



# Responding to maternal distress: from needs assessment to effective intervention

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## Abstract

**Objectives** 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** We searched PubMed, OVID and EBSCO and applied the PRECEDE logic model to select the data. Experts in the field validated the findings.

**Results** We identified 45 studies. Maternal distress was associated with diminished maternal and child's quality of life. Aetiological factors of maternal distress included past and present circumstances related to obstetric factors and to a woman's context of living, coping behaviour, and support mechanisms. Lacking knowledge of coping with (maternal) distress was identified as a predisposing factor. Reinforcing factors were relaxation, partner support, counselling experiences and positive interaction with the midwife. Enabling factors were the availability of a support network.

**Conclusions** When planning the development of an antenatal intervention for 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, enabling and reinforcing factors should also be taken into consideration.

**Keywords** Maternal distress · Intervention mapping · PRECEDE · Pregnancy · Intervention · Health promotion

## Introduction

Maternal distress is an umbrella term for a spectrum of psychological, emotional and behavioural symptoms during pregnancy (Emanuel and St. John 2010; Nast et al. 2013).

The Dutch Government has raised concerns regarding the limited attention within maternal care regarding psychosocial wellbeing of pregnant women (Stuurgroep zwangerschap en geboorte 2009). They emphasized the need for prevention and reduction of maternal distress in maternity services to promote emotional wellbeing during pregnancy and childbirth. In answer to the above, the project “Promoting Healthy Pregnancy” was initiated; a project aiming to develop an evidence-based, best practice intervention to prevent and reduce maternal distress during pregnancy among women with a healthy pregnancy.

Various interventions to reduce maternal distress—including antenatal education, group antenatal care and mentoring programs—are available (Svensson et al. 2009; Cupples et al. 2011; Ickovics et al. 2011), but they have limited success. The limit of success of these programs is likely the result of less than rigorous theoretical underpinnings (Kelly et al. 2007) or insufficient in-depth investigation of the context and the problem that the intervention needs to address (Green et al. 2006; Campbell et al. 2007).

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Maternal distress studies predominantly focus on isolated aspects of maternal distress, such as risk factors for or consequences of maternal distress in different populations with various characteristics, resulting in fragmented or limited generalization of findings (Jomeen 2004). Instead, a bounded population-based compilation of the health problem with a systematic analysis of causation of the health problem at multiple levels and consideration of the multiple determinants of health-related behaviour and environment including the actors relevant to the problem is needed (Jomeen 2004; Green et al. 2006; Campbell et al. 2007; Bartholomew et al. 2011). Building a logic model of the problem and its context, will aid intervention development (Bartholomew et al. 2011). Involving stakeholders brings a variety of knowledge, expertise and perspectives in the needs assessment, defining *reality* and bounds the system to be studied (Bartholomew et al. 2011).

The first step in the systematic development of an intervention is a formative needs assessment to provide an extensive description of the problem and to provide insight and theoretical grounding in the determinants of maternal distress (Bartholomew et al. 2011). An equally important step is collaboration with experts in the field to evaluate and understand the practical meaning of the findings (Jones 2004; Green et al. 2006; Bartholomew et al. 2011). We, therefore, aimed to:

1. Draw a preliminary but systematic theoretical conceptualization of factors with a strong relationship to antenatal maternal emotional health needs to guide the development of an intervention to reduce or prevent maternal distress and,
2. Assess the evidence for importance, relevance and changeability of the emerging factors with experts in the field.

## Methods

### Model for planning

We chose intervention mapping as the framework for our intervention development. Intervention mapping is a step-wise approach for theory and evidence-based program development, implementation and evaluation. It guides program planners in making balanced decisions by combining theoretical evidence with practical information from stakeholders with an interest in maternal distress (Bartholomew et al. 2011). We, therefore, convened a project group for the needs assessment based on stakeholder regulations of the funding authority (i.e., care, policy and education-related). We also considered expert knowledge of maternal distress during pregnancy, involvement with

pregnant women in primary care settings, influence to implement and sustain the intervention as important criteria for participation in the project group (Bartholomew et al. 2011). Midwives have been appointed as promoters of antenatal maternal mental health in the Netherlands (KNOV 2010; PRN 2013). We, therefore, regarded midwives as crucial members of our project group. The project group included six (practising) midwives, four public health professionals, an expert by experience (i.e., *a mother with personal experience of maternal distress*), a postdoctoral researcher, a research methodologist, a psychologist, two midwife researchers/lecturers, a coach counsellor, two maternity care nurses, a health visitor and two general practitioners.

### Search strategy and study selection needs assessment

We organized our collection of information for the intervention using the PRECEDE logic model, which includes a social (phase 1) and epidemiological assessment (phase 2), an aetiological assessment (phase 3) and an educational and ecological (phase 4) assessment (Green and Kreuter 2005; Crosby and Noar 2011). Following the PRECEDE phases, we aimed to identify studies including (i) antenatal maternal emotional and psychological health outcomes, (ii) quality-of-life aspects and (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 and excluded studies that reported no (significant) results or studies that included women with (i) overt severe mental pathophysiology (e.g., women requiring hospitalization for treatment; women with active substance abuse) and (ii) physical pathophysiology (e.g., complex pregnancies; cancer; HIV/AIDS).

