eerste trimester tot in het derde trimester van de zwangerschap (EDS $p < ,001$; STAI $p < ,001$; MD $p < ,001$). De gemiddelde Pregnancy Related Anxiety Questionnaire (PRAQ) scores namen ook toe maar niet significant ($p = ,12$). Ook het aantal zwangeren met scores boven de afkappunten op de EDS, STAI en PRAQ nam significant toe tijdens deze zwangerschapsperiode (EDS $p < ,001$; STAI $p = ,045$, PRAQ $p = ,03$). Het aantal zwangeren met een score boven het afkappunt voor MD nam toe maar niet significant ($p = ,13$). In de interventie groep namen de gemiddelde STAI, PRAQ en MD scores significant af van het eerste trimester tot in het derde trimester van de zwangerschap (STAI $p = ,001$; PRAQ $p < ,001$; MD $p < ,001$). De gemiddelde EDS scores verminderden maar bereikten geen statistische significantie ($p = ,13$). Het aantal zwangeren met PRAQ en MD scores boven de afkappunten verminderde significant van het eerste naar het derde trimester (PRAQ $p = ,002$; MD $p = ,009$). Het aantal zwangeren met EDS en STAI scores boven de afkappunten nam wel af maar bereikten geen statistische significantie (EDS $p = ,4$; STAI $p = ,4$). Er werd een middelmatig maar significant effect gemeten van *WazzUp Mama?!* op de afname van MD scores tijdens de zwangerschap ($F(1,43) = 27,05$, $p < ,001$, $d = ,5$). Er werd geconcludeerd dat de *WazzUp Mama?!* een interventie is die potentie heeft voor preventie of reductie van maternale distress voor zwangere vrouwen in de eerstelijns verloskunde.

De belangrijkste resultaten van de verrichte studies, de betekenis van deze resultaten, de methodologische sterke en minder sterke kanten en de implicaties van de resultaten voor verloskundige zorg, onderwijs en onderzoek zijn beschreven in **hoofdstuk 8**.

Maternale distress

Maternale distress is een multifactorieel en multidimensionaal gezondheidsprobleem dat verminderd kan worden door zowel het identificeren van vrouwen en hun kwetsbaarheid voor maternale distress, of de aanwezigheid van maternale distress. Dit kan door de detectie van predisponerende factoren in individuele omstandigheden van de zwangere, haar voorgeschiedenis of gedrag, en door de beoordeling van het emotioneel welbevinden van de zwangere. De verloskundige, de zwangere zelf of beiden kunnen dit doen. De term maternale distress refereert aan psychische spanning, moeilijkheden en het onvermogen om op psychosociaal gebied adequaat om te gaan met de zwangerschap, het hebben van kinderen of het opvoeden van kinderen. Tot de essentie van maternale distress behoort de relatie en interactie tussen moeder en kind, de authenticiteit van de individuele vrouw en het feit dat maternale distress ook buiten de zwangerschap zich kan voordoen.

Maternale distress differentieert zich in gezonde, milde en ernstige distress. Oorzaken, factoren en omstandigheden die vrouwen kwetsbaar maken voor maternale distress variëren in mate en ernst. Verschillende vrouwen reageren verschillend op dezelfde omstandigheden of situaties en ervaren en evalueren dit eveneens verschillend. Dit houdt in dat alleen een vrouw zelf kan bepalen hoe zwaar iets weegt voor haar of in hoeverre zij hiermee op een adequate wijze mee om kan gaan. Verloskundigen zijn afhankelijk van uitingen hoe vrouwen zich voelen, wat zij ervaren of hoe het werkelijk met hen gaat. Het bevorderen van het uiten van de vrouw haar emoties, gedachten en zorgen en het in kaart brengen van de mogelijke kritieke omstandigheden die vrouwen meer kwetsbaar en vatbaar maken voor maternale distress, vraagt van de verloskundige een vrouw-gerichte benadering.

