Vaccine 37 (2019) 5637–5644

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

A deliberate choice? Exploring factors related to informed decision-making about childhood vaccination among acceptors, refusers, and partial acceptors

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ARTICLE INFO

Article history:
Received 4 March 2019
Received in revised form 3 July 2019
Accepted 18 July 2019
Available online 2 August 2019

Keywords:
Childhood vaccination
Decision-making
Focus groups
Qualitative research
Vaccine hesitancy
Alternative vaccination schedule

ABSTRACT

Objective: In light of the decline in childhood vaccination coverage, the question rises concerning what factors play a role in informed decision-making about childhood vaccination. Insight into factors related to this decision helps us to support parents' informed decision-making about childhood vaccination.
Method: We conducted 12 semi-structured focus group interviews across the Netherlands based on a definition of informed decision-making: three with acceptors, three with refusers, and six with partial acceptors to ask about knowledge, attitudes, deliberation, and information needs. We performed a thematic analysis of the transcripts.
Results: Acceptors viewed the decision to participate in the National Immunization Program (NIP) as self-evident. Refusers and partial acceptors, however, reported to extensively deliberate the pros and cons of accepting or refusing the NIP in much detail. Their answers indicated that their knowledge was not always evidence-based. In addition, refusers and partial acceptors perceived fewer risks of vaccine-preventable diseases (VPDs), more risks of side-effects of vaccines, less social support from their environment, less trust in child welfare centers (CWCs), and information provided than acceptors.
Conclusion: We observed distinct differences in factors related to decision-making about childhood vaccination between acceptors, refusers, and partial acceptors. Acceptors in the current study perceived accepting childhood vaccinations as self-evident, refusers relied mostly on anecdotal information rather than evidence-based information to weigh up the pros and cons vaccines and the VPDs, and partial acceptors elaborately deliberated the pros and cons of each vaccine and VPD individually, which was time-consuming and difficult. To strengthen and support decision-making among parents, more elaborate dialogues are needed between Child Vaccine Providers (CVPs) and parents. These discussions could build trust between parents and CVPs, be used to discuss the evidence-based advantages of childhood vaccinations, and to decrease parents' susceptibility to anecdotal information and misperceptions about childhood vaccinations shared by other parents.

1. Introduction

Childhood vaccinations are very successful interventions to protect against vaccine-preventable diseases (VPDs) [1–4]. In the Netherlands, the National Immunization Program (NIP) offers vaccinations free of charge and on a voluntary basis [5]. Nowadays within the NIP, vaccinations are offered against 12 childhood diseases (i.e., polio, diphtheria, tetanus, pertussis, rubella, measles, mumps, disease caused by *Haemophilus influenzae* type b, meningococcal ACWY disease, hepatitis B, pneumococcal disease and cervical cancer caused by human papillomavirus (HPV)) [5]. In recent years, vaccination coverage has declined in various countries, including the Netherlands (from 95.4% in 2014 to 92.6% in 2018, for DTaP-IPV vaccination estimated for two-year-olds) [5,6]. Due to this decline, the question arises of whether a parent's decision about childhood vaccination is an informed decision and how their decision could be supported or strengthened.

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https://doi.org/10.1016/j.vaccine.2019.07.060
0264-410X/

In recent years, informed decision-making has gained more attention in the context of childhood vaccination [2]. Often, decisions are classified as informed when decision-makers have relevant *knowledge* about the subject and the decision reflects the *attitudes* of the decision-maker [7]. In addition, the consequences and the pros and cons should be *deliberated* [8]. Lehmann, de Melker [2] quantified how many parents accepting and refusing vaccinations made an informed decision about accepting childhood vaccinations. They found that refusers made a more informed decision about childhood vaccination than acceptors. While refusers elaborately deliberated the decision, acceptors had more evidence-based knowledge about vaccinations. In addition to knowledge, values, and deliberation, research has revealed additional important factors related to the decision about accepting childhood vaccinations. For example, risk perception, positive beliefs about the effectiveness and safety of vaccines, anticipated regret about VPDs and side-effects, trust in the NIP and information about the NIP, decisional conflict, a positive social environment towards accepting the NIP, and low perceived barriers, such as vaccinations being free of charge [2,8–15]. Research has focused on decision-making about accepting vaccinations among parents [2,16,17], but insight into whether parents also consider other options, such as refusing or partially accepting vaccinations is lacking. This may yield important information on how to support parents in making an informed decision about childhood vaccinations, and how supporting informed decision-making may reduce decisional conflict and vaccine hesitancy [18–20], positively affect intention to accept childhood vaccinations, and thus, the vaccination coverage [21].

