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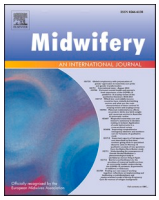

Research Article

Promoting informed decision-making about maternal pertussis vaccination in Centering Pregnancy group-antenatal care: A feasibility study

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ABSTRACT

Problem: Effective interventions are needed to promote informed decision making about vaccination.
Background: We developed a group-antenatal care (CP; Centering Pregnancy) intervention, i.e., a session about MPV within existing group-care settings, to promote informed decision making about Maternal Pertussis Vaccination in the Netherlands.
Aim: This study aimed to assess (1) to what extent the intervention was implemented as intended, (2) to what extent the intervention met the needs and wishes of pregnant individuals and midwives facilitating CP.
Methods: We conducted exploratory interviews with 6 CP facilitators and 10 CP participants to assess the implementation of the intervention, and how the intervention and its different components were perceived. Interviews were analysed using thematic analysis. In addition, we conducted a pre- and post-intervention survey amongst 35 participants, measuring knowledge about MPV, and MPV attitude and intention.
Results: The CP intervention was implemented as intended in 6 out of 7 groups. Participants were positive about the interactive CP-methods used to discuss MPV. Participants and facilitators evaluated the intervention as positive and relevant, although the intervention was time-consuming, and some participants had already made the de decision about MPV. Those who had not yet decided indicated that the session was helpful for their decision.
Discussion and conclusion: Discussing MPV in CP care settings is a feasible strategy to support decision making about MPV during pregnancy. The intervention could be improved by discussing the MPV sooner than 16–18 weeks of pregnancy. A larger-scale study is needed to assess effects on MPV uptake and informed decision making.

Introduction

In the Netherlands, pregnant individuals go to an obstetric care provider (midwife or gynaecologist) where they have individual consultations and check-ups, consisting of on average 13 appointments of 10–15 min. Nowadays, many obstetric care providers offer an alternative programme called Centering Pregnancy (CP). CP is a group-based prenatal care programme where 10 individual consultations are replaced with group sessions, with 8–12 pregnant participants in the same stage of pregnancy. The group sessions are facilitated by a midwife or other obstetric-care provider (Massey et al., 2006). Because the group sessions are much longer (90–120 min) than individual sessions, there is more time for education, self-management, skills building, and building trust between caregiver and clients (Ickovics et al., 2007; Lorig and Holman, 2003; Zantinge et al., 2009). On top of CP guidelines for the sessions, CP facilitators are free to adjust the group sessions according to group needs. During some sessions, according to group preferences, partners of participants will be invited to join. CP is associated with better pregnancy outcomes and an increase in the initiation of breastfeeding compared to individual care (Rijnders et al., 2019). Pregnant women feel more able to voice opinions about care and indicated that they were more likely to feel that their wishes were listened to by care providers (Rijnders et al., 2019).

CP has been implemented in about 20 % of midwifery clinics in the

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Netherlands and has been found to be a successful method to reach at-risk populations such as low-educated and low-literate people (Grady and Bloom, 2004; Picklesimer et al., 2012; Rijnders et al., 2019). A study in the US showed the potential of CP for increasing vaccination uptake during pregnancy (Roussos-Ross et al., 2020). However, there are no guidelines or instructions about discussion vaccination during pregnancy in the programme, even though maternal pertussis vaccination (MPV) is offered to all pregnant individuals in the Netherlands since 2019. MPV was introduced in the National Immunisation Programme to protect new-born infants against pertussis, commonly known as whooping cough (Furuta et al., 2017; Vygen-Bonnet et al., 2020). MPV is offered at 22 weeks of pregnancy in the Netherlands (timing may differ per country guidelines) and provides infants with passive immunisation through the transplacental transfer of antibodies.

MPV is a voluntary vaccination and the current uptake of MPV in the Netherlands was estimated at 70 % in 2020 (Schurink-van 't Klooster and de Melker, 2020). In the Netherlands, before the COVID-19 pandemic, we have seen a decrease in uptake of childhood vaccinations, and a lower uptake of newly introduced vaccines than expected (Schurink-van 't Klooster and de Melker, 2020). An informed decision ensures that the patient's choice is in line with their values, helps to avoid future feelings of regret, makes people less prone to misinformation (Bekker et al., n.d.; Marteau et al., 2001), and higher levels of informedness have shown to result in higher vaccination uptake (Smith et al., 2017; Thomson et al., 2016).

To facilitate informed decision making, we developed an intervention using the Centering methodology. We developed a training for CP facilitators (midwives and obstetric care assistants) for discussing the MPV in CP sessions, using a CP-method of their choice, depending on the groups' needs. They facilitated the sessions about MPV within existing CP care, between 16 and 18 weeks of pregnancy.

During the COVID-19 pandemic, CP was paused in many midwifery clinics or done in an online format. Therefore, we were unable to include the CP intervention in our planned randomised controlled trial (https://trialsearch.who.int/Trial2.aspx?TrialID=NL8811) with MPV uptake and informed decision making as outcome measures. Instead, with CP groups starting up again in early 2022, we investigated the feasibility of discussing MPV in CP in the Dutch care settings. Feasibility studies help determine whether an intervention should be recommended for efficacy testing. Key areas of focus for feasibility studies of interventions can be implementation of the intervention, acceptability, demand and practicality of the intervention, as well as adaptation, integration, expansion and if possible a limited measure of efficacy (Bowen et al., 2009). The aim of this study is to evaluate the feasibility of the CP intervention, with the following sub-aims: (1) investigate to what extent the intervention was implemented as intended, (2) investigate how the intervention was perceived by CP participants and facilitators, thereby assessing acceptability, demand and practicality of the intervention, and (3) investigate efficacy, to see if we can identify, despite a small sample, whether the intervention shows promising outcomes on MPV attitude and intentions. In the end, we will formulate recommendations for further testing or potential adaptations of the intervention.

