

# An Intervention to Prevent and Reduce Maternal Distress in the Netherlands – Its Development from Start to Finish

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Received Date: May 18, 2016, Accepted Date: July 04, 2016, Published Date: July 14, 2016.

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## Abstract

Prevalence rates and the health problems related to maternal distress instigated the development of an intervention to prevent and reduce maternal distress during pregnancy. Intervention Mapping served as a framework for the intervention development. A needs assessment using the PRECEDE model and the results of a cross-sectional study among healthy pregnant women, showed factors that are significantly related to women's vulnerability or development of maternal distress - for which midwives need to screen. A systematic review and meta-analysis showed evidence for use of selective and indicated prevention strategies in midwifery practice. Interviews and a survey among midwives exploring their behavioral intentions of antenatal management of care of maternal distress, showed midwives' educational needs for screening. All these factors were taken on board while developing, producing and implementing the intervention. The intervention consisted of a training and toolkit for midwives and a tailored web-based program for women. A non-randomized pre-post intervention study was conducted to evaluate the intervention for its effect. The intervention was shown to be effective in preventing and reducing maternal distress during pregnancy, albeit to take the limitations of the respective separate studies into account.

**Keywords:** Maternal Distress; Pregnant Women; Vulnerability; Intervention Mapping

## Introduction

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 [1,2]. Affected emotional wellbeing accompanied by psychological signs and symptoms during pregnancy is defined as maternal distress. Depression, anxiety and pregnancy-related anxiety are the most frequent occurring psychological signs and symptoms that construct maternal distress, varying in severity [1]. Prevalence rates of maternal distress among Dutch healthy pregnant women vary from 2 % to 30 % [3-14] measured with psychometric measures of depression and/ or (pregnancy-related) anxiety with scores above set cut-off points. Maternal distress can be caused by either pregnancy itself or non-pregnancy related factors [1-3]. Maternal distress can be regarded 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 [15,16]. There does not seem to be a need to prioritize or select between the above-mentioned mood disorders, as there is a recognized interrelation between them [17]. Maternal distress can be a predictor for negative birth outcomes and short or long-term post partum health problems for both mother as well as child [18-21].

In the Netherlands, midwives are the main providers of antenatal care [22], making them the default healthcare practitioners for the identification of women who are at-risk to develop maternal distress or who experience maternal distress [23]. 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 provide the intervention [24].

## “Promoting Healthy Pregnancy” And the Development of the Intervention

The “Promoting Healthy Pregnancy” project (2011 – 2015) was funded and launched as a response to the Department of Health concerns about maternal distress and to midwives' uncertainty about their specific role and responsibilities in providing care for women with maternal distress [25]. 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 Intervention Mapping protocol [24] was used as a framework for the structure and content of the project. Intervention Mapping is a method for developing effective health behavior change interventions that are underpinned by theory [24]. 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, program objectives, theoretical methods and practical strategies, program components and material, implementation, evaluation).

In order to plan and develop our antenatal intervention we conducted a thorough needs assessment [26]. In April 2011 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 PRECEDE (Predisposing Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation) model and included 45 studies with samples of healthy pregnant women and with moderate to good levels of evidence. The studies provided insight in the affected quality of life issues for both mother and child as a result of antenatal maternal distress. The measured psychological constructs making up maternal distress were depression (2 – 30 % between 12 to 32 weeks gestation), anxiety (2 – 29 % between 12 to 39 weeks gestation), stress (6 – 24 % between 30 to 36 weeks gestation) and pregnancy-related anxiety (9 – 31 % between 16 to 32 weeks gestation). Etiological factors for maternal

distress included past and present circumstances related to both obstetric factors and the context of a woman's life (e.g. miscarriage or a history of psychological problems, life-events, young(er) age), her coping behavior (e.g. smoking, somatization, avoidance) and her social and professional support mechanisms (e.g. friends, network, midwife). Limited knowledge ways of coping with (maternal) distress was identified as a predisposing factor. Reinforcing factors i.e. factors that promote coping – contained relaxation, partner support, counseling experiences and positive interaction with the midwife. Among the conditions that favor coping - enabling factors - was the availability of a support network [26].