Consequently, this qualitative study explores similarities and differences in factors related to decision-making about childhood vaccination among parents who accept (acceptors), refuse (refusers), or partially accept (partial acceptors) childhood vaccinations with regard to accepting, refusing, or partially accepting childhood vaccinations. We examined whether acceptors, refusers, and partial acceptors have similar knowledge and attitudes about childhood vaccinations, and how they evaluated the pros and cons of accepting, refusing, and partially accepting childhood vaccinations.

2. Methodology

To explore differences in factors related to informed decision-making of acceptors, refusers, and partial acceptors, we set up three focus groups with acceptors, three with refusers, and six with partial acceptors (three with parents are delaying vaccinations and three with parents who are refusing some vaccinations). As no new themes emerged in the last of the three focus group sessions, it was deemed that saturation was reached. Eligibility was determined based on the age of their child (two years old, born in 2013 and 2014, see Table 1). We chose to include the age of the child as an eligibility criterion to be able to classify parents of these children in the three groups: acceptors, refusers, and partial acceptors, based on their decision at the time of the focus groups about five vaccination moments (child is approximately two years old)). These five vaccinations moments were chosen to limit recall bias, and to make sure that parents made a conscious decision not to vaccinate, rather than through circumstances, such as sickness. Focus group discussions were chosen to stimulate an interactive discussion among peers [22,23]. This study was approved by the Medical Ethics Committee of Zuyderland – Zuyd (16-N-84).

2.1. Recruitment

We invited 300 acceptors, 399 refusers, and 464 partial acceptors. Participants were randomly selected within each group from Praeventis, the individual vaccination database in the Netherlands of the RIVM. Three large municipalities were selected from various parts of the Netherlands to promote a diverse selection of participants. The invitees received a letter of invitation containing the goal and procedure of the study. We did not differentiate between mothers and fathers, but only one parent from the same household could participate in a focus group. The parents could choose themselves which of the two would participate. Interested parents could register by following a link to an online registration form; a registration number was used to access the registration form. This number was checked for duplicates, so only one parent from the same household was included in the study. We asked about age, gender, level of education, availability, and contact information of parents. The final selection of participants for focus groups was based on the parents' availability and vaccination status of the child to ensure an open discussion among parents. Age, gender, and level of education were used to reduce selection bias. Education level was determined based on the Dutch version of the international standard classification of education (ISCED) [24]. Parents received an e-mail containing information on the date, time, and place of the focus group from the first author. All parents were also contacted by phone by the first author to ensure participation. Of the total of 1163 invited parents, we received 197 applications (109 (55%) acceptors, 32 (16%) refusers, 56 (29%) partial acceptors). A complete overview of participant characteristics is reported in supplementary file appendix A.

Table 1
Definitions of acceptors, refusers, and partial acceptors.

Parental group	Definition
Acceptors	Acceptors are parents (at least one of whom was born in the Netherlands) of children born in 2013 or 2014, who received all vaccinations scheduled according to the Dutch NIP.
Refusers	Refusers are parents (at least one of whom was born in the Netherlands) of children born in 2013 or 2014 who received none of the vaccinations scheduled according to the Dutch NIP.
Partial acceptors	Parents who partially accept childhood vaccinations are parents (at least one of whom was born in the Netherlands) who refuse or delay some vaccines of children born in 2013 or 2014. For example, some of these children did not receive any PCV[a], but received four doses of DTaP-IPV-Hib-HBV[a] vaccines; or they did not receive four doses of DTaP-IPV-Hib-HBV[a] vaccines but did receive three doses of PCV[a] vaccine; or their first DTaP-IPV-Hib-HBV[a] vaccine was delayed more than four months.

