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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 and proved to be effective. Finally, process and effect evaluations were planned.

Keywords

Intervention, Intervention mapping, Maternal distress, Preventative measures

Introduction

Maternal distress is a major concern for perinatal health [1,2]. We define maternal distress as a spectrum consisting of a variety of psychological constructs that occur during the antenatal period [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 and disturbed psychological functioning [8]. Maternal distress has shown to have adverse consequences for women, children, 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 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 results showed that preventive interventions targeted at pregnant women without symptoms of maternal distress did not have a significant effect in reducing maternal distress. However, women suffering from maternal distress and women that were more vulnerable for maternal distress as a result of predisposing factors were helped by an intervention [3]. 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 [12].

We used 'intervention mapping'- 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) [13]. This way, 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) [14]. This seems especially important since midwives differ in willingness and perceived self-efficacy regarding management of maternal distress [15]. Intervention mapping [13] describes the processes involved in

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planning an intervention in six steps including a needs assessment that offers an extensive description of the problem, selecting methods and generating implementation and evaluation plans.

The aim of this article is to describe how intervention mapping was used to the development of *WazzUp Mama?!,* an intervention for the prevention and reduction of maternal distress among pregnant women in midwife-led 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. The aim is to gain a clear understanding of the health problem, impact on women's and children's quality of life, behavioural and environmental causes, and the determinants of these causes [13,16]. We conducted the needs assessment using an integrative review and two additional studies among samples of Dutch women and midwives.

Application: The integrative review that we conducted included samples of healthy Western women and 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 [17]. The most often mentioned constructs used to assess maternal distress were depression, stress, anxiety and pregnancy-related anxiety with variety in occurrence between 2% to 31% during pregnancy. The possible short-term effects of maternal distress included fear of childbirth, longer labour duration and fetal growth restriction and reduced birth weight in neonates and in post partum maternal depression, stress and anxiety. Long-term consequences were identified as physical, emotional, behaviour and cognitive problems in infants, children and adolescents and long-term ill mental health in women [17].

We also gained preliminary insight into factors that influenced the occurrence of maternal distress such as women's personal characteristics (*e.g. history of psychological problems*), personal circumstances (*e.g. daily stressors*), behaviour (*e.g. negative coping styles*), environmental factors (*e.g. partner, family, healthcare professionals*) and predisposing (*e.g. knowledge of coping*), reinforcing (*e.g. partner support, rapport midwife, relaxation*) and enabling factors (*support network including self-management facilities and psycho-education*) [17].

In addition, we conducted a cross-sectional survey among pregnant women eligible for Dutch midwifery care [7]. In a sample of 458 healthy Dutch pregnant women we found that 21.8% of the respondents had heightened levels of maternal distress. 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. The determinants self-disclosure and help-seeking were effective coping-styles in preventing maternal distress [7].

When developing an intervention to address maternal distress, it is necessary to understand the behaviour of those who deliver care [13,16]. Because in the Netherlands the primary and most important caregiver in pregnancy is the midwife [12], we conducted semi-structured interviews among Dutch midwives giving us preliminary insight in their beliefs about maternal distress [18]. We subsequently conducted a survey among 112 Dutch midwives, exploring their behavioural intentions regarding antenatal management of maternal distress and the determinants influencing those intentions [15]. The findings indicated that supporting women in self-disclosure in order to screen for the vulnerability of maternal distress and assessment of signs and symptoms of maternal distress, supporting women in self-management of maternal distress, and supporting women in help-seeking were important elements of care. These elements of care were positively associated with midwives' experience, confidence, beliefs or interest in maternal distress [15].

To maximise the value of the findings for practice we discussed the importance and clinical relevance for midwifery practice with the stakeholders. Interpreting and discussing the findings emphasized the necessity for an antenatal intervention. The findings helped us to identify the factors relevant for screening for maternal distress - emphasising women's individuality - as well as the factors related to midwives' screening behaviour, both of which needed to be addressed by the intervention. The findings also helped us to recognise the importance of an individual approach addressing individual needs of women but also showed us that an intervention with interaction between midwives and women was required.

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 [13].