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 [26]. The review provided a systematic overview of factors showing a strong relation with maternal distress that served as guidance for the intervention development.

Since the aim of the project was the development of an antenatal intervention for women with healthy pregnancies in Dutch midwife-led care, we performed a cross-sectional study (10<sup>th</sup> September – 6<sup>th</sup> November 2012) to the factors derived from the PRECEDE model [26] among a representative sample of Dutch

pregnant women (n = 458) [27]. Sample size calculation with statistical significance set at  $p = 0.05$  (95 % CI) showed that we required a minimum of 383 participants in order to make inferences about pregnant women. Maternal distress was measured with the mean summed score of depression, anxiety and pregnancy-related anxiety using the Edinburgh Depression Scale (EDS) [28,29], State-Trait Anxiety Inventory (STAI) [30,31] and the Pregnancy Related Anxiety Questionnaire (PRAQ) [32]. One or more scores above a cut-off point on one or more of these measures were labeled as a heightened level of maternal distress. The prevalence of maternal distress was 22% among women with a mean gestational period of 29 (9 to 43) weeks. A multiple linear regression analysis showed a positive relationship between maternal distress and a history of psychological problems, having young children, daily stressors, avoidant coping, somatization, and negative feelings towards the forthcoming birth. Self-disclosure and acceptance of the situation were identified as effective coping-styles during pregnancy, helping to prevent or reduce maternal distress [27]. These results that are presented in table 1 helped us to identify the factors that are relevant for the screening of maternal distress.

Given the overall 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. We

FACTORS	B	p - value	95 % CI for B	
			Lower Bound	Upper Bound
(Constant)	0.759	0.002	5.114	22.404
<b>PERSONAL CHARACTERISTICS</b>				
Age	-0.051	0.457	-0.184	0.083
Number of children	-0.028	0.613	-0.136	0.080
<b>PERSONAL HISTORY</b>				
(Family) history of psychological problems	1.071	0.001*	0.462	1.681
Life events during the last year	-0.346	0.564	-1.527	0.834
Having young children	2.998	0.001*	1.279	4.717
History of miscarriage(s)	1.081	0.102	-0.215	2.376
Previous birth experience	0.121	0.248	-0.084	0.326
<b>PERSONAL CIRCUMSTANCES</b>				
With partner	4.314	0.442	-6.697	15.325
Currently experiencing domestic violence	0.976	0.640	-3.117	5.069
Ethnicity other than Dutch	-1.834	0.125	-4.178	0.510
Working (paid job)	0.629	0.459	-1.038	2.297
Level of income	0.314	0.620	-0.930	1.557
Weight prior to pregnancy	-0.030	0.132	-0.069	0.009
Daily stressors	1.304	0.00*	1.093	1.515
Negative feelings towards forthcoming birth	0.636	0.000*	0.502	0.770
Knowledge maternal distress	-0.101	0.470	-0.377	0.174
<b>BEHAVIOUR</b>				
Self-disclosure	-0.863	0.004*	-1.445	-0.282
Problem (active) focused coping	0.033	0.920	-0.607	0.672
Emotional (social support) focused coping	0.071	0.793	-0.463	0.606
Avoidant coping	1.047	0.000*	0.470	1.623
(Increased) substance usage	0.383	0.381	-0.476	1.243
Seeking support in religion	-0.173	0.274	-0.483	0.137
Use of humour	-0.035	0.854	-0.404	0.334
Acceptance of the situation	-0.542	0.008*	-0.940	-0.144
Somatization	0.484	0.004*	0.160	0.809
Help-seeking	-0.268	0.268	-0.743	0.207
<b>ENVIRONMENTAL FACTORS</b>				
Existing (social/ partner) support mechanism(s)	0.015	0.789	-0.098	0.129
Availability of supportive midwife	110	0.132	-0.033	0.254
Availability of (peer) network	0.016	0.591	-0.043	0.075
Rapport midwife	0.012	0.873	-0.138	-0.162