Participants, ethics and methods

Study design

We conducted a qualitative study. We interviewed participants and facilitators of CP groups to examine to what extent the intervention was implemented as intended and how they perceived the intervention and its components. In addition, we conducted a survey amongst participants of the CP groups to study levels of attitude and intention towards MPV in our sample, before and after the session. The study has received ethical approval from the TNO institutional board (reference number 2018–01).

Recruitment and protocol

The target group for this study was CP facilitators and pregnant individuals participating in CP in the Netherlands. We developed a training session for CP facilitators to discuss the MPV in their CP groups. During the three-hour training, CP facilitators applied interactive CP-methods to discuss MPV and different scenarios were practiced, so a CP-session about MPV was simulated. The training is described in our paper about the systematic development of the intervention (Anraad et al., submitted). CP facilitators were recruited via Foundation CenteringZorg in the Netherlands. Foundation CenteringZorg provides training for midwives to incorporate CP in their practice. CP facilitators could respond to a call for participants. In total, seven CP facilitators participated in the training. They were then asked to include counselling about MPV in their existing CP groups, at 16–18 weeks of pregnancy, before the MPV is offered at 22 weeks of pregnancy. These group sessions took place online or in the midwifery clinic, depending on COVID-19 regulations at the time of the session.

Participants in the CP groups were asked by their CP facilitator to participate in the surveys. In addition, they were all offered the option to participate in a one-on-one interview via telephone after the session, leading to two to three interviewees per group. Participants were eligible to participate if they took part in the CP session about MPV. We aimed to include groups with a variety of demographic backgrounds. Because the CP sessions were in Dutch, all participants automatically met language criterion of understanding Dutch. Participants received information about the study at the end of the session prior to the session about CP. This meant the participants had around 4 weeks to consider participation. At the start of the session about CP, participants had the opportunity to ask questions about the study. Those who decided to participate, were asked to sign an informed consent form (online or on paper, depending on the mode of the CP session) before participation. After giving informed consent, participants filled out a pre-test survey (either on paper or online). After the counselling session, a post-test survey was filled out. If the CP session took place online, the survey was filled out online as well. Participants who took part in the survey received a voucher of 5 euros, and participants (including CP facilitators) who took part in an interview received a 10-euro voucher.

Intervention

Within existing CP groups, the possibility to get MPV is discussed during the second CP meeting, approximately at 16–18 weeks of pregnancy. The CP session about MPV consists of the following components: (1) Identify needs: the facilitator identifies the needs of participants with regard to decision making about MPV, for example by asking them about what they already know and think of MPV. By doing this, the facilitator gets an idea of which information needs to be shared, and what is needed in terms of support in the decision making process.; (2) Discuss relevant information about MPV: Examples of techniques used by the facilitator to bring across information about MPV amongst participants are (a) A quiz to stimulate active learning by asking participants to indicate if a statement about MPV is true or false, after which they are given immediate feedback, or (b) letting participants write down their questions about MPV and encouraging others to discuss the answers. Depending on the input of the participants, specific topics were further explored. The consequences of vaccinating versus not vaccinating are discussed, incorrect beliefs about the safety and effectiveness of MPV are weakened, and correct beliefs are strengthened, confirmed, or if needed, introduced. (3) Support decision making: The facilitator encourages participants to think about what the information they received means for their decision about MPV and share this with the group if they wish to. Participants are further encouraged to voice any potential concerns and considerations. Participants who are still in doubt about MPV are encouraged to think about, express, and pursue what they need to make a decision that they feel good about, for example, individual

consultation with the doctor providing the vaccine, or a conversation with the partner or other important person. The intervention design rationale is described in (Anraad et al., submitted).

Interviews

Semi-structured, one-on-one interviews were conducted by one researcher (CA) with CP participants and facilitators. Interviews took place via telephone after obtaining verbal (recorded) informed consent at the start of the interview, between the day after the CP session up to 4 days after the session. The interviews were performed with an interview guideline. This guideline was developed based on the expertise present in the research team, structured according to our sub-aims derived from Bowen and colleagues (2009). The guideline for the interviews with facilitators contained questions regarding their observation (i.e., how the MPV intervention was implemented, how each part of the session was executed), their subjective evaluation (i.e. their opinion about what went well, what could have gone better, and how well were able to meet the groups' needs) and their needs (i.e. whether they need anything to implement the intervention and their evaluation of the training for facilitators). The guideline for structuring the interviews with participants held the same structure, except questions about participants' needs were centred around MPV decision making. The interviews were meant to be exploratory, and the interviewer did not express their opinions on vaccination. At the end of the interview, the interviewees were explicitly asked if they had anything to add.

Survey

The pre-test survey contained questions on socio-demographics (age, educational level, whether they already had children, religion), attitude about MPV and intention towards accepting MPV. The post-test survey contained questions evaluating the CP session about MPV, asking for elements that were perceived as helpful, what could be improved, and an evaluation of the information that was provided. In addition, knowledge about MPV was tested, and attitude about MPV and intention towards MPV were measured. Table 1 shows the questions that were used in the survey. Levels of knowledge, attitude and intention were compared to post-test levels measured in the control group of our randomised controlled trial on the effectiveness of another intervention promoting informed decision making about MPV, executed in the same time period (Anraad et al., 2023).

Analyses

Survey output was analysed using descriptive statistics and paired samples *t*-tests to compare pre and post-test measures. These analyses were done with R (version 4.1.2). Post-test averages were compared with post-test averages of the control group of our randomised controlled trial investigating the effectiveness of an online decision aid aiming to promote informed decision making about MPV (a part of the original trial design: https://trialsearch.who.int/Trial2.aspx?TrialID=NL8811). Independent sample *t*-tests were done to compare averages.