Note: Childhood vaccination status was determined by reported vaccination status for DTaP-IPV-Hib-HBV, PCV, MenC, BMR vaccination status in the Dutch Praeventis status for vaccination uptake reporting.
[a] D = Diphtheria, HBV = Hepatitis B, Hib = Hib disease, M = Measles, Men C = Meningococcal disease type C, B = Mumps, PCV = Pneumococcal disease, IPV = Polio, R = Rubella, T = Tetanus, aP = Whooping cough.

2.2. Procedure

The focus group sessions were conducted between February 13, 2017 and March 2, 2017 at convenient locations in three large cities across the Netherlands. Written informed consent was obtained before the start of the session, and after participation the parents received a 30 euro incentive. The number of participants per focus group varied between two and eight but on average a focus group consisted of five parents, and a session lasted approximately two hours. A semi-structured protocol based on a definition of informed decision-making [8] with open-ended questions was used to ensure minimal steering from the moderator and to allow participants to discuss all relevant subjects [25]. All focus group sessions were

audio recorded, and flipcharts were used so that participants could visualize the topics that had been discussed.

The topic list of this protocol was developed according to the definition of informed decision-making of van den Berg, Timmermans [8] and previous research conducted by Lehmann, de Melker [2] to investigate decision-making. A pilot focus group session was conducted with colleagues to test the topic list, after which the topic list was revised. The revised and final topic list was used during all focus group sessions, but specific phrasings of questions were adapted to fit specific groups (supplementary file appendix B).

The first author (K.A.G.J.R. a female, academic behavioral scientist) moderated all focus group sessions, but the observers varied between authors: S.L.S., M.S., and L.M. The focus group session started with a general introduction, and an opening question asking about participants' *knowledge* of childhood vaccination, using a mind map to visualize the topics mentioned for participants. In the second part of the session, participants were asked about their *attitude* and positive and negative aspects towards accepting, refusing, and partially accepting childhood vaccination. Participants were asked to provide individual positive and negative aspects that might have influenced their decision, on Post-its. These were shared in the group after everybody had time to consider their answers. *Deliberation and Information needs* were explored by discussing to what extent participants considered all risks and benefits of accepting, refusing, or partially accepting childhood vaccinations, and their need and understanding of information. The semi-structured protocol with open-ended questions allowed participants to discuss additional aspects related to their decision-making with each other.

2.3. Analysis

All focus groups were audio recorded and anonymously transcribed using transcription software F4 [26]. All observers kept field notes, and these were used during the transcription of the focus group session to add context to a transcript. For example, if one participant made a comment and another participant was vigorously shaking his or her head in disagreement, this was noted in the transcript, or if a participant walked in late during the mind map exercise, this was reported in the transcript.

The focus group transcripts were thematically analyzed using Nvivo 9 [23,27] to identify factors that appeared to be related to decision-making about childhood vaccination. The qualitative data analyses consisted of four phases. In the first phase, two observers (S.L.S. and M.S.) and the first author deduced relevant themes and subthemes from a random selection of the transcript of the first focus group (acceptors), and discussed and improved these with the last author [2,8]. Second, the observers S.L.S. and M.S. used these relevant themes and subthemes to develop a coding list. They then used this list to code another random selection of the transcript of the first focus group and explore possible additional relevant codes. After this, the first author and two observers discussed the code list, and the initial coding of a section of the first focus group transcript. Third, the two observers independently coded the entire transcript of the first focus group to look for additional codes, using the improved code list. The first author also coded this transcript to check for additional relevant codes. The coding list was discussed among the observers and the first author to resolve any differences, and add additional codes to create a final coding taxonomy. In the fourth and final phases, the final coding taxonomy was used to code the transcripts individually by KR, SS, and MS. The first author checked two additional transcripts of two other focus groups (refusers and partial acceptors) to ensure the coding taxonomy was used accordingly and checked for additional relevant codes; in this phase, no new codes were deemed necessary [28]. Examples of the final coding taxonomy are: anticipated regret regarding infectious diseases, beliefs about the importance of herd immunity, beliefs about the competence of the immune system of their child, Child Welfare Center, source of information, knowledge, and trust in competence of the CVP.

3. Results

We set up three focus groups with acceptors (n = 19), three with refusers (n = 12), and six with partial acceptors (n = 24), of which three with parents delaying vaccinations and three with parents refusing some vaccinations. Since no clear differences were found between parents who delay some vaccinations and parents who reject some vaccinations, we discuss the findings of these parents as one group. Of the 55 participants, 75% were female and 25% were male, with an average age of 39 years (±5.7, min = 27, max = 58), 96% of the participants were highly educated (i.e. university education) (supplementary file appendix A). Because of the explorative and qualitative nature of this study, the results are not intended to be generalized beyond the study population [29].