WazzUp Mama?!

*WazzUp Mama?! is een samengestelde interventie die aansluit op de complexiteit van maternale distress. De verschillende componenten en eigenschappen en gebruiksmogelijkheden van de interventie zijn interactief en versterken mogelijk elkaars werking. Het is moeilijk om te bepalen welk aspect of aspecten van de interventie verantwoordelijk is of zijn voor de afname van maternale distress tijdens de zwangerschap omdat de interventie voor iedere individuele vrouw op verschillende momenten een verschillende werking en effect heeft. Vrouwen reageren mogelijk verschillend op de verschillende interventie onderdelen. Hoe dan ook, het blijkt wel dat wanneer een vrouw de mogelijkheid heeft haar emoties, gedachten en zorgen te uiten en ook uiting te geven aan belangrijke persoonlijke omstandigheden in haar leven en hierover zelf de regie in handen neemt of hulp zoekt, dit alles bijdraagt aan de preventie of reductie van maternale distress. Er is geen onderzoek gedaan naar het lange termijn effect van *WazzUp Mama?! dus kan er geen uitspraak gedaan worden over het effect van de interventie postpartum of later.**

Aanbevelingen

Er zijn verschillende aanbevelingen voor de hedendaagse verloskunde praktijk, onderwijs en onderzoek. Het is belangrijk dat verloskundigen bekend zijn met de voorgeschiedenis en persoonlijke omstandigheden van iedere individuele zwangere die bij hen in zorg is en dat verloskundigen screenen voor de aanwezigheid van maternale distress. Verloskundigen hebben onderwijs of bijscholing nodig wat betreft herkennen van maternale distress en voor de screening van kwetsbaarheid hiervoor. Het delen van deskundigheid en praktijk ervaring over maternale distress door (student) verloskundigen draagt bij aan de educatie en vaardigheden betreft het screenen van maternale distress, de ondersteuning van zwangeren en de coördinatie van zorg rondom maternale distress.

Het concept maternale distress kan mogelijk nog beter ontwikkeld worden door het uitvoeren van een concept analyse. Het mogelijke lange termijn effect van *WazzUp Mama?! behoeft een longitudinaal onderzoeksdesign, een evaluatie van de door ons gekozen brede benadering van maternale distress, en een vervolg met kwalitatief onderzoek om mogelijk beter te begrijpen wat het effectieve mechanisme is van de interventie.*

Conclusie

Rekening houdende met de sterke (bijv. systematische benadering) en minder sterke kanten (bijv. mogelijke selectie bias) en gezien het feit dat *WazzUp Mama?! zich nog in een ontwikkelingsfase*

bevindt, draagt deze grondige en systematisch ontwikkelde prenatale interventie op positieve wijze bij aan het emotioneel welzijn van vrouwen tijdens de zwangerschap

* Bartholomew L, Parcel G, Kok G, Gottlieb N, Fernández M. Planning Health Promotion Programs. An Intervention Mapping Approach; 3rd edn. Jossey-Bass: San Francisco. 2011

VALORISATION ADDENDUM

This addendum complements the thesis: “*WazzUp Mama?! The development of an an intervention to prevent and reduce maternal distress during pregnancy*”, discussing the public and economic relevance of the findings described in the thesis. This addendum also includes discussing the planning and the realisation of the intervention, possible target groups, the innovative character of the intervention, and in which activities the findings of the thesis have resulted.

Relevance *WazzUp Mama?! The development of an an intervention to prevent and reduce maternal distress during pregnancy*

Public relevance

The birth rate in the Netherlands is approximately 175.000 per annum ¹. The thesis showed that one in every five women experiences maternal distress. Based on the birth rate we can estimate that approximately 35.000 women per year experience maternal distress. Numerous studies confirm that maternal distress is a public health problem with short and long-term consequences for maternal and child wellbeing. In the thesis we documented the effects of maternal distress on maternal and child health. The effects of maternal distress are documented as post partum depression or chronic mental health problems for women, including suicide. For children maternal distress results in low birth weight and it affects the child’s emotional development, behaviour and learning later in life. It is clear that maternal distress has a far-reaching effect on quality of life ².