**Table 1:** Multiple linear regression analysis of etiological factors of maternal distress. \* $p < 0.05$ ,  $R^2$  of all factors 0.629.

performed a systematic review and meta-analysis of randomized controlled trials intended to reduce maternal distress (1<sup>st</sup> May 2011 – 25<sup>th</sup> August 2011) [33]. 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) [33]. These results guided the focus of the intervention development towards selective and indicated prevention strategies.

When developing an intervention, insight into the behavior of the most important intermediaries is essential [24]. Given the significant role played by midwives [22,23], 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 (September - October 2011) with a sample of midwives ( $n = 6$ ) to gain preliminary insight in the beliefs of Dutch midwives with regards to maternal distress [34]. The results from these interviews, together with a literature review, served as the basis for the subsequent exploratory survey (June - August 2012) [35]. We used a survey to explore midwives' behavioral intentions

- and the determinants of those intentions - for the management of the antenatal care of women with maternal distress. Because of the exploratory character of the study, a sample size calculation was not required. Antenatal management of maternal distress consists of three components derived from existing guidelines [36-38] being: 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 Behavior (TPB) [24,39] 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 management of maternal distress. Midwives working in primary care practices were approached for the study.

The responses from midwives ( $n = 112$ ) showed that the intention to screen for maternal distress ( $3.46 \pm 1.8$ ) on a scale of 1 to 7 was less strong than the intention to support pregnant women with maternal distress ( $4.63 \pm 1.57$ ), and the intention to collaborate with other professionals regarding maternal distress ( $4.63 \pm 1.57$ ). Multiple linear regression analyses showed that year of work experience, the midwife's interest in maternal distress, and attitude about the value of screening for maternal distress, and self-efficacy with regard to screening for maternal distress had a positive linear relationship with the intention to screen for maternal distress during pregnancy (Table 2). Positive correlates of the intention to support pregnant women experiencing maternal distress were interest in maternal distress and attitude towards supporting pregnant women with maternal distress were identified positive correlates (Table 3). Finally, the intention to collaborate

Factors	B	p - value	95.0 % Confidence Interval for B	
			Lower Bound	Upper Bound
(Constant)	-1.660	0.271	-4.634	1.315
Work experience (in years)	0.035	0.028*	0.004	0.065
MD is a serious problem	-0.086	0.622	-0.430	0.259
MD is interesting	0.383	0.005*	0.117	0.649
MD is complex	-0.050	0.730	-0.335	0.236
Attitude screening	0.326	0.002*	0.125	0.528
Feeling knowledgeable to screen	-0.043	0.704	-0.265	0.180
Self-efficacy screening	0.248	0.004*	0.083	0.413
Personal norm screening	0.132	0.443	-0.209	0.474
Barriers screening	0.132	0.362	-0.154	0.418

**Table 2:** Multiple linear regression analysis of the intention to screen for maternal distress (Dependent variable: Intention screening for maternal distress,  $R^2 = 0.385$ , Note: \* significance at  $p < 0.05$ ).

Factors	B	p - value	95.0 % Confidence Interval for B	
			Lower Bound	Upper Bound
(Constant)	-1,959	0.250	-5,314	1.397
Work experience (in years)	0.023	0.130	-0.007	0.053
MD is a serious problem	-0.019	0.904	-0.327	0.289
MD is interesting	0.637	0.000*	0.360	0.913
MD is complex	0.045	0.746	-0.231	0.322
Attitude support	0.523	0.017*	0.097	0.949
Feeling knowledgeable to support	-0.151	0.183	-0.375	0.072
Self-efficacy support	-0.218	0.423	-0.754	0.319
Personal norm support	0.103	0.570	-0.256	0.463
Barriers support	0.154	0.343	-0.167	0.475

**Table 3:** Multiple linear regression analysis of intention to support women with maternal distress (Dependent variable: Intention supporting women with maternal distress,  $R^2 = 0.337$ , Note: \*significance at  $p < 0.05$ ).