3.1. Knowledge about childhood vaccination

When asked to talk about what they knew about childhood vaccination, most parents were able to mention some facts. For example, they shared facts about the NIP schedule, inclusion of combination vaccines in the NIP, the tasks of the CWCs, the high vaccination coverage in the Netherlands, low risk for susceptibility of VPDs in the Netherlands, differences in vaccination schedules between the Netherlands and other European countries, religious reasons parents may have to refuse childhood vaccinations, and the importance of herd immunity. While acceptors were able to report most evidence-based information about childhood vaccination during a mind mapping exercise, they expressed the most doubts about being well-informed when asked how informed they felt. Refusers and partial acceptors reported different information based on studies and anecdotal evidence acquired on, for example, vaccine-critical websites and social media. When asked about how informed they felt, they stated that they felt very informed (quote 1):

> *My knowledge of vaccines and immunization is high. . . I think that some of these diseases are really good for the development of a child, as part of their natural development. I know that there are studies that show that the hand-eye coordination of a child improves after they got sick [from a VPD]. . . . I really think that by experiencing diseases [VPDs] you'll be stronger later in life. (quote 1 – #49_refuser)*

Refusers mainly shared justifications based on knowledge that was discordant with scientific consensus, and rather referred to anecdotal evidence they acquired from vaccine-critical websites and social media (quote 2).

> *Herd immunity is based on a lie. Herd immunity doesn't exist! It's all got to do with hygiene, that's why all the VPDs have disappeared. (quote 2 – #49_refuser)*

3.2. Attitudes about childhood vaccination

Parents shared their thoughts, both positive and negative, on childhood vaccination. The overall attitude of acceptors and partial acceptors was positive towards vaccinations (quote 3).

> *Vaccines are one of the best inventions ever! (quote 3 – #37_partial acceptors)*

Most acceptors mentioned that they did not just perceive individual benefits, but they also perceived aiding the herd immunity with childhood vaccinations as a great public benefit (quote 4).

The public benefit of vaccination is a really important aspect for me. (quote 4 – #21_acceptor)

Acceptors were mostly negative towards refusing vaccinations, except for the vaccine against hepatitis B. Acceptors noted that they did not see the added benefit of the recently added hepatitis B vaccination (quote 5) (note: hepatitis B vaccination was introduced in the Netherlands in 2011):

This is one vaccine that makes me wonder: 'do we really need it?' We didn't receive this vaccine growing up, but because there are risk groups, all our children have to receive Hepatitis B in a cocktail…? (quote 5 – #23_acceptor)

Partial acceptors consciously assessed the pros and cons of accepting or refusing each individual vaccination, and were therefore not outspokenly negative or positive. Refusers were mostly negative about the NIP and vaccinations. They discussed negative aspects about the Dutch NIP and vaccines, such as the perceived early start of vaccinations, the lack of possibility to discuss alternatives and doubts with people in their social environment or with CVPs, the rigidity of a standardized schedule, the lack of transparency of the NIP, combination vaccines, and the perceived mandatory nature of the NIP.

3.3. Deliberation about childhood vaccination

During the focus group sessions, parents were asked to discuss their deliberation concerning childhood vaccinations. Most acceptors reported not giving the pros and cons of childhood vaccinations much thought, but when asked about their perceived pros and cons, all were able to share theirs. This lack of deliberation was not perceived as negative, since acceptors viewed childhood vaccination not as a choice but as self-evident. They mentioned that there is not much thought needed to deliberate the pros of childhood vaccination (quote 6).