We included qualitative and quantitative data in parallel to increase understanding, to seek various perspectives and to guard against misinterpretations (Bartholomew et al. 2011). We included studies of moderate to high quality because according to the intervention mapping approach, factors with strong evidence will serve as a theoretical ground for the future intervention targets, components and planning (Bartholomew et al. 2011).

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. The restriction applied to years searched was set from January 2000 to August 2014, but retrieval of papers was limited to 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 (OCEBM 2011). This scale 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 (Wright 2007), a feature that is important for our project. 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) (Cesario et al. 2002). Their tool has a scoring system ranging from 1 to 3, reflecting the quality of evidence; the highest level is ranked 1 (Cesario et al. 2002). These criteria were developed specifically for assessing the value of qualitative research for the practical management of care for women and children.

#### Analysis and expert validation

Given our aim—to conceptualize pregnant women’s emotional health needs to develop an intervention for maternal distress—we offer a narrative 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  $p < 0.05$ .

To maximize the value of our findings for practice, we asked our project workgroup to: (i) validate the results found in the literature with a focus on their clinical importance and relevance for midwifery practice and (ii) assess the changeability of the determinants of health behaviour using experience from their practice or academic discipline (Bartholomew et al. 2011). Brainstorm sessions and presentation of findings followed by semi-structured discussions with a reflective nature, were applied methods for dialogue. During these sessions, project group members were invited to share their lived experiences regarding importance, relevance of the issues and if they thought these were realistically changeable for pregnant women, the woman’s environment or for caregivers within their

field of expertise. We did not aim to reach consensus but wanted a variety of perspectives stemming from different roles, position and expertise (Bartholomew et al. 2011). 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 the identified inclusion criteria. This screening led to the exclusion of 734 papers. The full-text papers 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 women. Ultimately, a total of 45 studies met the inclusion criteria.

The 45 studies were conducted between 2000 and 2014 and included samples of on average healthy primiparous and multiparous women with a minimum of health-related risk factors. These studies recruited participants from a variety of countries. Maternal distress was assessed during all trimesters of pregnancy. Quality-of-life aspects were reported in maternal health outcomes measured up to one-year postpartum (4, 8–10, 13, 17, 26, Table 1) and child health outcomes, measured from birth up to 15 years of age (2, 12, 26, 31, 37, Table 1).

The studies included one systematic review of mostly observational studies (29, Table 1), three randomized controlled trials (27, 30, 31, Table 1), one quasi-experimental pre-post-test study (28, Table 1), 26 prospective studies (1–4, 6–13, 16, 18, 19, 24–26, 36, 37, 41, 43, 45, Table 1), one retrospective cohort study (44, Table 1), seven cross-sectional studies (14, 20, 21, 38–40, 42, Table 1) and six qualitative studies (22, 23, 32–35, Table 1). 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 bias (OCEBM 2011). Two qualitative studies showed levels of evidence 1 and four studies were rated with 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 rigor (Cesario et al. 2002). Details and results of the included studies are presented in Table 1 (Table 1 presents a shortened overview; the full version—including study design, levels of evidence, sample characteristics and references—can be obtained from the first author).

**Table 1** Overview of study details and results of literature review, ranked by: PRECEDE phase, level of evidence (quantitative–qualitative), publication year, and alphabetical order