The interviews were recorded and transcribed verbatim. Transcripts were analysed with thematic analysis (Braun and Clarke, 2006). Two researchers (XX and XX) independently familiarised themselves with the data, and generated initial codes. Then, they collated those into themes and sub-themes. This was an inductive process, with no pre-defined themes or codes. These were reviewed and discussed by the two researchers until a consensus was reached. Then, to assess the level of agreement on between both researchers on themes and sub-themes present in the data, they both individually re-coded the same 10 % of interviews of participants and midwives, using the themes and sub-themes that were agreed on. Based on these transcripts, XX and XX agreed on 70 % of the codes. One researcher (XX) coded all the interviews using Atlas.ti.

Table 1
Overview of survey items and outcome measures, the scores or scales and internal consistencies. (R) indicates that the score was reversed because the correct answers to the question was 'false'.

Measures and items	Score/scale	Cronbach alpha (α) or Pearson r (r)[2]
Knowledge (7 items) The MPV is meant to protect the baby. A painful arm is a common side-effect of MPV. Whooping cough is never serious for young babies. (R) The MPV only protects against whooping cough, and not against other diseases. (R) After getting MPV, the baby can skip their first vaccination after birth. Whooping cough can be transmitted by coughing. The MPV protects only my baby, and not me, against whooping cough. (R)	Sum score of correct answers 0=low knowledge about MPV to 7=high knowledge about MPV. (total number of correct answers)	NA
MPV intention (3 items) I plan to get MPV. I expect to get MPV. It is probable that I will get MPV.	1=low intention of getting MPV to 5=high intention of getting MPV	0.99
Attitude about MPV (4 items) I find MPV: very bad – very good very unimportant – very important very undesirable – very desirable very unnecessary – very necessary	1=negative to 5=positive	0.80

Results

Sample description

Table 2 shows the number of participants per group in the pre-test survey, post-test survey, and interviews. In total, 7 CP groups with in total 42 participants took place. Five out of seven groups were smaller than the recommended 8–12 participants. Out of the 42 invited

Table 2
Number of participants that participated in the surveys and interviews.

Group	Total number of pregnant participants in the group	Number of participants pre-test survey	Number of Participants post-test survey	Interviews
1	8	7	5	3 participants, 1 facilitator
2	5	5	3	1 participant, 1 facilitator
3	3	3	3	2 participants, 1 facilitator
4	7	5	3	1 facilitator
5	6	4	3	2 participants, 1 facilitator
6	5	5	5	2 participants, 1 facilitator
7	8	6	2	
total	**42**	**35**	**23**	**10 participants, 6 facilitators**

participants, 35 filled out the pre-test survey (a response rate of 83.3 %), and 23 filled out the post-test survey (65.7 % of participants who filled out the pre-test survey). Interviews took place with 6 CP facilitators and 10 CP participants.

Table 3 shows the socio-demographics of the participants that were included in the survey. The mean age was 32 years. High-educated women were overrepresented (80 % in our sample versus 30 % the general population(*CBS Open data StatLine*, 2022).

Interview findings

The average duration of the interviews was 20 min. The interviews focused on (1) to what extent the intervention was implemented as intended and (2) how the intervention was evaluated by CP participants and facilitators. In this section, we first describe the implementation of the intervention and the CP process as described by the CP facilitators, how it was evaluated by them, and what their needs were. Then, we describe how the intervention was perceived by the participants, and what their experience of and needs for decision making were. We summarize their answers, and support this with quotes. Fig. 1 shows an overview of themes and sub-themes for facilitators and participants.

CP facilitators

Implementation

Facilitators described the implementation of the CP session. The intervention was implemented as intended in 6 out of 7 groups, meaning that all three essential components of the CP session were present, these were: identifying group needs, interactive transfer of information, and deliberation on the decision. In one of the groups, two essential components were not applied as intended: information transfer was one-way instead of being interactive, and deliberation on the information was not encouraged.

Out of the 6 facilitators, 5 were midwives and one was obstetric care-assistant (co-facilitator). Experience with CP ranged from half a year to up to 6 years. In two groups, the partners of the pregnant participants were present, in the other groups they were not. Facilitators indicated trying to let participants come up with questions themselves and correcting or providing extra information where needed. All facilitators said that the atmosphere in the group had been open and good.

CP-method

To discuss the pros and cons of MPV, two facilitators divided the participants into smaller groups of three or four participants, two other facilitators provided participants with cards with statements or questions about MPV, one facilitator asked participants to write down a fact and a misconception about MPV to discuss in the group, and one facilitator provided the information about MPV to participants and answered questions. The time spent on discussing MPV ranged from 15 to 45 min.

> "What we do with the CP sessions about MPV is that we have a number of cards with statements on them. One person reads the statement and the others indicate if they think it is true or false, and then we ask why. In the end, we provide the explanations. And then afterwards we check if there are any questions left." (facilitator group 5)

Identifying group needs

Three facilitators indicated actively asking participants at the beginning of the session what their knowledge about MPV was by asking the group, or by using a form. The facilitators indicated that the individual needs in the group varied. Some participants had already decided while others had never heard of MPV. This also depended on whether any written information was provided prior to the session, which happened in two of the groups.

> "[the online form] asked a question: what do you think about vaccinating during pregnancy, and then have them type in something like four words, and then you get a kind of word field with all words. Words that came up were preventive, protective, good for the baby, also someone who wrote unknown. Someone wrote flu shot, also COVID-vaccination, and also whooping cough vaccination. So that gave me a bit of an idea of what their associations are with vaccination." (facilitator group 6)

Matching group needs

Facilitators indicated that they met the needs of the group in terms of information provision. Some were not sure how much they should let the group decide the topics that were discussed. Additionally, it was not always clear to them whether the group felt a need to share personal opinions and experiences during the deliberation process.