For us, childhood vaccination is really self-evident. It's not that I didn't think about alternatives, I knew you could decide to delay vaccines. But I considered it self-evident, why would the NIP exist if it wasn't good…? (quote 6 – #26_acceptor)

Compared to acceptors, refusers and partial acceptors did deliberate the pros and cons of childhood vaccinations. Refusers and partial acceptors deliberated the pros and cons of the VPDs *versus* side-effects of vaccines. They also consciously deliberated the pros and cons of accepting or refusing each individual vaccination. They mentioned that this was an elaborate, time-consuming, and difficult process. They explained it was difficult to find trustworthy information and that they did not feel supported in their decision-making. When asked how deliberate they perceived their decision, refusers and partial acceptors reported to have made a very deliberate choice. When asked how they had made a deliberate choice, parents explained (quote 7):

You look at the pros and cons for each disease, plus… I like statistics. So I look at the diseases and at the statistical risks of the disease. You read about vaccinations in general, those pros and cons you consider as well. We looked at each disease separately, what is the story behind the vaccine… then you make a decision. (quote 7 – #51_refuser)

3.4. Information need about childhood vaccination

When asked about their information needs, parents stated that several of their questions remained unanswered. They reported concerns about contradictory information being available, which they find difficult to navigate. Most parents in this study mentioned that when they asked their CVPs about the contradicting information they received no or unsatisfactory answers, such as childhood vaccinations are safe. Most parents explained they wanted to know why vaccinations were safe or why vaccinations worked (quote 8):

Childhood vaccination is really a diabolical dilemma… do we know what it does to you? What is going into my child? (quote 8 – #6_acceptor)

Most parents agreed that the information provision about the NIP was currently inadequate (brochures and CVPs). They mentioned that the tone of voice of information about the NIP by CVPs is patronizing, which made parents feel that they were perceived as stupid and bad parents (quote 9).

We need to start open discussions and not just a one-way flow of information from the government or health professionals: 'you are just a stupid citizen and you should listen and follow our advice'. We ARE equal and we want an open dialogue. (quote 9 – #34_partial acceptor)

Refusers and partial accepters noted that information about symptoms and case fatality rates of the VPDs was lacking. They also reported that information about the consequences of their choice about childhood vaccinations, for example how they should act if their child shows symptoms of one of the VPDs, was not available. Acceptors and partial acceptors realized that their search for information about childhood immunization is influenced by their beliefs and that they will search for information that confirms their initial opinions.

3.5. Additional factors related to decision-making about childhood vaccination

3.5.1. Risk perception: Severity and susceptibility of VPDs and side-effects of vaccines

Both the severity and susceptibility of VPDs and side-effects of vaccines were expressed as being influential in the decision to accept, refuse, or partially accept vaccines. Acceptors perceived the severity and susceptibility of the VPDs as great, which increased their anticipated regret should they not accept all childhood vaccinations. Unlike acceptors, partial acceptors and refusers perceived the risks of alleged side-effects of vaccines as great. For example, epilepsy, lactose intolerance, and an underdeveloped immune system were mentioned. They also mentioned other strategies to boost the immune system of their child (quote 10):

Delaying the NIP was a deliberate choice because I was breastfeeding my child. Her immune system would strengthen through me, through breastfeeding… (quote 10 – #16 partial acceptor)

Neither refusers nor partial acceptors perceived all VPDs as being a risk. These parents mentioned that experiencing a disease would aid the development of their child (quote 1). Among refusers and partial acceptors, the severity and susceptibility of each VPD was debated separately (quote 11).

It really depends on the type of disease [VPD]. I'm thinking, really… how likely is it he or she will get polio? The risk is so small, that's why I was comfortable with my decision to refuse this vaccine. (quote 11 – #13_partial acceptor)

In the end, acceptors and partial acceptors described the anticipated regret of the risk of a VPD as being a decisive factor in their decision about childhood vaccination (quote 12):

You would just never forgive yourself if your child would get sick… that's why you vaccinate your child. The risk is too great. (quote 12 – #39 partial acceptor)

3.5.2. Norms in parents' social environment towards childhood vaccination

The importance of norms in their social environment often recurred as a factor related to decision-making about childhood vaccination. Acceptors stated that their decision was confirmed by a strong social norm expressed by friends, parents, and the CWC, which reinforced their decision to accept vaccinations. Acceptors explained that they and society perceive the refusal of vaccination as being negative or the wrong choice, describing it as selfish. Refusers and partial acceptors felt criticized by the same social norm in society, and among friends and family for their decision (quote 13), since the majority of society perceived accepting childhood vaccination as self-evident (quote 6).