| Nr | Study (year)/country of study  | Prevalence of mental distress  | Factors PRECEDE logic model factors (phase)  |
|----|--|--|--|
| 1  | Verkerk et al. (2003)/<br>Netherlands                                    | Depression 2.3–22% 32 weeks  | High depressive symptomatology 2nd trimester OR = 2.9 [95% CI 1.07–8.04] $p = 0.036 \rightarrow$ PPD (1)   |
| 2  | Bergh et al. (2008)/<br>Belgium  | Mean anxiety scores described  | Antenatal anxiety 2nd trimester $\rightarrow$ depressive symptoms 14–15 year old girls $p = 0.04$ (1)  |
| 3  | Loomans et al. (2011)/<br>Netherlands                                    | Depression 30%; anxiety 29%; fear of childbirth 9% at 16 weeks   | Antenatal anxiety $\beta = 0.13$ , $p = <0.01 \rightarrow$ overall problem behaviour at 5 years (stronger in boys)<br>$\beta = 0.09$ , $p = <0.01 \rightarrow$ over-activity in boys at 5 years (1)<br>$\beta = -0.07$ , $p = <0.01 \rightarrow$ decreased pro-social behaviour at 5 years (1)<br>Antenatal depression 2nd/3rd trimester $\rightarrow$ PPD up to 8 months postpartum $r = 0.63$ , $p = <0.001$ /OR = 6.55 [95% CI 4.68–0.17] (1) |
| 4  | Heron et al. (2004)/UK   | Depression 11%; anxiety 13% between 18 and 32 weeks  | Antenatal depression $\rightarrow$ PPD up to 1 year postpartum $p = 0.04$ (1)  |
| 5  | Söderquist et al. (2004)/Sweden  | Fear of childbirth 13.5%; anxiety 8.6%; depression 9.1% 16–20 weeks  | Antenatal anxiety 1st and 2nd trimester $\rightarrow$ FoC, OR 2.3 (1.5–3.8), $p = 0.004$ (2)   |
| 6  | Van Son et al. (2005)/<br>Netherlands                                    | Depression 26% 32 weeks  | Antenatal depression $\rightarrow$ PPD, $\beta = 0.50$ , $p = 0.05$ (1)<br>Antenatal depression $\rightarrow$ postpartum stress $\beta = 0.15$ , $p = 0.05$ (1)  |
| 7  | Mennes et al. (2006)/<br>Netherlands                                     | Maternal anxiety 25% 12–22 weeks   | Antenatal anxiety 2nd trimester $\rightarrow$ cognitive deficits (task performance $F[1.41] = 5.78$ , $p = 0.02$ ; multi-tasking $F[2.82] = 3.38$ , $p = 0.03$ at child's age 17 (1)   |
| 8  | Grant et al. (2008)/<br>Australia  | Depression 7%; anxiety 21% 35–39 weeks   | Antenatal anxiety 3rd trimester<br>$\rightarrow$ postnatal anxiety 7 months postpartum OR = 4.97 [95% CI 1.31–18.88] $p = 0.02$ (1)<br>$\rightarrow$ PPD, 7 months postpartum OR = 4.99 [95% CI 1.37–18.15] $p = 0.02$ (1)   |
| 9  | Leigh and Milgrom (2008)/Australia<br>Leigh and Milgrom (2008)/Australia | Depression 16.9% 28–32 weeks; Anxiety 27.7% 26–34 weeks<br>Depression 16.9% 28–32 weeks; Anxiety 27.7% 26–34 weeks | Antenatal depression $\rightarrow$ parenting stress $\beta = -0.52$ , $p = 0.00$ (1)<br>Antenatal depression $\rightarrow$ PPD, $\beta = 0.47$ , $p = 0.00$ (1)<br>Antenatal anxiety $\rightarrow$ PPD, $\beta = 0.18$ , $p = <0.05$ (1)   |
| 10 | Milgrom et al. (2008)/<br>Australia                                      | Depression 8.9%; gestation not mentioned   | Antenatal depression $\rightarrow$ PPD, 6 weeks postpartum OR = 1.18 [95% CI 1.15–1.21] $p = <0.001$ (1)   |
| 11 | Robinson et al. (2008)/<br>Australia                                     | Mean stress scores described   | Antenatal stress events during 2nd and 3rd trimester $\rightarrow$ mental health problems at child's age 2 and 5 OR = 1.41 [95% CI 1.29, 1.55], $p = 0.005$ (1)  |
| 12 | Tegethoff et al. (2011)/<br>Denmark                                      |  | Antenatal stress<br>$\rightarrow$ increased risk of physical conditions in children 0–3 years OR = 1.13 [95% CI 1.06–1.21] $p = <0.001$ (1)<br>$\rightarrow$ increased risk mental disorders in children 0–2.5 years OR = 2.03 [95% CI 1.32–3.14] $p = 0.007$ (1)  |
| 13 | Matthey et al. (2000)/<br>Australia                                      | Depression 12.3%   | Antenatal depression $\rightarrow$ PPD, up to 1 year postpartum $p = 0.04$ (1)   |
| 14 | Rubertsson et al. (2005)/Sweden  | Depression 13.7% 16 weeks  | Antenatal depression $\rightarrow$ PPD, OR = 6.78 [95% CI 4.07, 11.31] (1)   |
| 15 | De Bruijn et al. (2009)/<br>Netherlands                                  | Depression; Anxiety 25% at 12–36 weeks   | Antenatal depression and anxiety all trimesters $\rightarrow$ reduced birth weight in boys at term $p = <0.05$ (1/2)   |
| 16 | Van Bussel et al. (2009)/Belgium   | Mean general mental health scores  | Antenatal anxiety 1st trimester $F = 9.47$ , $p = <0.0001 \rightarrow$ birth-related anxiety 2nd and 3rd trimester (2)   |
| 17 | Adams et al. (2012)/<br>Norway   | Fear of childbirth 7.5% 32 weeks   | FoC $\rightarrow$ longer labour duration $\beta = 1.31$ [95% CI 0.32–2.31] $p = 0.05$ (2)  |
| 18 | Helbig et al. (2013)/<br>Norway  | Medium–high emotional stress 24.1%; high stress 20.7% 30 weeks   | Antenatal emotional distress $\rightarrow$ reduces fetoplacental volume blood flow at 30 weeks gestation $\beta = -2.583$ , $p = 0.0001$ (1/2)   |