Application: Given the needs assessment we identified specific performance objectives (POs). These 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 who will benefit by *selective prevention*, and those already suffering from maternal distress benefitting by *indicated prevention* methods [19]. Therefore we determined the objectives by taking the found women's individual and behavioural factors as starting-points and indicated what women must learn and change in order to prevent and reduce maternal distress (Table 1). Firstly, women should learn to be conscious of the factors in their life that make them more vulnerable for maternal distress in order to undertake preventive actions. Secondly, women should learn to self-disclose about their feelings and emotions and to handle maternal distress in their daily lives if present. In addition, they should learn when and where to seek help or support. The found personal factors and behavioural determinants were all relevant and therefore potential components for an intervention that sought to support and sustain women in reaching the POs. Knowledge concerned the origins of the predisposing factors but also the differentiation between psychological mood states that belong to pregnancy and there were emotions deviate. Knowledge also concerned practical knowledge about how to optimise emotional wellbeing or how to cope with maternal distress. Attitude reflected women's perception of the importance of sharing their emotions and seeking help when they needed this. Risk-perception expressed women's awareness of predisposing factors in their lives but also the necessity and positive and negative consequences of self-disclosure and help-seeking. Self-efficacy reflected the confidence of undertaking preventive actions for maternal distress or dealing with it when it occurs. In addition we chose to address social influence from the woman's partner, relatives and friends as well as the midwife because these have been found to be the most important environmental factors [7,17].

There were parallels between women's individual and behavioural factors and midwife's care behaviour and therefore we determined what midwives must learn and change in order to promote self-disclosure of pregnant women, to support women in self-management of maternal distress and to implement, monitor and coordinate care for maternal distress (Table 2). The found behavioural intentions' determinants of midwives were all modifiable and therefore potential targets for the implementation and sustainability of the intervention. Midwives' knowledge concerned content knowledge of maternal

Table 1: Change objectives for all pregnant women (PO1 is a selective prevention method; PO2, PO3 and PO4 are indicated prevention methods).

	Knowledge	Attitude			Risk- perception	Self- Efficacy	Social Influence		
		General	Self-disclosure	Help- seeking			Social support	Professional support midwife	Social norm
PO1. Pregnant women identify factors that trigger MD	Point out which factors can trigger MD	Express that personal life issues can have an impact on emotional wellbeing during pregnancy			Explain which factors in their personal life (can) trigger MD during pregnancy	Express confidence in identifying factors in their life that trigger MD	Express feeling supported by their friends and relatives in identifying factors in their life that trigger MD	Identify their midwife as a trustworthy professional to consult regarding factors that trigger MD Identify their midwife as a trustworthy professional source of information regarding factors that trigger MD Express feeling supported by their midwife in identifying factors that trigger MD in their own life	Explain that identifying pregnant women that are at-risk for MD is a task of the midwife
PO2. Pregnant women decide to express that they experience MD (self-disclosure)	Explain that self-disclosure can reduce MD during pregnancy Report that having a sense of meaning/ purpose can contribute to self-disclosure of MD during pregnancy	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	Report the positive and negative consequences of self-disclosure Report personal reasons to self-disclose	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 their midwife in disclosing to her when experiencing MD	Explain that encouraging women in talking about MD is a task of the midwife
PO3. Pregnant women actively handle MD in their daily life (self-management)	Explain effective and ineffective coping mechanism to deal with MD during pregnancy Report that having a sense of purpose can contribute to self-management of MD during pregnancy	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	Report the importance of asking for support Express that support in coping with MD is positive		Express confidence in self-managing/ coping with MD	Express feeling supported by their friends and relatives in coping with MD	Express feeling supported by their midwife in coping with MD	Explain that coaching women in the self-management of MD is a task of the midwife
PO4. Pregnant women seek professional support for MD when needed (help-seeking)	Report the availability of different screening instruments to determine appropriate support for MD Explain different professional support options and resources for MD Report that having a purpose can contribute to self-disclosure			Express positive aspects of seeking professional support for MD Express the importance of seeking professional support for MD	Report whether professional support involves positive and/ or negative consequences for MD and their daily functioning	Express confidence in finding appropriate professional support for MD	Express feeling supported by their friends and relatives in seeking appropriate professional support for MD Express that their personal environment provides support when seeking professional support	Express feeling supported by their midwife when discussing professional support for Express feeling supported by their midwife when exploring appropriate professional support for MD	Explain that advising pregnant women about professional support of MD is a task of the midwife Explain that referring pregnant women suffering from MD to other caregivers is a task of the midwife

* MD: Maternal Distress

distress, knowledge about screening instruments and the meaning and implications of parameters, knowledge about options and sources for help and support and about communication pathways with other healthcare professionals. Attitude reflected midwives' positiveness, their willingness and sense of importance and relevance regarding the management of maternal distress. Self-efficacy expressed the confidence midwives perceived in assessment of maternal distress and its predisposing factors. Skills management concerned the competencies regarding assessment, psycho-education, mobilizing social support and the coordination and referral of care. Additionally, we chose to address the midwife's social norm because this involves the different roles within the midwife's professional scope [20]. We have given examples of change objectives for women (Table 1) and midwives (Table 2). The complete matrices of change objectives can be obtained from the first author.