> *The debate makes me very uncomfortable… You enter a war zone as soon as you mention you refused the NIP, I didn't tell my family… I just didn't feel like starting a war with them (quote 13 – #11_refuser)*

Refusers and partial acceptors stated that their social environment changed due to their choice; for example, they no longer had the same friends.

3.5.3. Trust in information provision

Due to the tone of voice of the information (brochure and information from CVPs) about the NIP, many participating parents experienced a lack of trust in this information (quote 14):

> *The information brochure of the NIP is presented so black and white, and blunt, that I start mistrusting it… (quote 14 – #23_acceptor)*

Lack of trust was related to one-sided information provided, and parents concluded that trustworthy information would discuss both pros and cons of childhood vaccination and would appeal to a variety of parents.

3.5.4. Trust and confidence in child vaccine providers

Most participating parents lack confidence in the knowledge of CVPs at CWCs about childhood vaccinations and their skills to address their doubts about childhood vaccinations. When asked what they would like to change about the CWC, they all stated that they needed room for a dialogue in which parents and CVPs are equal, without a condescending tone of voice. In particular, the lack of time CVPs took to discuss childhood vaccinations was perceived as negative, and the tone of voice of the CVPs was experienced as haughty. Some refusers or partial acceptors even mentioned that the latter was a reason to refuse or partially accept vaccinations (quote 15).

> *I wanted to discuss childhood vaccination, but that was not possible… they just didn't want to discuss it with me. At the time, I was still trying to decide what to do; it was not my intention to refuse… (quote 15 – #28_refuser)*

4. Discussion

We explored whether Dutch parents made an informed decision about childhood vaccination and factors related to informed decision-making about accepting, refusing, or partially accepting childhood vaccination. Our qualitative study was based on the definition of informed decision-making [8] and assessed factors related with the ongoing assessment phase of parents' informed decision-making [17]. Knowledge, attitudes, and deliberation differed among parents. Acceptors perceived accepting childhood vaccinations as self-evident, refusers relied mostly on anecdotal information rather than evidence-based information to weigh up the pros and cons of side-effects of vaccines and the VPDs, and partial acceptors described an elaborate, time-consuming, and difficult deliberation to weigh up the pros and cons of each vaccine and VPD individually. In line with previous research [2,8,9,11–15,30–34], besides knowledge, attitudes, and deliberation, other factors were reported in relation to informed decision-making. For example, all participating parents mentioned their information needs about childhood vaccination in general and about vaccine safety, a need for a supportive social environment, and a strong social norm to vaccinate their children. While acceptors trusted the information provided, refusers and partial acceptors considered that there was a lack of open dialogue with CVPs, one-sided information provision about the NIP, and lack of trust in the CWC. While acceptors reported the severity and susceptibility about VPDs and anticipated regret about their child getting sick from a VPD when not vaccinating as factors related to decision-making, refusers and partial acceptors mentioned the severity and susceptibility of side-effects of vaccines.

Acceptors could recall more evidence-based information about the NIP than refusers and partial acceptors; they were negative about refusing childhood vaccinations and positive about the NIP. Although previous research indicates that acceptors tend to be uninformed [17], and acceptors in our study felt uninformed, we found that they were able to provide more evidence-based information than other parent groups. Acceptors strongly believed that childhood vaccination is an action that benefits not only their child (individual benefit), but also herd immunity (societal benefit) and they described a positive and strong social norm in place regarding this belief, which is confirmed by Brunson [17]. This strong social norm was also perceived by refusers and partial acceptors, but they perceived this norm as judgmental [35]. Overall, acceptors did not perceive uptake of childhood vaccinations as a choice which needs much deliberation because they considered it as self-evident, and this finding is confirmed by previous research [2,36].

All participating parents mentioned inadequate information provision, stating that the mere response of 'vaccines are safe' is not satisfactory. Similar to refusers and partial acceptors, acceptors perceived this type of information provided by the CWC as condescending. This may also be why acceptors did not feel informed. Stimulating an open dialogue between parents and CVPs may increase parents' feeling of being informed [30,35,37–39]. The lack of discussion with CVPs, the perception that childhood vaccination is self-evident, and the patronizing tone of voice of CVPs may leave parents vulnerable for anti-vaccination messages about alleged risks and side-effects of childhood vaccination [30–34,39–41]. As suggested by Benin et al. [37], attitudes towards childhood vaccination are continuously developing and shifting. Therefore, it is important to strengthen existing positive attitudes about childhood vaccination and build resistance for future anti-vaccination messages, as well as to discuss the arguments and anecdotal evidence used on anti-vaccination websites [42].