**Table 1** continued

| Nr | Study (year)/country of study           | Prevalence of mental distress                                       | Factors PRECEDE logic model factors (phase)   |
|----|---|---|---|
| 19 | Ayers and Pickering (2005)/UK           | Mean anxiety scores described                                       | Antenatal anxiety 3rd trimester → negative expectations of the birth $r = 0.25, p = <0.001$ (2)   |
| 20 | Storksen et al. (2012)/Norway           | Fear of childbirth 8%; Anxiety 8.8%; Depression 8.9% 32 weeks       | Antenatal anxiety → FoC, OR = 2.4 [95% CI 1.1–5.2] (2)<br>Antenatal depression → FoC, OR = 8.4, [95% CI 4.8–14.7] (2)   |
| 21 | Vossbeck-Elsebuch et al. (2014)/Germany | Stress 12.5%  | Reduced antenatal emotional wellbeing → FoC, $\beta = -0.15, p = <0.05$ (2)<br>Antenatal anxiety AND antenatal depression → FoC, OR = 11.0 [95% CI 6.6–18.3] (2)  |
| 22 | Schneider (2002)/Australia              | Not applicable  | Positive interactions with midwife → reduces antenatal stress (3a)<br>Positive relationship between woman and midwife → reduces antenatal stress (3a)<br>Available social support → reduces antenatal stress (3a)   |
| 23 | Nilsson and Lundgren (2009)/Sweden      | Not applicable  | Antenatal encounter with midwife → decreases FoC, (3a)<br><br>Low self-confidence → increases FoC, (3b)<br>History of negative previous birth experience → increases FoC, (3c)  |
| 24 | DiPietro et al. (2004)/USA              | Not described   | Multiparity → more hassles than emotional uplifts in 3rd trimester (3b/3d)<br>Primiparity → more emotional uplifts than hassles in 3rd trimester $F(1.50) = 5.71, p < 0.001$ (3b/3d)  |
| 25 | Sjöström et al. (2004)/Sweden           | Anxiety 2–9%; depression 3–6% 12–34 weeks                           | Positive coping with stressful situations → reduces antenatal depression 1st trimester $\beta = -0.26$ ; 3rd trimester $\beta = -0.50, p < 0.001$ (3e)<br>Positive coping with stressful situations → reduces antenatal anxiety 3rd trimester $\beta = -0.38, p < 0.001$ (3e)<br>Multiparity (more child than 1) → Antenatal depression 3rd trimester $p < 0.01$ (3d)   |
| 5  | Söderquist et al. (2004)/Sweden         | Fear of childbirth 13.5%; anxiety 8.6%; depression 9.1% 16–20 weeks | Psychological counselling/support related to pregnancy/childbirth → FoC, OR 2.4 (1.1–5.2), $p = 0.04$ (3a/4a)<br><br>History of traumatic birth → FoC, OR 4.0 (1.7–9.3), $p = 0.001$ (3c)<br>History of psychological problems → FoC, OR 1.7 (1.1–2.5), $p = 0.01$ (3c)<br>Low stress coping mechanisms → FoC, OR 1.8 (1.1–2.8), $p = 0.01$ (3e)<br>Limited social support → FoC, OR 1.8 (1.2–2.9), $p = 0.008$ (3a)                |
| 26 | Rich-Edwards et al. (2006)/USA          | Depression 9% mid-pregnancy   | History of (diagnosed/treated) depression → antenatal depression OR = 4.07 [95% CI 3.76, 4.40] (3c)   |
| 9  | Leigh and Milgrom (2008)/Australia      | Depression 16.9% 28–32 weeks; anxiety 27.7% 26–34 weeks             | Low income $\beta = -0.05, p = 0.04$ → antenatal depression (3d)<br><br>History of abuse $\beta = 0.06, p = 0.03$ ; (history) major life events $\beta = -0.07, p = 0.01$ → antenatal depression (3c)<br>Negative cognitive style → Antenatal depression $\beta = 0.11, p = 0.00$ (3e)<br>Social support → antenatal depression $\beta = -0.18, p = 0.00$ (3a)<br>Self-esteem → antenatal depression $\beta = -0.34, p = 0.00$ (3f) |
| 9  | Leigh and Milgrom (2008)/Australia      | Depression 16.9% 28–32 weeks; anxiety 27.7% 26–34 weeks             | Lack of partner support → antenatal depressive symptoms (3a)<br><br>Domestic violence → antenatal depressive symptoms [OR = 2.5] (3d)<br>Unintended pregnancy → antenatal depressive symptoms (3d)<br>Low finances → antenatal depressive symptoms (3d)   |
| 27 | Vieten and Astin (2008)/USA             | Mean depression, anxiety and stress scores                          | Professional supported coping by positive regulation of emotions and feelings (relaxation/acceptance/self-awareness) → reduces anxiety $F_1(2.24) = 4.32, p = 0.04, d = 0.85$ (3a/3e)   |
| 28 | Beddoe et al. (2009)/USA                | Mean anxiety and stress scores described                            | Mindfulness-based yoga<br>→ Reduces antenatal stress 3rd trimester $MS_T 54.4$ ( $df 4.6$ ), $p = 0.05$ (3a)<br>→ Reduces antenatal anxiety 3rd trimester $MS_T 34.1$ ( $df 5.8$ ), $p = 0.03$ (3a)   |