> "You also very much attune the information to the needs, but then you also leave certain things undiscussed. For example, we didn't talk very much about the side effects of the vaccination. And then I think, is that bad? It wasn't a question. Don't think that's a bad thing. But if you really had a one-on-one conversation, as the Youth Health Service then does, with that counselling, I would shed more light on all those sides. And now the group actually determines which side we discuss." (facilitator group 6)

Process facilitation

Facilitators indicated that the facilitation was smooth. According to the group needs, and how much knowledge was already present in the group, information was supplemented. Most facilitators already had extensive experience with CP so were used to facilitating discussions in CP groups.

> "I have supplemented the information, but they have already been able to name and explain a lot to each other." (facilitator group 1)

Online CP

Two of the groups took place online (via zoom) due to COVID-19 regulations and 5 groups took place in the clinics. Facilitators of the online groups indicated that doing sessions online is sub-optimal.

> "I notice that it is a bit easier, live, to gauge people, so to speak, that if you see facial expressions, I notice that I can then understand them faster. I think online is just a bit second best, as far as CP is concerned, but it is better than doing nothing." (facilitator group 1)

Table 3
Socio-demographics of participants.

Sociodemographic variables	Participants in the pre-test survey ($N = 35$)	Participants in the post-test survey ($N = 23$)	Interview participants ($N = 10$)
	Mean (standard deviation) for age and number of participants for dichotomous or categorical variables		
Age	32.0 (4.56) Range: 20–42	32.4 (4.10) Range:24–42	31.08 (3.16) Range: 26–35
Has at least one child			
No	25	17	6
Yes	10	6	4
Country of birth			
Netherlands	30	22	9
Other	5	1	1
Highest education completed	1	1	1
Low	6	3	2
Intermediate	28	19	7
High			

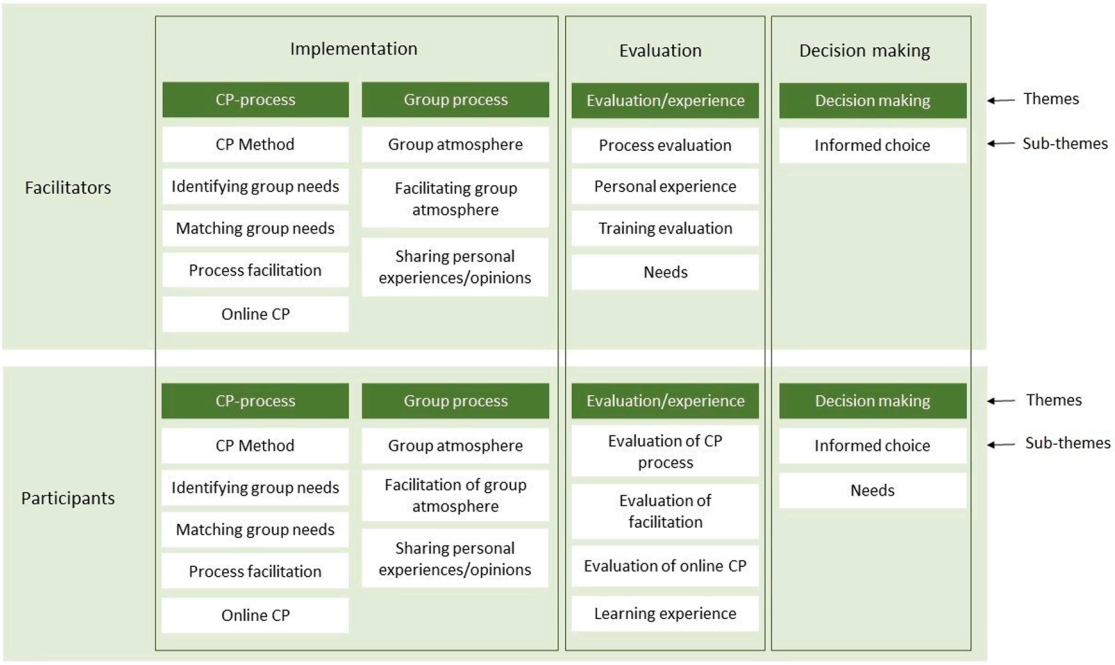

Fig. 1. Overview of themes and sub-themes for facilitators and participants.

Subjective evaluation

Overall, facilitators evaluated the intervention positively because it provided more in-depth information and decision making than a regular (individual) consultation, although they indicated that it was time-consuming.

Process evaluation

Two facilitators indicated that they were unsure if discussing MPV extensively is suitable for all participants, as some had already read information and made the decision themselves prior to the meeting at about 16 weeks of pregnancy. They found that, although it was good to be able to spend more time discussing MPV in CP than in an individual consult, it was time-consuming and took time away from other important topics. However, they found that even though some participants had already made their choice, it was good to refresh everybody's memory about potential side effects, information about whooping cough in babies, and the reasons for MPV.

> "Yeah, well I think it's a nice way. The CP is, of course, you just have more time to go in-depth. That's nice. Where with a consultation in fifteen minutes, you're just touching a subject superficially. And at CP you have half an hour to spend, but of course, you also have to choose your themes." (facilitator group 6)

> "I had never done it so extensively before and it went well, but it took a lot of time. So that is still a thing that I still have to find a way of when I discuss it because we didn't get around to many other subjects at all." (facilitator group 2)

Personal experience

All facilitators were reluctant to ask participants about their personal opinion about MPV and were wary of potentially heated discussions about vaccinations. However, they said that in hindsight, it would have been a good addition to the session.