Refusers may base their arguments against vaccination mainly on anecdotal evidence and were negative about childhood vaccinations in general. They indicated that they had consciously deliberated the pros, but mostly the cons of participating in the NIP, and some mentioned that they did not know about alternative vaccination schedules at the time of decision-making. Compared to acceptors, refusers may believe that the risks of vaccine side-effects are more severe than the risks of VPDs, and they do not trust the information about the NIP offered by CVPs. Refusers mostly preferred to acquire anecdotal evidence from vaccine-critical websites and social media platforms, such as Facebook©. They reported searching and gathering information supporting anti-vaccination arguments [43,44]. In addition, using search engines to gather information about childhood vaccination leads to selection bias due to previously used search terms and the ranking of websites by search engines [45].

Partial acceptors may elaborately deliberate the pros and cons of each vaccine and VPD individually, which resulted in a feeling of decisional conflict regarding the benefits and risks of vaccines *versus* the perceived benefits and risks of experiencing VPDs. Some parents lost their trust in the competence of CVPs when their questions were ignored, or when the CVPs were not able to answer their questions. Because their questions remained unanswered, their decisional conflict increased [17,18]. This feeling of decisional conflict may lead parents to search for anti-vaccination arguments and diminishes the positive attitude of parents about childhood vaccination. In addition, partial acceptors described a lack of social support from friends, family, and CVPs with regard to their choice to partially accept childhood vaccinations. Research shows that decisional conflict and lack of discussion between parents and CVPs at the CWC influences the information seeking behavior of parents navigating anti-vaccination websites [39,41]. In an open discussion among CVPs and parents, inoculation messages about childhood vaccination can strengthen existing positive attitudes and build resistance for anti-vaccination messages [42]. These messages are similar to a vaccination, parents could be trained to resist attacks on their positive beliefs about childhood vaccination by practicing their response to anti-vaccination messages [42].

Finally, many participants expressed the need for more information about childhood vaccination [30–34]. This information need was not met by the CVPs. Refusers and partial acceptors mentioned that they accessed vaccine-critical websites because their questions are ignored by CVPs. Furthermore, they view the current information provision as insufficient, and they distrust the information provision about the NIP. All groups agree that the tone of voice of CVPs at the CWC is condescending. The inadequate information provision and condescending tone of voice do not meet the information needs of parents, and our research confirms findings from Benin et al. [37] indicating that this leads to a lack of trust among parents regarding CVPs and CWCs. Our results demonstrate that merely disseminating evidence-based knowledge does not lead to a trusting relationship between parents and the CVP. Research found that some CVPs find it difficult to discuss alternative vaccination decisions with parents [46,47]. CVPs need to have knowledge about the NIP, time, and skills to discuss childhood vaccinations with all parents [37]. In particular, it is important to not exclude parents refusing or partially accepting childhood vaccination. In this way, evidence-based information can be exchanged, misperceptions and doubts can be addressed, positive attitudes can be strengthened, questions can be answered, and the various options for childhood vaccination can be discussed. To increase factual knowledge about childhood vaccination and facilitate discussion skills among CVPs to build trusting relationships with parents, the Dutch National Institute for Public Health and the Environment (RIVM) developed an e-learning tool, and funds were made available by the government to reduce time constraints to discuss childhood vaccination with parents in 2017–2018 [48]. The e-learning tool was adopted by over one thousand CVPs in 2017 [9]. While further research and monitoring is needed to evaluate the implementation, adoption, and effectiveness of this tool, these changes and measures may stimulate an open dialogue, increase informed decision-making, reduce decisional conflict, and increase trust between parents and CVP professionals [10,48,49].

4.1. Application and further research

To gain more insight into which factors played a role in informed decision-making about childhood vaccination among acceptors, refusers, and partial acceptors, population surveys are necessary. The outcome of such quantification can be used to support informed decision-making on the part of parents about childhood vaccination.