**Table 1** continued

| Nr | Study (year)/country of study             | Prevalence of mental distress                         | Factors PRECEDE logic model factors (phase)   |
|----|---|---|---|
| 16 | Bussel et al. (2009)/ Belgium             | Mean general mental health scores                     | Perception that unborn baby controls pregnancy and life (negative thoughts) → general and birth-related antenatal anxiety all trimesters $\beta = 0.01, p = <0.001$ (3f)<br>Negative coping → general and birth antenatal anxiety $\beta = 0.28, p = <0.0001$ (3e)  |
| 29 | Lancaster Palladino et al. (2010)         | Not applicable  | Life stress → antenatal depressive symptoms (3d)<br>Lack of social support → antenatal depressive symptoms (3a)<br>Domestic violence → antenatal depressive symptoms (3d)   |
| 30 | Milgrom et al. (2011)/ Australia          | Depression 12%; anxiety 7%; stress 6.5–8% 20–32 weeks | Self-management (preparation parenthood) and support psychologist → Reduces depression $F_1(86) = 7.82, p < 0.01, d = 0.6$ (3a/3e)<br>→ Reduces anxiety $F_1(86) = 7.35, p < 0.01, d = 0.58$ (3a/3e)  |
| 31 | Bogaerts et al. (2013)/ Belgium           | Depression 4.1% 1st trimester                         | Obesity (existing prior to pregnancy) → antenatal anxiety all trimesters $p = <0.005$ (3d)<br>History of stressful (family) events<br>→ Antenatal anxiety all trimesters $\beta = 5.08, p = 0.002$ (3c)<br>→ Antenatal depression all trimesters $\beta = 1.91, p = 0.01$ (3c)<br>Ethnicity<br>→ antenatal anxiety all trimesters $\beta = 4.67/5.85, p = <0.04$ (3d)<br>→ Antenatal depression all trimesters $\beta = 1.63, p = 0.04$ (3d)<br>Being single → antenatal anxiety all trimesters $\beta = 10.11, p = 0.008$ (3d)<br>History of miscarriage → antenatal anxiety all trimesters $\beta = 3.61, p = 0.01$ (3c)<br>Multigravidity → antenatal depression all trimesters $\beta = 1.67, p = 0.0004$ (3d)<br>History of depression → antenatal depression all trimesters $\beta = 1.91, p = 0.01$ (3c) |
| 32 | Melender (2002)/ Finland                  | Not applicable  | Help-seeking → reduces FoC (3e)<br>Social support → reduces FoC (3a)<br>(Self-)knowledge distress → reduces FoC (3g)<br>Self-disclosure to midwife → reduces FoC (3a/3e)<br>Problem-focussed coping → reduces FoC, (3e)   |
| 33 | Escott et al. (2004)/ United Kingdom      | Not applicable  | Problem-focussed coping → reduces FoC, (3e)   |
| 34 | Blanchard et al. (2009)/ USA              | Not applicable  | Stressors → antenatal depression (3d)<br>Lack of perceived partner support → antenatal depression (3a)<br>Available support in general → antenatal depression (3a)  |
| 35 | Furber et al. (2009)/ United Kingdom      | Not applicable  | History of adverse life-events → antenatal psychological distress (depression) (3c)<br>History of have given birth/having children → antenatal psychological distress (depression) (3c)   |
| 36 | Huizink et al. (2002)/ Netherlands        | Mean depression scores described                      | Emotion-focussed coping → depression 2nd trimester $\beta = -0.28, p = 0.04$ (3e)   |
| 37 | Yali and Lobel (2002)/ USA                |   | Avoidant coping → pregnancy distress (PSS, STAI) 1st/2nd trimester $r = 0.91/0.48, p = <0.001$ (3e)   |
| 38 | Rubertsson and Waldenström (2003)/ Sweden | Depression 8% 15 weeks                                | Lack of partner support → antenatal depression primiparous/multiparous OR = 6.9/3.4 [95% CI 3.4–13.9/1.9–6.1] $p = <0.001/p = <0.001$ (3a)<br>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] $p = 0.01/p = 0.03$ (3c)   |