When maternal distress strikes a woman, her family as a whole is affected by the experience. The care and support for a woman suffering from maternal distress often falls on the woman’s immediate family or relatives. They must alter their lifestyle and take on some of the role functions of the woman, which in turn affects their own normal role and functioning. A woman’s significant others’ largest challenges are providing assistance with daily activities (e.g. providing transportation, offering financial assistance, helping with housework) and handling the stress associated with care (e.g. concerns about possible embarrassing behaviours, intra-family conflict, and financial strains). Long-term effects of maternal distress, even in the most stable and supportive families, bring changes in family relationships and produces disequilibrium in the family structure ³⁻⁵. Maternal distress does not only affect mothers and their families but also healthcare professionals and teachers who are involved with the woman or with her affected child.

Dutch studies looking at absence due to psychological problems show that 20 percent of female employees have absence episodes longer than a month. Women between 30-39 years of age working in education, financial services and the health sector have an absence incidence of an average of 35 percent as a result of psychological problems ^{6,7}. Pregnancy is associated with a 15% higher sickness absence in primigravid pregnant women compared to non-pregnant women ⁸, and to a longer sickness absence amongst all pregnant women compared to non-pregnant women ⁹. Psychological problems during pregnancy are related to a higher sickness absence amongst Dutch women compared to physical-related sickness causes. Maternal distress is known as an important reason for absence of work during pregnancy ⁸.

The intervention *WazzUp Mama?! The development of an an intervention to prevent and reduce maternal distress during pregnancy* decreases the burden on women and subsequent on their relatives, relations and employers during pregnancy. The thesis showed that one in thirteen women experiences maternal distress after receiving the intervention instead of every five women when not receiving the intervention. Based on the birth rate we can hypothesize that approximately 13.500 women, instead of 35.000, per year would experience maternal distress when receiving the

intervention. The promising effects of *WazzUp Mama?! during pregnancy* also need to be confirmed in a study that explores the post partum and long-term effects of the intervention. Establishing the long-term effects of the intervention *WazzUp Mama?! would have an enormous public relevance. Unlike earlier efforts at public health intervention* ⁵, *WazzUp Mama?! was able to access and target populations using a strategy that was selective and indicative, tailoring psycho-education to the individual needs of women.*

Economic relevance

It has been recognized that affected emotional wellbeing and psychological ill-health account for over 15 percent of the burden of disease worldwide ³. This is more than the disease burden caused by all cancers. For women throughout the world, depression is the leading cause of death and disability ³. In the Netherlands, anxiety and depression are listed as number two and four in the top-ten of diseases with the highest disease burden and disability ⁵. In the thesis we have established the correlation between depression, trait-anxiety and pregnancy-related anxiety during pregnancy. This co-occurrence or comorbidity increases the disease burden of depression in women.

Untreated distress brings with it significant societal costs. Taking into account expenditures on psychological problems and loss of productivity, The World Health Organization (WHO) ⁴ has estimated that psychological problems cost developed nations between three and four percent of their Gross National Product (GNP). Financial strain on others, absences from work, healthcare costs, and additional resources and support have economic consequences. There are Dutch calculations ⁵ to establish the costs of treatment for psychological distress. These calculations are based on a population of males and females between 18 and 65 years of age. It is estimated that 447 million Euros per annum is spent on care for women with depression and anxiety within this age group. One in seven people who experience psychological distress, experience partial or complete disability - and the majority of this group are women ⁵. These data, however, offer little information about the exact costs attributable to maternal distress during pregnancy – a figure that is difficult to estimate.