Acceptors, refusers, and partial acceptors agree that the information provision is currently not sufficient. Refusers and partial acceptors would like more information on consequences of and susceptibility to VPDs and possible side-effects of childhood vaccinations. Such information is a potential measure to counter anti-vaccination messages, and to increase informed decision-making about childhood vacations [3,11,37,44,50]. Betsch et al. [43] showed that numeric information, in combination with narratives about the susceptibility to VPDs and side-effects of vaccines had the greatest impact on parents' risk perception towards childhood vaccination. Further research is necessary to test how a combination of numeric risk communication and narratives can inform parents about the low level of individual susceptibility of VPDs, which may have severe consequences; and the greater individual susceptibility of side-effects after a childhood vaccination, which are mild, pass quickly, and have no lasting effects [3,34,38,39,41,43]. The information on risk communication and narratives can be used in a communication approach of CVPs at the CWC to answer the questions of parents in detail and thus build a trustworthy relationship. In addition, our results show that while parents accepting childhood vaccinations are not interested in refusing or partially refusing childhood vaccinations, refusers and partial acceptors are highly interested in elaborate information about various vaccination options. Refusers appeared to be interested in hearing more about partially accepting childhood vaccination instead of refusing the NIP. Compared to refusing childhood vaccinations, there are more health benefits associated with partially accepting the NIP. Still, accepting all childhood vaccinations yields the most individual and public health benefits for children, so the possible adverse effects of informing parents – such as acceptors switching to refusing or partially accepting childhood vaccinations – need to be prevented. Further research is necessary to investigate the individual and public health effect of informing parents about these options of childhood vaccinations.

4.2. Strengths and limitations

This study explores whether parents make an informed decision, and factors related to the decision about childhood vaccination (e.g. accepting, refusing, or partially accepting), by examining parents' knowledge, attitude, and deliberation, and additional factors concerning accepting, refusing, and partially accepting childhood vaccinations. There are several limitations in this study [22]. Selection bias may have occurred. Respondents were asked to participate in a two-hour discussion, which may have attracted individuals more inclined to talk about childhood vaccination. In addition, 96% of the persons in our sample were highly educated, and this percentage is not a reflection of the Dutch population [51]. We drew a randomly selected sample within each municipality, but mainly higher educated parents responded to our invitation. We suggest that further research consciously includes other segments of the population, and that differences between low and higher educated parents should be investigated. Because of the overrepresentation of higher educated parents, and the explorative and qualitative nature of this study, the results are not able to be generalized to Dutch parents [29].

We asked parents to consider their decision in retrospect, thereby possibly introducing recall bias. However, children were not older than two years old and the last vaccinations for which parents had made a decision was no later than ten months prior to the focus group sessions. Even though the moderator followed rigorous training for focus groups, interviewer bias may be a factor. There was one moderator to standardize a possible bias, and the moderator took measures to remain as neutral as possible in dress, tone, and body language.

5. Conclusion

To conclude, our exploration of informed decision-making and factors related to decision-making about childhood vaccination identifies distinct differences in knowledge, attitudes, and deliberation of parents. The findings can facilitate informed decision-making among parents by promoting an open dialogue at the CWC, and improving the type and form of information presented. An open dialogue between parents and CVPs may increase deliberation among parents, strengthen positive attitudes, prevent misperceptions, and resolve decisional conflict.

Acknowledgements

The authors gratefully thank the study participants for their time and thoughtful considerations. The authors would also like to thank Tessel Rigter for her critical feedback on this article.

Contributors

KR was responsible for drafting the manuscript, organizing, and moderating. SS and MS observed and transcribed all focus group sessions, and together with KR analyzed the transcripts. LM and LO supported with the development of the focus group design. LM supported the drafting and writing of the manuscript and LO and HV supported the interpretation of the data and provided detailed feedback on all drafts.

Funding

This work was supported by the Dutch National Institute for Public Health and the Environment (RIVM) (grant number S132006).

Declaration of Competing Interest

None.

Ethics approval

This study has been reviewed and approved by the Medical Ethics Committee of Zuyderland – Zuyd (16-N-84).

Provenance and peer review

Not commissioned, externally peer reviewed.

Data sharing statement

Only the authors have access to the raw data (transcripts) quoted in this study due to confidentiality. Any request for access to other material relating to the study can be made directly to the authors, who will negotiate information sharing on a case by case basis.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2019.07.060.

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