**Table 1** continued

| Nr | Study (year)/country of study            | Prevalence of mental distress        | Factors PRECEDE logic model factors (phase)  |
|----|--|--------------------------------------|--|
| 38 | Rubertsson and Waldenström (2003)/Sweden | Depression 8% 15 weeks               | <p>Ethnicity/other language than Swedish → antenatal depression primiparous/multiparous OR = 6.9/3.4 [95% CI 3.4–13.9/1.9–6.1] <math>p = &lt;0.001/p = &lt;0.001</math> (3a/3d)</p> <p>Increased number of children → depression RR 2.1 [95% CI 1.0–4.3] (3d)</p> <p>History of miscarriage → antenatal depression OR = 1.9 [95% CI 1.1–3.5] <math>p = 0.03</math> (3c)</p> <p>Younger than 25 years → antenatal depression OR = 1.8 [95% CI 1.1–3.0] <math>p = 0.02</math> (3d)</p> <p>Unplanned pregnancy with mixed feelings about pregnancy → antenatal depression OR = 1.9 [95% CI 1.1–3.5] <math>p = 0.03</math> (3d/3f)</p> <p>Being single → antenatal depression OR = 2.7 [95% CI 1.3–5.5] <math>p = 0.005</math> (3d)</p> <p>Unemployed → antenatal depression OR = 1.7 [95% CI 1.0–2.8] <math>p = 0.03</math> (3d)</p> <p>History of a negative birth experience → antenatal depression OR = 2.0 [95% CI 1.2–3.1] <math>p = 0.005</math> (3c)</p> <p>Anticipating lack of social support after the birth → antenatal depression OR = 2.9 [95% CI 1.9–4.4] <math>p = &lt;0.001</math> (3a)</p> |
| 39 | Matthey et al. (2004)/Australia          | Depression 13% 1st to 3rd trimester  | 5 or more risk factors in 3rd trimester (support; perceived stressors; worriers; lack self-confidence; past/present mental health; childhood abuse; family violence) → Antenatal depression $X^2(1) = 4.78$ , $p = <0.05$ (3a/3c/3d/3e)  |
| 14 | Rubertsson et al. (2005)/Sweden          | Depression 13.7% 16 weeks            | <p>Stressful life events → antenatal depression OR = 3.7 [95% CI 2.2–6.1] <math>p = &lt;0.001</math> (3d)</p> <p>Ethnicity/other language than Swedish → antenatal depression OR = 3.6 [95% CI 2.0–6.8] <math>p = &lt;0.001</math> (3a/3d)</p> <p>Increased number of children → depression RR 2.6 [95% CI 1.2–6.7] (3d)</p> <p>Unemployment → antenatal depression OR = 2.6 [95% CI 1.5–4.7] <math>p = 0.001</math> (3d)</p> <p>History of depressive symptoms → antenatal depression OR = 4.51 [95% CI 4.24, 4.80] (3c)</p>  |
| 40 | Elsenbruch et al. (2007)/Germany         | Depression 22% 1st trimester         | Available social support (network) → antenatal depression 1st trimester $F = 83.60$ , $p = <0.001$ (3a)  |
| 41 | Fertl et al. (2009)/Germany              | Not described                        | History of miscarriage (one or more) → antenatal anxiety up to 13 weeks $p = 0.001$ (3c)   |
| 42 | Haines et al. (2010)/Sweden              | Fear of childbirth 31.1% 17–19 weeks | <p>Having children → FoC, <math>Z = -3.01</math>, <math>p = 0.003</math> (3d)</p> <p>Negative previous birth experience → childbirth-related fear <math>Z = -6.40</math>, <math>p = &lt;0.001</math> (3c)</p> <p>Complicated previous mode of childbirth → childbirth-related fear <math>Z = -2.65</math>, <math>p = 0.008</math> (3c)</p> <p>Negative state towards forthcoming birth → childbirth-related fear <math>Z = -10.87</math>, <math>p = &lt;0.001</math> (3b)</p>  |
| 42 | Haines et al. (2010)/Australia           | Fear of childbirth 29.5% 18–20 weeks | <p>Negative previous birth experience → childbirth-related fear <math>Z = -3.70</math>, <math>p = 0.000</math> (3c)</p> <p>Negative feelings forthcoming birth → childbirth-related fear <math>Z = -4.77</math>, <math>p = &lt;0.001</math> (3b)</p>   |
| 43 | Woods-Giscombé et al. (2010)/USA         | Stress 6% 20–36 weeks                | History of previous miscarriage $F[3.409] = 7.93$ , $p = <0.001$ → anxiety 2nd and 3rd trimester (3c)  |
| 44 | Røsand et al. (2011)/Norway              | Mean depression scores described     | <p>History of depression <math>\beta = 0.27</math>, <math>b = 0.21</math>, <math>p = &lt;0.001</math> → antenatal depression early pregnancy (3c)</p> <p>Unsatisfactory relationship <math>\beta = 0.21</math>, <math>b = 0.33</math>, <math>p = &lt;0.001</math> → antenatal depression early pregnancy (3a)</p>  |

**Table 1** continued

| Nr | Study (year)/country of study      | Prevalence of mental distress | Factors PRECEDE logic model factors (phase)  |
|----|------------------------------------|-------------------------------|--|
| 45 | Aktan (2012)/USA                   | Mean anxiety scores described | Limited/no social support during pregnancy<br>→ Increased antenatal state anxiety $r = -0.308, p = >0.001$ (3a)<br>→ Increased antenatal trait anxiety $r = -0.420, p = >0.001$ (3a) |
| 23 | Nilsson and Lundgren (2009)/Sweden | Not applicable                | Availability approachable/positive relationship midwife (4b)   |
| 32 | Melender (2002)/Finland            | Not applicable                | Available social support networks → Increases social support (4b)<br><br>Acquired information coping distress → Increases knowledge coping distress (4c)                             |
| 35 | Furber et al. (2009)/UK            | Not applicable                | Relaxing activities → positive coping with distress (4a)   |

*PPD* Postpartum depression, *FoC* fear of childbirth

*1* Social phase, *2* epidemiological, *3a* environment, *3b* personal state, *3c* personal history, *3d* personal circumstances, *3e* behaviour, *3f* personal trait, *3g* personal characteristics, *4a* reinforcing, *4b* enabling, *4c* preceding

## Phase 1 and 2: Social and epidemiological health needs

### Literature

In these phases, we identified measurable maternal distress objectives postulated by different psychological constructs and 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 (OCEBM 2011). 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, or as a combination of depression and anxiety and stress or as a combination of depression and anxiety or stress. The incidence of depression was 2.3–30% measured between 12 and 32 weeks of gestation. Anxiety occurred 2–29% between 12 and 39 weeks of gestation. The incidence of stress was 6–24.1% measured between 20 and 36 weeks of gestation and the incidence of fear of childbirth was 9–31.1% measured between 16 and 32 weeks of gestation. Antenatal depression can lead to fear of childbirth (20, 21, Table 1) and antenatal anxiety might lead to a negative anticipation of the forthcoming birth (16, 19, Table 1) and fear of childbirth (5, 20, Table 1). Fear of childbirth is associated with longer duration of labour (17, Table 1). All these constructs are measurable health outcomes.