In order to assess or estimate the financial benefits of *WazzUp Mama?! we must assess the costs involved with the intervention, weighing the costs for (early) treatment against the costs of untreated maternal distress. Included here should be the reduction in costs associated with the long-term effect of the intervention. We do have insight into the costs of the intervention development and implementation of WazzUp Mama?! but our data came from 17 Dutch midwifery practices including 72 midwives and practice assistants. We have not estimated the costs and benefits of the intervention if implemented nationwide. We recommend that a thorough and critical investigation of costs of nationwide implementation among 518 midwifery practices and nearly 3000 practising midwives* ¹⁰ needs to be done.

It is difficult to estimate the costs of maternal distress to society because we do not know the exact prevalence and long-term consequences of maternal distress. The lack of information about exact prevalence is the result of underreporting and the use of different methods for measuring maternal distress ¹¹. The lack of information about long-term consequences is due to the difficulty of determining specific health outcomes associated with maternal distress ¹¹. In order to assess the public health costs and the cost-effectiveness of the intervention, specific health outcomes that result from maternal distress during pregnancy need to be mapped. The reduction of aforementioned health issues will have huge financial benefits for the healthcare insurances in the Netherlands. The healthcare insurances should be consulted in order to set outcomes for further investigation of the intervention, allowing their costs to be taken into account.

The economic relevance of addressing vulnerable groups within larger populations can only be demonstrated when risk factors are linked to the onset or occurrence of maternal distress and only then if effective treatment is available ¹². *WazzUp Mama?!* includes several screening elements focusing on vulnerability for maternal distress and women's perception about this vulnerability, which are then translated into a scoring system to rank seriousness and burden. Scores above certain cut-off levels are linked to the advice about self-management possibilities or to referral to additional resources or (professional) support. Women who do not receive treatment during pregnancy are more likely to have poor long-term mental health outcomes, which makes screening and follow-on care important and economically relevant components of *WazzUp Mama?!* ¹³. Our intervention includes a variety of locally available individual and group support and treatment options for the woman herself as well as consultation and referral possibilities for the midwife as caregiver. We included mainstream and alternative support and treatments and E-health possibilities in order to suit women's individual needs. Tailored support and treatment encourage the initiation and continuation of care for maternal distress ¹⁴.

Planning and realization of *WazzUp Mama?!*

Although we have stressed the long-term negative effects of maternal distress and the possible long-term beneficial effects of *WazzUp Mama?!* , the value of the intervention during pregnancy must not be underestimated. Pregnancy is a life-event that will be remembered throughout the rest of a women's life ¹⁵. The prevention and reduction of maternal distress during pregnancy will promote life-long positive memories

In an effort to maximize the effect of *WazzUp Mama?!* during pregnancy we asked users to evaluate the intervention. Six months after commencement of the intervention we conducted a preliminary process evaluation ¹⁶ among midwives and practice assistants ($n = 37$) (November 2014). We did the same among pregnant women with a mean gestational age of 37 weeks, who had received the intervention from the start of pregnancy ($n = 121$) (January 2015). Both involved the evaluation of context, recruitment, reach, dose delivered, dose received, fidelity, resources and barriers ¹⁶.

Midwives were positive about *WazzUp Mama?!* and regarded it as a positive and helpful initiative and tool although they voiced a need for additional education or a helpdesk as a possibility to ask further questions while using the toolkit. They found the training components about the background, structure, content of the intervention and the toolkit adequate and sufficient to implement the intervention in practice. Some midwives expressed the wish to expand the training and to include scenarios, communication skills exercises, and practice with the web-based tailored program. They also had advice about the layout and content of the guideline and clinical pathway.