Factors	B	p - value	95.0 % Confidence Interval for B	
			Lower Bound	Upper Bound
(Constant)	-3,190	0.066	-6,597	0.217
Work experience (in years)	0.042	0.017*	0.008	0.076
MD is a serious problem	0.225	0.215	-0.133	0.582
MD is interesting	0.455	0.002*	0.171	0.740
MD is complex	0.020	0.894	-0.283	0.324
Attitude support	0.097	0.586	-0.255	0.448
Feeling knowledgeable to collaborate	0.034	0.835	-0.286	0.354
Self-efficacy collaboration	0.038	0.865	-0.402	0.478
Personal norm collaboration	0.312	0.127	-0.090	0.715
Barriers collaboration	0.039	0.839	-0.344	0.423

**Table 4:** Multiple linear regression analysis of the intention to *collaborate* with other healthcare professionals for maternal distress. (Dependent variable: Intention collaboration with other healthcare professionals for maternal distress,  $R^2 = 0.275$ , Note: \* significance at  $p < 0.05$ ).

was positively influenced by years of work experience and the midwife's interest in maternal distress (Table 4) [35].

### Objectives, Program Production and Implementation of the Intervention

The results from the above studies helped us to identify factors for our intervention that are relevant for screening for the vulnerability of maternal distress. Behavior 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. In addition, women need to learn to adopt self-management measures to prevent maternal distress or to seek for help and support to reduce maternal distress. Behavior 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 [40].

We subsequently formulated practical applications for fitting the intervention into a coherent intervention program for pregnant women and midwives. Program materials were designed, tested and produced. The program was called *WazzUp Mama?* 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 to maternal distress during pregnancy and included a tailored web-based program. This included advice for women based on the answers to questions that are generated by a computer program. Subsequently, the feedback is adapted to the specific characteristics of the particular individual woman, yielding the potential to provide messages highly tailored to the woman's situation. 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 tool kit with a guideline and clinical pathway, including an aid for assessment of wellbeing and vulnerability for maternal distress, consultation and referral and a regional healthcare map. The program was introduced by means of an accredited training (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 [40].

### Evaluation of the Intervention

These 17 midwifery practices also took part in our non-randomized pre-post intervention study [41]. In this study we

reported the changes in maternal distress among a control group of healthy pregnant women receiving antenatal care-as-usual ( $n = 215$ ) (24<sup>th</sup> April 2013 - 7<sup>th</sup> March 2014) as compared to women receiving the intervention ( $n = 218$ ) (14<sup>th</sup> April - 9<sup>th</sup> March 2015). Power calculation was based on a 1:1 ratio between control and experimental group, a hypothesized 10 % decrease of heightened scores of maternal distress, 80% power and  $\alpha$  level of  $< 0.05$ . To achieve this, 149 women were required in each arm. Although we did not randomize the participants, there were no differences in baseline characteristics of women in both control and intervention group. Maternal distress was measured in the first (mean gestational period 7; 4-14 weeks) and the third (mean gestational period 37; 35-42 weeks) trimester of pregnancy. Maternal distress was measured with the mean summed score of depression (EDS) [28], anxiety (STAI) [30,31] and pregnancy-related anxiety (PRAQ) [32]. One or more scores above a cut-off point on one or more of these measures were considered as a heightened level of maternal distress. Changes in the control and intervention group were analyzed with multivariable-repeated measures ANOVA. The effect of the intervention was measured with ANCOVA with maternal distress as dependent variable. 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 were entered as covariates to control for initial between group-differences.