> "Well, bringing up vaccination, especially in the current time, is a sensitive subject. And of course, you don't want people to see it as an attack, the midwife tells you to vaccinate. You don't take those words in your mouth, but that's how it feels a bit. That since covid, that vaccination is a lot more sensitive than it was before. So in that respect, I think it's a bit of a tricky subject to tackle. But in such a group, it turns out that that is always not so bad, and that people are really open to information." (facilitator group 3)

Training evaluation

Facilitators said the training they received about discussing MPV in the CP sessions was useful, both receiving the information about MPV and brainstorming with other facilitators about which method to use for the topic, and how to apply it. Some said a valuable addition would be to have the materials for a session with statements on cards provided.

> "Actually, the training helped. Simply because then you stop to think about the subject [of MPV] and that it is good to discuss it. And give each other some tools and discuss that, and what are things that can raise questions, for example. Yes, mainly just coming together and then just get started with it right away." (facilitator group 2)

> "Well, I also liked to coordinate with my colleagues about the different working methods, just to think about it for a while. And we also received some documents with some background information and I thought it was nice to be able to go through that at my leisure." (facilitator group 1)

Facilitator needs

Facilitators indicated that getting some pre-made materials to use during the session, such as cards with statements about MPV, would be helpful. In addition, one facilitator indicated that hearing about experiences from colleagues would be helpful.

> "It might be nice to get cards with statements about MPV. For example, that you have a statement or 5, 6 or something with some explanation and that you can let people vote with a thumbs up or down. It would be convenient to get those at the training." (facilitator group 1)

> "Well, I always like it, with all subjects, to occasionally hear from other colleagues, how they approach it, what they do. And not only around MPV but also in the field of work, how you can approach

things and learn from them, so that is fun and useful." (facilitator group 5)

Decision making

Informed choice

Three facilitators, especially those more experienced with CP, indicated that they focused on the participants' informed choice, rather than wanting to steer them towards accepting MPV. They valued a conscious choice in participants over an automatic one and wanted participants to be aware that they have the freedom to choose when it comes to accepting MPV.

> "If you explain it, they start to think and then eventually make- almost everyone makes the choice to do it, but then they know that they have a choice. Because with the MPV, I think a lot of people don't even realize that they have a choice." (facilitator group 5)

> "Because now they are going to think about why is that jab there, and the disadvantages, I usually do not discuss the possible disadvantages further, but then will then be discussed. Things come up like that you can get autism from it and such, and then I can explain that research has not shown that, so I will discuss that. But there are people who think that way, and I think that's okay. And most people don't change their mind, but they will look more critically and think differently about the choice, so to speak." (facilitator group 5)

> "In the end, I don't feel like I want to move them towards a certain choice, I just want them to make a conscious choice." (facilitator group 4)

CP Participants

Implementation

The implementation as described by the participants confirmed the descriptions given by the facilitators. Therefore, we will not describe these again.

Subjective evaluation

Evaluation of CP process All participants in the interviews were positive about MPV, and some had already made the decision prior to the session about MPV. For four of them, the session was quite extensive, but others appreciated having their memory refreshed with the information, even when they had already decided about MPV. The interactive methods that were chosen were evaluated positively, although the method of dividing into sub-groups, with one sub-group coming up with pros and one with cons of MPV was evaluated less positively by some participants.

> "I thought it was a very open way of discussing it, so if you have any doubts, we understand. I think we happened to have a group where there weren't really any doubts. But I did get the idea because you do it in small groups that you feel a little freer to discuss it or something. I thought that was a good way." (group 3, participant 2)

> "breaking up into breakout groups I liked, because you always came into a different group and because you get to know each other a bit. You still have some contact with everyone." (group 1, participant 3)

> "I actually missed the explanation about the 22-week jab a bit beforehand, but we immediately started discussing it in groups in break-out rooms. And that actually felt a bit like school, as it used to be." (group 1, participant 1)

Although participants appreciated parting into groups because it provided the opportunity to get to know each other better, the assignment felt forced, because participants had to come up with cons even though they were in favour of MPV.

In one group, the methods used were less interactive, and participants indicated that they preferred a more interactive method, where there is also space to share personal opinions and experiences about MPV, like with other topics in CP.

Evaluation of facilitation

Overall, participants were positive about the facilitation. In one group, participants indicated that the facilitator had explicitly not given specific advice to accept or refuse MPV, but they would have preferred to have this advice.

> "[the facilitator] lets everyone take a turn. If you have any questions, just ask. Then, anyone can answer. So she asks first when you ask a question, she first asks the group if someone has an answer to it, and if no one has an answer, then she's going to tell us what that answer is." (group 2, participant 1)

> "What I did see the [facilitator] wouldn't really give her opinion of I should do this or do that, it was kind of discussing what everyone thinks about it and what everyone knows about it. Somehow I thought maybe it would have been more helpful if [the facilitator] had said, "I would do *this*"." (group 1, participant 3)

> "I would prefer it if they say as a midwifery practice we advise you to do it, but it is your own choice." [as opposed to not getting advise] (group 1, participant 2)

Evaluation of online session

Participants in the sessions that took place online (via zoom) unanimously evaluated the online aspect as sub-optimal. They preferred meeting in person over meeting online, to get to know each other better, and be able to speak more freely. One participant indicated feeling not completely free to speak during the online session because she could not be sure about who was listening in the background.

> "Well online… that's also because you just don't know who's there, that may sound very unkind, but some things, if you discuss it with women, you can do that because you're all in it same situation. But if you are indeed someone's partner, some things he doesn't need to know" (group 3, participant 1)

> "You miss a bit of the chit chat in between and you do get a more complete picture of people when you see them in real life" (group 1, participant 3)

Learning experience

In all groups, participants indicated that the atmosphere was good, and they felt free to ask questions. Participants also indicated wanting to learn from each other, learning from each other's questions, and preferring to hear other participants' opinions about MPV. In some groups, personal opinions and experiences about MPV were not shared, and half of participants indicated that this could help them in their decision process.