For their part, women reported that the recurring case-finding questions asked by midwives encouraged self-disclosure and help-seeking. Questions with regard to vulnerability, asked by midwives and by the *WazzUp Mama?!* website, were experienced as creating awareness and increasing insight in one's individual situation. Repetition enhanced importance and relevance. Midwives referral led to the highest and most frequent use of the web-based program. The use of posters and cards also resulted in website visits although it was the midwife advice that women identified as most persuading to actually log on to the web-based tailored program. Women were very enthusiastic about the *WazzUp Mama?!* website and suggested some changes to the layout of the sentences on website pages and to spelling and grammar. Women felt that the use of the website stimulated self-management of maternal distress. Women expressed that the whole 'feel

and look' of the website was very positive and lacked stigmatization of mental illness. The program was only accessible on a computer and women suggested adaptation of the tailored program of *WazzUp Mama?! for tablets and smartphones.*

All these suggested changes seem fairly easy to accomplish. However, it is not these changes that must to be addressed to realize a nationwide implementation of *WazzUp Mama?!.* Wider implementation among more midwifery practices is inevitably associated with financial resources. The intervention has been pilot-tested and requires additional development to optimize its usage. It would be important to perform *post hoc* analyses to look at the separate effects of the selective and indicated prevention strategies of the intervention. Once this information is gathered and complete it will be possible to seek a source of funding for development and further testing of *WazzUp Mama?!.* Knowing if *WazzUp Mama?! has a certain type of preventive effect, will direct the type of funding bodies and organizations to be addressed. Possibilities for financial support are commercial sources, governmental organizations, health research organizations, health care insurances, or local councils.*

We do know that the intervention has to be offered as a complete package, thus including the intervention component for women as well as for midwives. It can be assumed that organizations with a for-profit motive would be interested in the E-health aspect of the intervention. Development and optimization of *WazzUp Mama?! could be achieved with little funding by, for instance, turning it into a project for business and entrepreneurship students. This can also apply to optimizing the web-based program, turning this into a project for web design and web development students. The interest of bigger bodies and organisations will likely be related to a possible long-term effect of the intervention and the success of our project should encourage supporting our work.*

Target groups *WazzUp Mama?!.*

The Dutch Royal Organization of Midwives (KNOV) represents Dutch midwives and provides quality standards, guidelines and additional education to their members. They are able to reach a large number of practicing midwives. The KNOV should endorse the use of *WazzUp Mama?! among their members, emphasizing the importance of its use by midwives to improve the wellbeing of women. KNOV's quality standards and guidelines are not compulsory but incorporating *WazzUp Mama?! as a guideline or standard would provide a solution to the uncertainty expressed by midwives about their specific role and responsibilities in providing care for women with maternal distress. Our interviews with midwives showed that they believed that maternal distress is a serious problem and they wished to contribute to a positive change for women with regard to maternal distress. They were, however, not truly convinced that they could, or how they could make an effective difference. Offering midwives the choice to use *WazzUp Mama?! can meet this need.***

Other groups that should be targeted to receive the results of this study include midwifery students and members of other healthcare professions. *WazzUp Mama?! can be embedded in the new curriculum for Bachelor midwifery education. Within the new curriculum there is an emphasis on the midwife's public health role¹⁷. Our findings can provide concrete and valuable input for filling this role. Another (unpublished) study we performed as part of this project was a Delphi study about maternal distress and multidisciplinary collaboration. This study showed that the involvement of other practitioners from other healthcare disciplines contributes to circulation of knowledge about maternal distress.*

Although *WazzUp Mama?! was developed for midwifery-led care, thus primary care, obstetricians will be interested in the intervention for use with their patients who have*

characteristics similar to those studied here. It is also possible to adapt the intervention for women in secondary or tertiary care.