The studies found the different constructs of antenatal maternal distress to have negative effects on the quality of life of mothers and their infants. Antenatal depression can lead to postpartum depression (1, 4, 6, 9, 10, 13, 26, Table 1) and parenting stress (9, Table 1). Antenatal anxiety can lead to postpartum depression and anxiety (8, 9, Table 1). The combination of antenatal anxiety and

stress reduces the fetoplacental blood flow, which successively can lead to fetal growth restriction and low birth weight (18, Table 1). 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 (12, Table 1). Antenatal anxiety can lead to behaviour problems (3, Table 1), cognitive deficits (7, Table 1) and mental health problems in children (3, 11, 12, Table 1). The combination of antenatal depression and anxiety can result in a child's emotional and behaviour problems and psychopathology (7, Table 1) and in reduced birth weight of at-term baby boys (15, Table 1). These adverse outcomes are all measurable, except behaviour problems reported by mothers.

### 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 longer continuing period of time throughout the life course, were more aware of, and knowledgeable about the consequences of maternal distress. Midwives 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. They, however, 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

In this phase, we identified behavioural and environmental conditions that affect maternal distress (Bartholomew et al. 2011). The evidence for phase three was provided by quantitative studies with level II and III of the OCEBM scale (OCEBM 2011), and qualitative studies with level 1 and 2 scores according to the AWHONN tool (Cesario et al. 2002). 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 (13, 26, 31, 44, Table 1) and fear of childbirth (5, Table 1). A history of negative life-events is related to anxiety, depression and feelings of stress (25, 35, 31, 39, Table 1). A negative or traumatic birth experience or a complicated birth can contribute to fear of childbirth (5, 23, 42, Table 1) or depression (38, Table 1). A history of miscarriage(s) can contribute to antenatal anxiety in all trimesters of pregnancy (31, 41, 43, Table 1).

A *woman's personal current circumstances and lifestyle* are associated with maternal distress. An unintended pregnancy (9, Table 1) but also having (multiple) children is linked to antenatal depression (14, 25, 31, 35, 38, 42, Table 1). Experiencing stressors and hassles in (daily) life might contribute to the occurrence of depression (14, 29, 34, 39, Table 1). Being younger than 25 years of age (14, Table 1), being obese (31, Table 1) and having a low(er) income (9, 14, Table 1) can lead to depression. Being single and having a different ethnicity from the people in the country of habituation can contribute to depression and anxiety in pregnancy (14, 31, 38, Table 1).

*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 (16, 23, 32, 42, Table 1). Negative coping *behaviour* (5, 9, 25, Table 1) such as worrying (39, Table 1) and avoidance (37, Table 1) contribute to antenatal depression. Positive coping *behaviour* (27, 36, Table 1) such as self-disclosure (32, Table 1), help-seeking (32, Table 1), emotion-focussed coping (36, Table 1), problem-focussed coping (33, Table 1), self-management (30, Table 1) and acceptance (27, Table 1) are protective against maternal distress.

Important *environmental* factors contributing to depression, anxiety and birth-related anxiety are the lack of social support provided by the direct environment (e.g., *friends, family*) (5, 9, 14, 29, 34, 39, 40, 45, Table 1), partner support (9, 34, 44, Table 1) and the lack of support from healthcare professionals (5, 27, 28, 30, Table 1), including the midwife (22, 23, 32, Table 1).

### Experts in the field

Experts from different health disciplines recognized the existence and effect of aetiological factors on the occurrence of maternal distress during pregnancy. Midwives perceived assessment of vulnerability as relevant and changeable. Midwives in the consortium voiced that stimulating self-disclosure and stimulating help-seeking behaviour by involving significant others in the woman's environment were frequently applied skills. Stimulation of self-management is a less frequently practised skill, as midwives perceived themselves as problem-solvers instead of facilitators of self-management. Although not practised in its full potential by midwives, midwives regarded stimulating self-disclosure, help-seeking and self-management as health-enhancing behaviour, appreciating priority and as highly changeable and achievable in antenatal care.

### Phase 4: Educational and ecological assessment

#### Literature

In this phase, we identified predisposing, reinforcing and enabling factors associated with how pregnant women cope with maternal distress and the enabling factors that influence the environment (Bartholomew et al. 2011). These are factors that increase or modify the likelihood that behavioural and environmental changes will occur (Bartholomew et al. 2011; Crosby and Noar 2011). 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 occur (Crosby and Noar 2011). The evidence for phase four was provided by quantitative studies with level II and III of the OCEBM scale (OCEBM 2011), and qualitative studies with level 1 and 2 scores according to the AWHONN tool (Cesario et al. 2002).

Having knowledge about (sources and possibilities) how to cope with (maternal) distress (32, Table 1) 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 skills (35, Table 1), partner support (34, 38, Table 1), counselling experiences (5, Table 1) and a positive interaction with the midwife (22, 23, Table 1). Factors that facilitate coping with maternal distress (*enabling*) are the availability of a support network (32, 40, Table 1) including healthcare professionals such as a therapist/(coach)counsellor/psychologist (27, Table 1) and a midwife (23, Table 1). Also, the availability of facilities such as psycho-education on

pregnancy and birth, self-management facilities such as (online) peer-groups, mindfulness, yoga, meditation, relaxation/breathing exercises for pregnant women (5, 28, 30, 32, 35, Table 1) facilitate coping behaviour.