> "What I wouldn't ask, someone else asked. Sometimes I didn't find out that I should ask that question, but if someone else asks, that's an idea right away… … You also learn from that." (group 2, participant 1)

> "Usually you learn more from your peers, yes, sometimes… than a teacher" (group 2, participant 1)

> "I think you immediately start thinking actively because you have to indicate is it true or false, so you have to immediately start thinking actively about what was the statement actually, and to split it up from one piece, I think that so and the other part might have been a bit iffy. You are put in the active thinking mode." (group 5, participant 1)

Overall, there was a notable difference between higher-educated participants and lower-educated participants in the interviews, with higher-educated participants wanting more in-depth, expert information and having less need for interacting and learning from each other, while this is highly valued amongst lower-educated participants. There was no notable difference in needs between those who had already had a child and those who did not.

Decision making

Participants valued making an informed decision and having extra knowledge about MPV, even if this did not influence their decision.

> "First, discussing it 1 on 1 is so that you really get information from the obstetrician, and second [in a group] so that you also know how others think. Of course, some already have experience with the MPV and they can also say that it made me really sick or, well, you take that with you. So you broaden your world a bit in it." (group 1, participant 2)

Participants needs

For most participants, the information provided was enough to make a decision. In one group, two participants indicated wanting to have more information, preferably from an expert. Some participants said the information came a bit too late for them, as they had already decided about MPV.

> "Perhaps I would have preferred the information based on a kind of expert advice, and then what personal considerations do you make in that regard." (group 1, participant 3)

> "I had already read about it myself. So I think at the time when I was looking for the information I would have found it more relevant so I guess it was a little too late for me.) (group 1, participant 3)

Survey results

Table 4 describes the survey results. Mean values of attitude and intention were already high at pre-test (>4.5 at a 5-point scale). These mean values slightly increased from pre- to post-test (from 4.53 at pre-test to 4.89 at post-test for MPV attitude, and from 4.60 at pre-test to 4.86 at post-test for MPV intention). This increase was significant for attitude (t = 2.52, 95 %CI= 0.04–0.44, p=.04) but not for intention towards MPV (t = 0.89, 95 %CI=0.04–0.44, p=.16). Knowledge was only measured at post-test, the mean score of the sample was 5.5 correct answers out of 7.

Table 4
Pre and post-test survey outcomes on attitude about MPV, intention towards accepting MPV and knowledge about MPV.

	pre-test (mean, SD) (N = 35)	post-test (mean, SD) (N = 23)	t-test
Attitude about MPV	4.53 (0.70)	4.89 (0.20)	t(22)=2.52 95 % CI=0.04–0.44 p=.02
Intention towards accepting MPV	4.60 (0.84)	4.86 (0.35)	t(21)=0.89 95 %CI=−0.22 – 0.04 p=.16
Knowledge (average number of correct answers)	NA	5.50 (1.15)	NA
Q1: The MPV is meant to protect the baby (true)		96 % correct	
Q2: A painful arm is a common side-effect of MPV (true)		68 % correct	
Q3: Whooping cough is never serious for babies (false)		100 % correct	
Q4: The MPV only works against whooping cough, and not against other diseases (false)		56 % correct	
Q5: After MPV, the baby can skip their first vaccination (true)		80 % correct	
Q6: Whooping cough is transmitted through coughing (true)		64 % correct	
Q7: The MPV only protects the baby, not me against whooping cough (false)		80 % correct	

When comparing these scores to mean scores of the control condition in our related randomised controlled trial about MPV decision making (N = 444) (Anraad et al., 2023), knowledge was higher than post-test measurements in the control group also measured at 20–22 weeks of pregnancy (mean of control condition=4.83, SD=1.53, t = 2.53, 95 % CI=0.15–1.19, p=.01), whereas attitude scores (mean of control condition=4.62, SD=0.67) were slightly higher (t = 2.37, 95 % CI=0.05–0.49, p=.02) and intention scores (mean of control condition=4.60, SD=0.79) were similar and not statistically different (p=.55) (Anraad et al., 2023). The characteristics of the control condition in the sample used for comparison were similar to the sample of the current study with regard to mean age and education levels. Differences between samples occurred with regard to country of birth and whether they already had children. Compared to the control sample, the percentage of participants born outside the Netherlands was higher in the current study (5.7 % in the control sample versus 14.3 % in the current study), and the percentage of participants who already had children was lower in the current sample (53.1 % versus 28.6 % in the current sample).

Most participants indicated in the questionnaire that all their questions about MPV were answered. One participant indicated that the session could have been held sooner as some participants had already decided about MPV, and one indicated wanting more scientific facts. One said the session could have been a bit shorter, and one participant wanted a bit more interaction in the session. To the question 'what was most useful for you about the session about MPV?', fourteen participants said that receiving general information about the pros and cons of MPV was most useful. Three participants indicated that talking together about MPV and knowing that others are also getting it was most useful. Two participants indicated that the information provided about side effects was most useful.

Discussion

Sub-aim 1: implementation

This study assessed the feasibility of an intervention discussing MPV in CP groups. First, we looked at to what extent the intervention was implemented as intended (sub-aim 1). Interviews with CP facilitators revealed that in most groups, the intervention was implemented as intended. Most facilitators actively investigated the group needs prior to the part of the session about MPV, while some facilitators integrated this into the CP method. Most CP facilitators used interactive methods to discuss MPV, in line with CP methodology. Facilitators indicated that talking about MPV cost a lot of time, in some groups up to 40–45 min. This is a potential practical barrier, and this can make it more difficult to implement the session in existing CP care in its current form. Facilitators indicated that they will continue to discuss MPV in CP groups, although some said they will spend less time on it (about 20 min instead of 30–45 min, depending on the groups' needs). Many participants indicated that spending less time on MPV in the CP session than in the current study would have been sufficient.