Mean depression (EDS), anxiety (STAI) and maternal distress (MD) scores in the control group significantly increased from the first to the third trimester of pregnancy. Mean pregnancy-related anxiety (PRAQ) scores increased over the same time period, but the change was not statistically significant. 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. The proportion of MD scores above cut-off level increased, but did not reach statistical significance. Within the experimental group the mean STAI, PRAQ and MD scores significantly decreased from the first to the third trimester. The mean EDS scores decreased but not significantly. The proportion of scores above cut-off level PRAQ and MD significantly decreased from first to third trimester of pregnancy. The proportion of EDS and STAI scores above cut-off level decreased but not significantly (see Table 5 for the results). ANCOVA analysis showed that there was a moderate but significant main effect of *WazzUp Mama?* on the decrease of MD scores during pregnancy ( $F(1,43) = 27.05, p < 0.001, d = 0.5$ ). We concluded that the intervention provides an opportunity to prevent and reduce maternal distress during the antenatal period in a population of healthy pregnant women.

Measure	Control group (n = 215)								
	T1 (baseline)			T2 (post)			F (4.21)	X <sup>2</sup>	p
	Mean	SD (±)	N (%)	Mean	SD (±)	N (%)			
Depression (EDS) (0-30)	4.48	± 3.5, 0-20		7.21	± 4.69, 1-26		70.23		< 0.001
Above cut-off level EDS			15(7)			42 (19.5)		14.74	< 0.001
Anxiety (STAI) (20-80)	28.9	± 9.38, 20-62		31.6	± 10.17, 20-72		16.6		< 0.001
Above cut-off level STAI			29 (13.5)			43 (20)		3.27	0.045
Pregnancy-related anxiety (PRAQ) (10-50)	18.59	± 7.07, 10-42		19.43	± 7.17, 10-42		1.47		0.12
Above cut-off level PRAQ			22 (10.2)			37 (17.2)		4.42	0.03
Maternal Distress (MD) (0-80)	17.32	± 6.65, 0-62		19.41	± 7.34, 1-72		11.94		< 0.001
Above cut-off level MD <sup>1</sup>			45 (20.9)			57 (26.5)		1.55	0.13
	Experimental group (n = 218)								
	T1 (baseline)			T2 (post)			F (4.21)	X <sup>2</sup>	p
	Mean	SD (±), range	N (%)	Mean	SD (±), range	N (%)			
Depression (EDS) (0-30)	4.55	± 3.52, 0 - 18		4	± 3.4, 0 - 24		6.32		0.13
Above cut-off level EDS			17 (7.8)			14 (6.4)		0.313	0.4
Anxiety (STAI) (20-80)	28.72	± 9.58, 22 - 60		26.93	± 9.85, 20 - 63		11.1		0.001
Above cut-off level STAI			30 (13.8)			27 (12.4)		0.182	0.4
Pregnancy-related anxiety (PRAQ) (10-50)	18.58	± 7.01, 10 - 42		15.04	± 6.42, 10 - 41		47.4		< 0.001
Above cut-off level PRAQ			25 (11.5)			8 (3.7)		9.48	0.002
Maternal Distress (MD) (0-80)	17.28	± 6.64, 0 - 60		15.32	± 6.55, 0 - 63		28.69		< 0.001
Above cut-off level MD <sup>1</sup>			49 (22.5)			29 (13.3)		6.25	0.009

**Table 5:** Multivariable-repeated measures ANOVA experimental and control group in 1<sup>st</sup> trimester (T1) and 3<sup>rd</sup> trimester (T2) of pregnancy (<sup>1</sup>Heightened scores on one of more levels of EDS ≥ 11 (T1)/ ≥ 10 (T2), STAI ≥ 41 and/or PRAQ > 90<sup>th</sup> percentile).