Step3: Theory-based intervention strategies

The focus of this third step is to select theoretical change methods and to formulate practical strategies [13]. Methods are theoretical-based techniques that can influence behavioural change [21] and are translated into strategies [13]. The objective is to base all the decisions for the *WazzUp Mama?!* intervention on scientific evidence and theory [13].

Application for pregnant women: We used 'tailoring' as one of our general methods for change that we found suitable for almost all of the relevant determinants of behaviour [13]. Tailoring is prescribed when information given is matched to previously measured characteristics, individual problems, feelings and emotions, experiences, wishes, needs and abilities of the woman [22]. It provides opportunities for women to have their personal questions answered and to receive advice that aligns with their individual progress [22]. In order to fulfil this need pregnant women frequently use the Internet for support and antenatal advice [23]. Our second general method involved 'supportive communication', [13]. Supportive communication with the midwife influences the way women appraise their uncertainties and desires during pregnancy and it facilitates effective coping [24].

Additional methods were the use of 'advance organizers' and 'elaboration' to improve women's understanding of the complex nature of maternal distress and to enable them to access relevant information [13,25,26]. Women select a (pre-defined) situation, like feeling emotionally unbalanced, which is then followed by a tailored response generated with a 'narrative advance organizer'. To alter women's knowledge of and attitude toward self-disclosure and help-seeking we chose 'elaboration'. Elaboration intends to increase women's motivation to process information and adds meaning to the information [13]. 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 memories [13]. To target risk-perception we chose 'consciousness raising' [13]. Risk-perception involves increased awareness about one's vulnerability to, the consequences of, and the solutions for maternal distress [13]. 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 insight into their severity. The use of an inventory was followed immediately by evaluative and descriptive advice based on a woman's reported severity [27]. To enable women to identify risk situations for maternal distress in advance of exposure to them we chose 'cue altering' [13]. 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 [28]. To influence both attitude and self-efficacy we chose 'cultural similarity' [13]. Since pregnant women identify with other pregnant women and are more receptive to their experiences [27] 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' was selected to change risk-perception, attitude and social influence [13]. Individualization is concerned with providing opportunities for personalised answers or to receive instructions that are paced with individual progress [13]. As part of the tailored advice 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.

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 (Table 2) we called upon several methods. 'Information processing' was chosen as a general method [13]. 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 [29]. Because it is important for learners to identify with the educator [30] we chose for a practising midwife to lead the training session. In the training session we used 'intergroup dialogue training' as an important method to address social norm and skills management in relation to the midwife's role, competencies and tasks [20,31]. In the training session we also used 'verbal persuasion' to convince midwives that they are capable to screen for maternal distress [13]. Midwives are familiar with screening for various risk behaviours (e.g. smoking) and are aware that addressing sensitive psychosocial issues (e.g. sexual abuse) is part of their scope of practice [20]. 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.

Additional methods were 'facilitation of means' [13] that 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 [32]. 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. 'Providing cues' [13] - 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' [13] 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 3 presents the main methods and strategies used for the development of the *WazzUp Mama?!* An overview of all methods and strategies can be obtained from the first author.

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 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

Table 2: Change objectives for midwives.