Health insurance companies will be interested in *WazzUp Mama?!* not only from an economic point of view but also as a tool for quality-assurance. Another interested party might be institutions like the Trimbos Institute for prevention, treatment and monitoring of multidisciplinary care in mental health and addiction, or the Landelijke Vereniging voor Psychiatrie en Zwangerschap (LKPZ) (National Association for Psychiatry & Pregnancy). The Trimbos Institute has developed an action plan for the prevention of postnatal depression to be provided by health visitors and is in the process of shifting its attention to depression during pregnancy ¹⁸. *WazzUp Mama?!* would fit their scope and field of interest. The LKPZ is looking for screening instruments for maternal distress and might also be interested users of in *WazzUp Mama?!* . The LKPZ disseminates research and evidence of effective screening instruments among healthcare practitioners and information about screening and treatment to women. The LKPZ is therefore a resource for identifying potential users of the intervention.

Innovative character of *WazzUp Mama?!*

The innovative character of *WazzUp Mama?!* originates from the way the intervention was developed, guided by the Intervention Mapping protocol ¹⁹. Intervention Mapping revealed that a dual focus on both women and midwives was essential for an effective approach of maternal distress. To our knowledge there are no existing interventions for maternal distress that include this dual approach. Neither are we aware of existing theory-based developed interventions for maternal distress including intervention materials that are a result of the formulation of change objectives, theoretical methods and strategies.

E-health is a fairly unexplored and underdeveloped aspect in midwifery care but is a path that should be developed. The web-based program is the embodiment of digital technology in care. The tailoring character of the intervention coincides with woman-centered care, a model of midwifery care that is receiving a lot of attention in the changing role and scope of midwifery care ¹⁷.

Activities and products

The development of the intervention has led to national and international presentations and to publications in national and international scientific journals. This has led to the PhD student's acting as a peer reviewer of submitted articles with topics related to maternal distress in pregnancy. The PhD student has taken part in advisory groups regarding the development of an index instrument for vulnerable pregnant women in the 'Rivierenland' area, and regarding the development of an intervention for postnatal depression, conducted by the Trimbos Institute. Students from the Bachelor of Science Midwifery program and a Public Health Master of Science student (University of Maastricht) have been involved in data collection but also in additional analyses, seeking answers for their own individual studies and research questions. Topics such as fear of giving birth, maternal distress and weight gain; maternal distress and quality of sleep, and validation of case-finding questions have been part of these students' studies.

At the moment the *WazzUp Mama?!* program is still being used in the midwifery practices that took part in the studies. The Verloskunde Academie Maastricht-ZUYD managed to keep the web-based program up and running, allowing women to use the tailoring offered there. Because the materials are produced through the funding body of the project "Gewoon Gezond Zwanger", Regional Attention and Action for Knowledge (RAAK PRO), at this point the training and materials are

not available for midwifery practices that did not take part in the study. Additionally, Master of Science students of the University of Maastricht, Department of Health Services Research, will perform a cost-benefit analysis of the intervention as part of their final thesis.

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CURRICULUM VITAE

Yvonne Fontein-Kuipers was born on the 5th of August 1965 in Steenberg. After finishing secondary school, she was educated as a mental health nurse at Stichting Vrederust in Bergen op Zoom. A shortened general nursing education program in Hospital Dongemond St. Theresia in Raamsdonksveer followed a post-graduation work period in psychiatric nursing. During this education program she had her first encounter with midwifery. After her nursing graduation Yvonne did the specialised nursing program Obstetrics and Gynaecology at Utrecht AZU Education Institution. Subsequently she worked for ten years as an obstetric nurse at antenatal, postnatal and labour wards in Overvecht Hospital and Utrecht Medical Centre, both in Utrecht.

Yvonne graduated as a midwife in 2011 at the former University of Paisley, Campus Ayr in Scotland. Her clinical part of the educational program was at the Royal Alexandria Hospital in Paisley (Renfrewshire), at the time one of the maternity units with a well developed midwife-led unit and team-led small-sized and woman-centred community based practices, run by midwives who understood the *art* of midwifery.