### *Experts in the field*

Experts from the different health disciplines recognized 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. The usual lead-carer of pregnant women, midwives, perceived this, however, as changeable. Midwives expressed that they mostly leave it with the pregnant women to take the initiative to determine and access members of her support network. Based on the findings from the literature it was regarded as relevant and easily changeable in (the organisation) of antenatal management of care to create an accessible professional network with various disciplines for consultation and referral. They also believed that they could help to involve members of a woman’s own social network during the period of antenatal care. This was also perceived as relevant and changeable in the provision of antenatal care.

## **Discussion**

We searched the literature to gain a preliminary and systematic conceptualization of pregnant women’s emotional health needs to plan and conduct a further needs assessment for the development of an intervention for preventing and reducing maternal distress. Discussing findings from the literature with experts in the fields, allowed us to assess the relevance and changeability of the determinants we identified. This underscored the importance of the findings and helps in the selection of potential components to be considered for incorporation in the future intervention (Jones 2004; Green et al. 2006; Bartholomew et al. 2011). We consider the validation of our results from scientific research by experts in the fields as a strong point of our study.

To our knowledge, our review is the first to systematically compile evidence, relating to health needs of healthy Western pregnant women with regard to maternal distress, to verify the evidence with experts in the fields and to summarize that evidence into a cogent model for maternal distress.

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 and that different psychological constructs of maternal distress, lead to

similar impaired quality-of-life issues for mothers and their children. The negative short- and long-term health outcomes as a direct result of antenatal maternal distress have their own consecutive effects on future life and the quality of life of mothers, their children, significant others and on society as a whole. This can consequently affect bonding, mother–child interaction and parenting (Singer et al. 2003; Beebe et al. 2012), early discontinuation of breastfeeding (Cooke et al. 2007) and even the choice for having a subsequent child (Jokela 2010).

We identified a great variety of measurable maternal distress objectives in phase 1 and 2 of the PRECEDE logic model. Different constructs were reported in our included studies. None of the constructs was singled out to have a more profound meaning. The focus of phase 3 of the PRECEDE model was the identification of the aetiological factors in the behavioural patterns and the environment of pregnant women.

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, and these coping styles were identified 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 (Wright 2007). Recognition, self-disclosure, help-seeking and self-management are particularly worthwhile targets in a health-promoting intervention for emotional wellbeing (Kelly et al. 2007). 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 (Green and Kreuter 2005). 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 (Berg 2005), which makes self-disclosure a dyadic target 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 directly to maternal distress (Green and Kreuter 2005).

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*), which are building blocks in care pathways for emotional health and wellbeing (Van Splunteren 2014). Enabling factors that pertained to change the environment, were also identified in phase 3 as

environmental factors. This is a recognized phenomenon in a PRECEDE needs assessment (Bartholomew et al. 2011). The enabling and reinforcing factors of importance in our review indicated resources and facilities that need to be addressed in a collaborative infrastructure (Van Splunteren 2014). The predisposing factor ‘having knowledge of sources and possibilities of ways of coping with (maternal) distress’ requires further investigation about specific content needs, but carefully points to an intervention component with a psycho-educative and informative character.

#### 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 have only included 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 (Bartholomew et al. 2011). The studies included in our review focused on women with healthy pregnancies, rather than a psychopathology sample, so that the findings have more general relevance but cannot be extrapolated to specific groups of pregnant women.

#### Recommendations

The best way to design interventions to achieve positive changes in health is to understand why women behave as they do and what might help or hinder them to change (Green and Kreuter 2005). A proven theoretical base on which to build an intervention is essential.

Quality-of-life issues emphasize the need for screening for maternal distress and contributing factors to maternal distress, albeit with precaution for stigmatization and labelling (Buist 2002; Mojtabai 2010). Multiple past and present aetiological factors that contribute to maternal distress have been identified, and it would be of great value—for the purpose of the project—to determine self-referent specific factors for Dutch pregnant women that make them 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 recognizing maternal distress can become very important components of the midwife’s antenatal management of care. These components possibly expand the midwife’s role and scope of practice (Ross-Davie et al. 2006). Exploration of midwife’s behavioural intentions and facilitating factors

and barriers seems relevant, as reduction of maternal distress might be associated with the midwife’s intention antenatal management of care. In addition, the involvement of mothers and mothers-to-be is highly recommendable to tailor the intervention to women’s needs.

#### Conclusion

The main evidence in this paper is that we constructed a logic model for maternal distress, using literature review and seeking a pragmatic balance between evidence and clinical relevance. The results can guide future program planners to develop effective interventions. Multiple quality-of-life issues of mothers and children as a result of maternal distress were identified. Maternal distress is identified as the main health objective. Factors that contribute to maternal distress mainly included past and present circumstances, coping and the environment. 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 support of their environment, where midwives were identified as key health practitioners to bring about change. An antenatal intervention should focus on assessment of maternal distress and the identification of factors that make women vulnerable for maternal distress and to take availability and accessibility of individual supportive needs of women and the collaborative organization of care into account.

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