	Knowledge	Attitude	Self-efficacy in screening for MD	Skills Management	Social norm
PO1. Midwives utilize assessment (including screening) of MD (to promote self-disclosure)	Define maternal distress Define psychopathology Report that assessment of MD promotes self-disclosure of pregnant women Report the barriers that affect the midwife's approach in assessment of MD Report risk groups for MD (within their population) Report the appropriate times for screening for MD within antenatal care Report methods to screen for MD during pregnancy Report how screening results must be interpreted Define which screening parameters are relevant for consultation or referral to other healthcare professionals Report the risk factors in a woman's (medical) history or current personal circumstances for developing MD Report the risk factors during pregnancy and birth for developing MD Report which personality traits are risk factors for developing MD	Express their motivation regarding assessment and screening of MD Argue the relevance of prevention regarding assessment and screening of MD Argue that midwives are the appropriate caregivers for MD assessment and screening Argue that pregnancy is a 'window of opportunity' to assess and screen for MD Express the importance of assessment and screening of MD in order to adequately refer to other healthcare professionals	Express confidence in assessment and screening of MD Express competence in assessment and screening of MD Express competence in asking the right questions in assessment of MD Express that their experience in assessment increases their confidence in asking the right questions Express competence in managing women that self-disclose after assessment or screening	Demonstrate assessment and screening for MD Demonstrate correct interpretation of the screening results Demonstrate when consultation or referral is indicated based on assessment or screening results Demonstrate discussing the answers regarding MD and the results of MD screening with pregnant women	Acknowledge that assessment and screening is part of the midwife's role as coach and counsellor and as medical professional
PO2. Midwives advice women in coping with MD	Report the effect of advising women in coping with MD Report the three effective coping mechanisms (self-disclosure, acceptance, help-seeking) Report the three ineffective coping mechanisms (avoidance, drinking, smoking) Report a minimum of 5 practical tips for pregnant women aimed at coping with MD in daily life	Express their motivation to advice women in coping with MD Report the relevance to advice women in coping with MD Report the importance to advice women in coping with MD		Demonstrate advising women experiencing MD how to influence stress-factors Demonstrate advising women experiencing MD how to positively cope with MD	Acknowledge that advising women in dealing with MD is part of the midwife's role as coach and counsellor and advisor Acknowledge their position involving confidentiality Acknowledge their non-judgmental position regarding MD
PO3. Midwives support pregnant women in finding self-help initiatives and professional support for MD	Report the effect of supporting pregnant women in seeking 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)	Express their motivation to guide pregnant women in finding self-help initiatives and professional support for MD Report that supporting pregnant women in finding self-help initiatives and professional support promotes reduction of MD		Demonstrate informing pregnant women in finding self-help initiatives and professional support for 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	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

*MD: Maternal Distress

Table 3: Theoretical Methods and Practical Strategies for the *WazzUp Mama?!* Intervention

Pregnant Women

Determinant	Theoretical Method	Strategies	Conditions
	Communicative support	Encourage and stimulate women to disclose private and sometimes sensitive information	Requires a relationship of trust and supportiveness with the midwife
	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.

Midwives

Determinant	Theoretical Method	Strategies	Conditions
Social norm	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
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		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

Table 4: *WazzUp Mama?!* Web-based tailored program for pregnant women.

Homepage	Self-directed pathways or starting points: (1) Mood changes - *Emotional dips* (2) Mapping risk factors - *Are you in balance?* (3) Emotional wellbeing - *I don't feel well*
Information collection	(1) First name (2) Midwifery practice or post code (3) Results of screening tests addressing: - Personal history and circumstances - Emotional wellbeing - case-finding questions* - Emotional stamina or perceived burden - Maternal distress - Coping mechanisms
Personalised feedback	(1) Advice for daily life: a variety of practical tips and tricks [42], including relaxation exercises (2) Advice about positive ways of coping and alternative ways of effective coping, based on most frequently used coping styles [43-46] (3) Overview of all relevant caregivers and health initiatives aimed at psychological and emotional wellbeing: - Self-management resources - Local individual and group support: (i) lay (ii) professional (iii) alternative
	Synopsis

*Whooley questions - (1) During the past month, have you often been bothered by feeling down, depressed or hopeless? (2) During the past month, have you often been bothered by little interest or pleasure in doing things?

they were comprehensive, understandable, and acceptable to the implementers and the participants [13].

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 [33] and we used this Dutch neologism to emphasize the importance of a mother's experiences of pregnancy. *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. Among the pregnant women and young mothers who helped with the pre-test were women who (had) experienced maternal distress during pregnancy.

Application for pregnant women: 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 (Table 4), consisting of (i) a homepage with three self-directed pathways, (ii) a process for collecting personal information, and (iii) personalized feedback based on the data collection in ii. The self-directed pathways addresses different topics of emotional wellbeing: (1) mood changes as a result of pregnancy, (2) identifying factors that unbalance and disturb emotional wellbeing, and (3) identification of (levels of) maternal distress. Self-direction is based on recognition of a situation presented at the starting point.