## Discussion

*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. Self-disclosure includes showing emotions and concerns aiming to seek comfort and understanding. This coping style is associated with decreased maternal distress [18] and can explain why the intervention's focus on women's coping [40] supports the reduction of maternal distress in our intervention group [41]. Another component of our intervention included guidance of midwives' assessment of emotional wellbeing, support and referral of women for professional help. This was introduced through training and accompanied by a guideline and clinical pathway [40]. Midwives have identified that when prevention or reduction measures for maternal distress are implemented into practice, workable questioning and identification, adequate service provision and clear referral pathways combined with contextualized knowledge as well as knowledge of adequate service provision are required. According to midwives this ensures effective assessment of women's emotional wellbeing during pregnancy [42]. These findings are congruent with the midwife's assessment component of our intervention and might have contributed to the positive effect of the intervention [41]. Computer-tailoring has found to be effective in reduction of antenatal alcohol use in a similar low-risk, fairly affluent and well educated pregnant population [43], compared to the women in our studies [27,41]. Safeguarding the woman's anonymity [43] and reducing the woman's dependence on the midwife's knowledge, skills and resources [35,43], both strategies

of our web-based intervention component, might contribute to the explanation of positive effects of our intervention on maternal distress [41]. The literature shows positive effects of the separate interventions components. However, in order to determine if the whole of the intervention is greater than the sum of its parts needs further investment. Future research will also determine if there is a postpartum or long-term effect of our antenatal intervention. Computer-tailoring for antenatal alcohol use has led to a sustained six month behavior change in women [43]. Moreover, with our intervention we aimed to change behavior in women and midwives. We aimed to achieve positive coping behavior in pregnant women, taking on board that changing coping behavior has the potential to result in a long-term change in coping. Positive changes in antenatal coping behavior can reduce pregnancy and birth-related anxiety in the third trimester of pregnancy and subsequently result in favorable post partum wellbeing [44]. Therefore, measurement of the long-term effect of the intervention will require a longitudinal design.

The characteristics of our samples included on average healthy pregnant population women. Our findings are generalizable to similar populations of pregnant women but not necessarily to all pregnant women. Therefore, generalizability of our findings to a broader population must be done carefully. However, prevalence's of maternal distress are similar with those of healthy pregnant women in international studies.

We used various measures to increase statistical power. We used sample size calculation [35], power calculation [41] and we controlled for confounding factors and used a repeated-measure design in our quasi-experimental study [41]. We summed the scores of depression and anxiety creating the maternal distress variable [35,41]. Creating one continuous measure improved power. A limitation we could not control were the small sample sizes in the meta-analyses causing wide confidence intervals what possibly affected power.

This study allows making several recommendations for midwifery practice, education and research. It is important that

midwives familiarize 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. In addition, our understanding of maternal distress will benefit from a rigorous concept analysis of the condition. Therefore, 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 the intervention 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.

Midwifery healthcare practitioners should be aware that the experience of maternal distress is unique to each woman. Each woman has personal and individual reasons for maternal distress as well as women have different signs and symptoms of maternal distress. The variety of women's responses to the different predisposing factors for maternal distress underscores the individuality of maternal distress. Healthcare practitioners involved in the antenatal management of maternal distress should consider this. Variability of different populations should be addressed in practice, education, organization of care, interventions and research. Individual healthcare setting and individual populations of pregnant women require appropriate indexes of vulnerability for maternal distress.

## Acknowledgements

'Promoting Healthy Pregnancy' was a Regional Attention and Action for Knowledge (RAAK PRO, ref. 2-014) research project. RAAK is managed by the Foundation Innovation Alliance (SIA).

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**Received Date:** May 18, 2016, **Accepted Date:** July 04, 2016, **Published Date:** July 14, 2016.

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**Citation:** Kuipers (2016) An Intervention to Prevent and Reduce Maternal Distress in the Netherlands – Its Development from Start to Finish. *Women Heal Int* 2(1): 115.