Sub-aim 2: perceptions of CP facilitators and participants

We also looked at how the intervention was perceived by CP facilitators and participants (sub-aim 2). Both groups evaluated the intervention positively. A discrepancy between facilitator and participant evaluations was that whereas many facilitators were reluctant to start a

personal conversation about MPV because they considered vaccination to be a sensitive topic, participants indicated wanting the space and time during the session to hear about each other's experiences with MPV, and also hear others' opinions. Therefore, the session could be improved by leaving more time for a personal exchange and by actively checking the groups' wishes for this during the session. This is in line with other studies about CP, in which participants evaluated the community aspect and sharing experiences positively (Wadsworth et al., 2019).

Most participants in the interviews indicated that the session helped them decide about MPV, although some had already made the decision. The timing of the session would therefore be more optimal in an earlier stage of pregnancy. There was a difference in the evaluations of higher-educated participants and lower-educated participants. Higher-educated participants wanted more (scientific) information. The interactive methods were evaluated more positively by lower-educated participants, as well as learning from each other. Despite these differences, both low and high-educated participants had a need for information or support in the decision-making process, indicating that there is a demand for the session about MPV. Although having diverse participants in the groups helps participants to learn from each other, CP strategies with a specific target group have also shown successful results because the needs of the individuals in the group are better aligned (Grady and Bloom, 2004; Picklesimer et al., 2012).

Unanimously, facilitators and participants agreed that the atmosphere in the groups was good. In-person sessions were preferred over online sessions. With online CP sessions having started recently during the COVID-19 pandemic (van den Berg et al., 2021), there are, to our knowledge, no studies about the effectiveness of online CP. Our study showed that online CP was perceived as sub-optimal compared to in-person CP, but better than no CP at all.

Sub-aim 3: efficacy of the intervention

Overall, MPV intention and attitude were very high in the sample at baseline. MPV attitude increased slightly between pre and post-test (95 %CI=0.04–0.44). Because of our small sample size with 23 participants at post-test, these results cannot provide any conclusions about intervention effectiveness or efficacy. However, the direction of the effect in this sample is positive, which, in combination with the successful implementation, positive subjective evaluations and positive effects in literature (Roussos-Ross et al., 2020) shows that the intervention is promising enough for a large-scale evaluation.

Our results are in line with other studies about CP, showing that CP leads to active participation in decisions during pregnancy, and voicing opinions and questions by learning from other participants (Hunter et al., 2018; Rijnders et al., 2019). In addition, in our study and other studies, interactive CP methods seemed particularly suitable for groups at risk of being missed by vaccination programmes, such as lower-educated women (Grady and Bloom, 2004; Picklesimer et al., 2012).

Strengths and weaknesses

A strength of the study is that we used both interviews and survey-data to assess how participants evaluated the intervention. This gave us the opportunity to get a deep understanding of what worked and what could be improved for both CP facilitators and CP participants. The semi-structured interviews created room for free responses from participants.

A weakness of this study is that it had a small sample size, therefore we were unable to make conclusions about effectiveness of the intervention. In addition, our sample was relatively high-educated, even though the CP intervention was specifically suitable for low-educated or low-(health) literate people. Also, the participants in our sample were mostly positive about MPV. Therefore, it is uncertain how the intervention would be evaluated by people with negative attitudes towards vaccination.

Recommendations

Based on the results of this study, we found that the intervention is feasible and promising. We recommend that a large-scale randomised controlled trial amongst a diverse sample is done to assess the effects of the intervention on MPV uptake and informed decision making, as well as determinants of MPV uptake targeted in the intervention design (Anraad et al., submitted). This way, effective components of the intervention can be identified.

Based on our findings, we recommend that CP sessions about MPV include discussing personal considerations about MPV in the group, as this will help meet the needs of the participants in their decision about MPV. There could be extra attention for this in the training for CP facilitators about discussion MPV in the CP groups. Ideally, MPV should be discussed slightly earlier than 16–18 weeks of pregnancy. Practically this is difficult because there is only one group session before this, in which many topics need to be discussed. We recommend discussing MPV in the first session if there is time for it. If not, it should be discussed in the session at 16–18 weeks of pregnancy. Providing information about MPV prior to the CP session can help to make discussing CP less time-consuming and leave more time for other important topics.

Conclusions

The CP intervention was implemented as intended in 6 out of 7 groups. Participants were positive about the interactive CP-methods used to discuss MPV, and most participants preferred hearing from other participants about their experiences with MPV and opinions of MPV. Participants and facilitators evaluated the intervention as positive and relevant, although the intervention was time-consuming, and some participants had already made the de decision about MPV. However, those who had not yet decided indicated that the session was helpful for the decision.

Discussing MPV in CP care settings is a feasible strategy to support decision making about MPV during pregnancy. The intervention could be improved by discussing the MPV sooner than 16–18 weeks of pregnancy. A larger-scale study is needed to assess effects on MPV uptake and informed decision making.

CRediT authorship contribution statement

Charlotte Anraad: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Pepijn van Empelen:** Conceptualization, Funding acquisition, Supervision, Writing – review & editing. **Robert A.C. Ruiter:** Conceptualization, Funding acquisition, Supervision, Writing – review & editing. **Marlies Rijnders:** Resources, Methodology, Writing – review & editing. **Katja van Groessen:** Resources, Methodology, Writing – review & editing. **Jeroen Pronk:** Formal analysis, Validation, Writing – review & editing. **Hilde van Keulen:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they do not have competing interests.

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References

Anraad, C., van Empelen, P., Ruiter, R.A.C. Rijnders, M., van Groessen, K., van Keulen, H. M. **The systematic development of an online tailored decision aid and a Centering-based Group Antenatal Care intervention to promote informed decision making regarding maternal pertussis vaccination, Submitted. (n.d.).**

Anraad, C., van Empelen, P., Ruiter, R.A.C., van Keulen, H.M., 2023. Effects of an online tailored decision aid to promote informed decision making about maternal pertussis vaccination in the Netherlands: a randomized controlled trial. Vaccine, *in press*.