The first pathway focuses on the signs and symptoms of maternal distress and determines if the respondent's emotions belong to the

Table 5: Toolkit *WazzUp Mama?!* For midwives.

Guideline	(1) Clinical pathway for consultation and referral (2) Case-finding questions* to be used throughout the whole antenatal care period. (3) Scoring system of perceived burden or emotional stamina (according the same cut-off points as the web-based program for women)
Regional healthcare map	All relevant caregivers and health initiatives aimed at psychological and emotional wellbeing: (1) Self-management resources (2) Local individual and group support: (i) lay (ii) professional (iii) alternative
Posters for practices (for waiting and consultation rooms)	Advertising the tailored website
Credit card-sized cards	To hand out to women with the URL of the web-based tailored program
A set of pocket cards	Functional format and convenient size (credit card-size) including: (1) Clinical pathway (2) Case-finding questions* (3) Scoring system of perceived burden or emotional stamina (according the same cut-off points as the web-based program for women) (4) Card to write down relevant phone numbers
Training	- Prevalence and causes - Predisposing factors maternal distress - Consequences - Recognition/signs and symptoms (psychological, behavioural, biological/ vital, social)/differentiation physiological mood changes and maternal distress - Assessment predisposing factors and emotional wellbeing - Assessment negative birth experience - Problem and emotion focussed questions based on sense of coherence - Local healthcare map - SBAR - Interpretation EDS scores and cut-off points - Interpretation VAS scores perceived burden or emotional stamina - SSRI usage - Use toolkit - Reading material (EPDS [39,40]/Distress-thermometer [36]/Salutogenesis model [47,48]/Post partum Post Traumatic Stress Syndrome [49]/NICE guideline Antenatal and Postnatal Health [50]/Guideline SSRI use [51])

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 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 [34,35]. 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 [36]. The third pathway is a measurement of maternal distress operationalized by means of the Edinburgh Depression Scale (EDS), derived from the Edinburgh Postnatal Depression Scale (EPDS) [37]. Scores above defined cut-off points identified the severity of maternal distress [38,39] and were used as indicators for support. The Edinburgh Depression Scale was incorporated because this is validated to measure depression and anxiety simultaneously [40] and is recognised for its user-friendliness and compact size [41].

The results of the information collection and screening tests led to personalized feedback from the screening tests including advice and a synopsis of all the advice given. The respondent 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. The starting points of the website and the 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 [15] the program part for midwives included a toolkit. The toolkit included six components and are presented in table 5. 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 [13].

Application: Use of the stakeholders 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. 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.

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 [13].

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 pregnant women eligible for midwifery care at booking for both control (n = 215) and experimental condition (n = 218). These women were asked to fill out a self-reported maternal distress instrument [38,41,52-57] 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. The difference in the prevalence of maternal distress between the participants in the control group and experimental group differed significantly. In the control group maternal distress significantly increased from first to third trimester (20.9% to 26.5%) of pregnancy, in the experimental group it significantly decreased (22.5% to 13.3%) after receiving the intervention, and thus *WazzUp Mama?!* was interpreted as successful [58].

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 [7,17] and quantitative [15] and qualitative information from midwives [18] were systematically collected and combined with expert validation [17], and with behavioural change theories to develop an intervention tailored to the needs of the target groups and implementers. 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 [13]. Including both midwives and other healthcare professionals involved in the psychosocial wellbeing of women in the consortium was also strength, since it provided insight into the clinical relevance of the practical strategies we used.

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 [59]. Women using the intervention were recognised as having personal histories and differing initial conditions. 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 possibly enhanced each other and the various features of the two program parts were 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 were able to choose what suited them best but also to relate the information to their personal life [25]. Combining computer tailoring with professional face-to-face contact has shown to have positive results in pregnant women in earlier studies [60].

A major limitation of applying the Intervention Mapping protocol is the time it requires. Also in multi-facetted 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. Process evaluation among midwives 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 is required [61,62]. Pregnant women should be asked to evaluate the components of the intervention and to indicate dosage received [62]. 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. Process evaluation also enables correct interpretation of findings from effect studies and can be used to identify key facilitating and hindering factors for future program implementation and dissemination [13,16].

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

Intervention mapping can be a useful tool to apply to the development of an intervention in the complex area of emotional wellbeing during pregnancy. By involving stakeholders from the start of the project, the intervention is not only 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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