After her graduation Yvonne carried forward midwifery care from the local midwifery active General Practitioners in Hoevelaken in the Netherlands. She practised in Hoevelaken until 2008, first as a solo-practitioner and later in a duo practice. She continued studying and graduated first for the Bachelor of Science in Midwifery, followed by the Master of Science in Midwifery at Glasgow Caledonian University in Scotland as well as for obstetric ultrasound scanning for primary care in University Medical Centre Utrecht.

In august 2008 Yvonne took up the post for lecturer and became program leader of both the on-distance learning program Bachelor and Master of Science of Midwifery at Glasgow Caledonian University. Yvonne graduated at this same university for her Postgraduate Diploma Healthcare Education and her teaching qualification for Higher Education.

From 2011 to 2015 Yvonne joined the 'Promoting Healthy Pregnancy' project as a researcher and PhD student at Research Centre for Midwifery Science Maastricht, Zuyd University. During this period she had teaching responsibilities for the Midwifery Academy and she worked as a clinical midwife in the Diaconessenhuis in Utrecht and occasionally in midwife-led care practices.

Currently Yvonne works as a senior lecturer and researcher at Rotterdam University of Applied Sciences, Midwifery Education and the Centre of Expertise Innovations in Care.

Yvonne Fontein-Kuipers werd 5 augustus 1965 geboren te Steenberg. Na de middelbare school deed ze de in-service opleiding tot psychiatisch verpleegkundige (B) bij Stichting Vrederust te Bergen op Zoom en na een nawerk periode in de psychiatrie volgde ze de in-service opleiding tot verpleegkundige (A) in Ziekenhuis Dongemond St. Theresia te Raamsdonksveer. Tijdens deze opleiding kwam ze in aanraking met de verloskunde. Yvonne vervolgde haar verpleegkundige opleiding met de specialisatie Obstetrie en Gynaecologie in Utrecht AZU opleiding. Daarna bleef zij tien jaar werkzaam in Utrecht op de pre-, post en verlosafdelingen van het Overvecht ziekenhuis en het Utrecht Medisch Centrum.

In 2001 studeerde Yvonne af als verloskundige bij de voormalige University of Paisley, Campus Ayr te Schotland. Het praktiserende gedeelte van de opleiding doorliep zij in 'the Royal Alexandria Hospital' te Paisley, destijds een van de weinig maternity units met een goed ontwikkelde

midwife-led afdeling met kleinschalige en woman-centered midwife-led community care practices, geleid door verloskundigen die wisten wat de *kunst* van verloskunde inhield.

Na haar beëdiging nam Yvonne de zorg over van de verloskundig actieve huisartsen in Hoevelaken en praktiseerde daar tot 2008, aanvankelijk als soliste en later in een duopraktijk. Terwijl zij haar praktijk opbouwde behaalde Yvonne de Bachelor of Science verloskunde en de Master of Science verloskunde aan Glasgow Caledonian University in Schotland en de opleiding eerstelijns echoscopie in het Universitair Medisch Centrum Utrecht.

In augustus 2008 werd Yvonne aangesteld als docent en programma leider van de on-distance learning Bachelor- en Master of Science Midwifery aan de Glasgow Caledonian University. Yvonne behaalde ook aan deze universiteit de Master of Science 'Onderwijskunde Healthcare Education' en haar leerbevoegdheid voor Hoger en Universitair onderwijs.

Van 2011 tot 2015 werkte Yvonne bij het Project 'Gewoon Gezond zwanger' als onderzoeker en promovenda bij het lectoraat Midwifery Science, Academie Verloskunde Maastricht, Zuyd. Tijdens het project verrichtte zij onderwijstaken voor de Academie en werkte zij als klinisch verloskundige in het Diaconessenhuis te Utrecht en incidenteel als waarnemend verloskundige in de eerstelijns verloskundige zorg.

Momenteel is Yvonne werkzaam als hoofddocent verloskunde bij de Hogeschool Rotterdam, Instituut voor Gezondheidszorg, Verloskunde Academie Rotterdam en het Kenniscentrum Zorginnovatie.

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