Bekker, H., Thornton, J., Airey, C., Connelly, J., Hewison, J., Robinson, M., Lilleyman, J., MacIntosh, M., Maule, A., Michie, S., Pearman, A., n.d. Informed Decision Making 168.

Bowen, D.J., Kreuter, M., Spring, B., Cofta-Woerpel, L., Linnan, L., Weiner, D., Bakken, S., Kaplan, C.P., Squiers, L., Fabrizio, C., Fernandez, M., 2009. How we design feasibility studies. Am. J. Prev. Med. 36, 452–457. https://doi.org/10.1016/j.amepre.2009.02.002.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3 (2), 77–101. https://doi.org/10.1191/1478088706qp063oa.

CBS Open data StatLine, 2022. Centraal Bureau voor de Statistiek.

Furuta, M., Sin, J., Ng, E.S.W., Wang, K., 2017. Efficacy and safety of pertussis vaccination for pregnant women – a systematic review of randomised controlled trials and observational studies. BMC Pregnancy Childbirth 17, 390. https://doi.org/10.1186/s12884-017-1559-2.

Grady, M.A., Bloom, K.C., 2004. Pregnancy outcomes of adolescents enrolled in a centering pregnancy program. J. Midwifery Women's Health 49, 412–420. https://doi.org/10.1016/j.jmwh.2004.05.009.

Hunter, L., Da Motta, G., McCourt, C., Wiseman, O., Rayment, J., Haora, P., Wiggins, M., Harden, A., 2018. It makes sense and it works': maternity care providers' perspectives on the feasibility of a group antenatal care model (Pregnancy Circles). Midwifery 66, 56–63. https://doi.org/10.1016/j.midw.2018.07.016.

Ickovics, J.R., Kershaw, T.S., Westdahl, C., Magriples, U., Massey, Z., Reynolds, H., Rising, S.S., 2007. Group prenatal care and perinatal outcomes. Obstet. Gynecol. 110, 330–339. https://doi.org/10.1097/01.AOG.0000275284.24298.23.

Lorig, K.R., Holman, H., 2003. Self-management education: history, definition, outcomes, and mechanisms. Ann. Behav. Med. 26, 1–7. https://doi.org/10.1207/S15324796ABM2601_01.

Marteau, T.M., Dormandy, E., Michie, S., 2001. A measure of informed choice. Health Expectations 4, 99–108. https://doi.org/10.1046/j.1369-6513.2001.00140.x.

Massey, Z., Rising, S.S., Ickovics, J., 2006. CenteringPregnancy group prenatal care: promoting relationship-centered care. J. Obstet. Gynecol. Neonatal Nurs. 35, 286–294. https://doi.org/10.1111/j.1552-6909.2006.00040.x.

Picklesimer, A.H., Billings, D., Hale, N., Blackhurst, D., Covington-Kolb, S., 2012. The effect of CenteringPregnancy group prenatal care on preterm birth in a low-income population. Am. J. Obstet. Gynecol. 206 https://doi.org/10.1016/j.ajog.2012.01.040, 415.e1-415.e7.

Rijnders, M., Jans, S., Aalhuizen, I., Detmar, S., Crone, M., 2019. Women-centered care: implementation of CenteringPregnancy® in The Netherlands. Birth 46, 450–460. https://doi.org/10.1111/birt.12413.

Roussos-Ross, D., Prieto, A., Goodin, A., Watson, A.K., Bright, M.A., 2020. Increased TDAP and influenza vaccination acquisition among patients participating in group prenatal care. J. Primary Prevent. 41, 413–420. https://doi.org/10.1007/s10935-020-00606-z.

Schurink-van 't Klooster, T., de Melker, H., 2020. The National Immunisation Programme in the Netherlands : surveillance and developments in 2019-2020. Rijksinstituut voor Volksgezondheid en Milieu. https://doi.org/10.21945/RIVM-2020-0077.

Smith, L.E., Amlôt, R., Weinman, J., Yiend, J., Rubin, G.J., 2017. A systematic review of factors affecting vaccine uptake in young children. Vaccine 35, 6059–6069. https://doi.org/10.1016/j.vaccine.2017.09.046.

Thomson, A., Robinson, K., Vallée-Tourangeau, G., 2016. The 5As: a practical taxonomy for the determinants of vaccine uptake. Vaccine 34, 1018–1024. https://doi.org/10.1016/j.vaccine.2015.11.065.

van den Berg, L., Thomson, G., de Jonge, A., Balaam, M., Moncrieff, G., Topalidou, A., Downe, S., 2021. Never waste a crisis': a commentary on the COVID-19 pandemic as a driver for innovation in maternity care. BJOG. https://doi.org/10.1111/1471-0528.16996.

Vygen-Bonnet, S., Hellenbrand, W., Garbe, E., von Kries, R., Bogdan, C., Heininger, U., Röbl-Mathieu, M., Harder, T., 2020. Safety and effectiveness of acellular pertussis vaccination during pregnancy: a systematic review. BMC Infect. Dis. 20, 136. https://doi.org/10.1186/s12879-020-4824-3.

Wadsworth, K.H., Archibald, T.G., Payne, A.E., Cleary, A.K., Haney, B.L., Hoverman, A. S., 2019. Shared medical appointments and patient-centered experience: a mixed-methods systematic review. BMC Fam. Pract. 20, 97. https://doi.org/10.1186/s12875-019-0972-1.

Zantinge, E.M., Seesing, F.M., Tol, F.E., Raats, C.J.I., Spreeuwenberg, P.M.M., van Dulmen, A.M.S., 2009. Shared medical appointments: experiences of patients and care givers. Ned. Tijdschr. Geneeskd. 153, A828.