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General discussion

General Discussion

Introduction

Pregnancy and the first two years of life are sensitive periods in a young life. In these periods, we are susceptible to environmental factors, especially in interaction with others. Children who grow up in families with a low socioeconomic status are more commonly exposed to several negative environmental risk factors, like stress and substance abuse that compromise fetal and early child development. Furthermore, these children are at increased risk of child maltreatment. Child maltreatment is a major public-health problem which is associated with negative (mental) health as well as developmental consequences. Child maltreatment is linked with physical injury, growth retardation, obesity and can lead to anxiety, depression, posttraumatic-stress disorder, and is associated with long-term deficits in educational achievement. Children who are victims of abuse are more likely to engage in risky health behavior during adolescence. And by the time they reach adulthood, these children have an increased risk to develop chronic diseases and of reduced life expectancy[1]. Therefore, it is important to intervene at an early stage of life to address environmental risk factors for child maltreatment and to contribute to better health and development of the child.

The Nurse-Family Partnership (NFP) is an evidence-based nurse home visiting program to prevent child abuse and neglect starting during pregnancy until the child's second birthday. NFP has been developed and studied in the United States and was found to be effective in addressing risk factors for child maltreatment among high risk families, as well as primary prevention of child abuse[2]. Because there are no evidence-based programs for the primary prevention of child maltreatment in the Netherlands, and studies on the effectiveness of NFP were all conducted in the US, we translated and culturally adapted NFP into VoorZorg for use in the Netherlands and to study its effectiveness. VoorZorg is an intensive program; high risk women receive 40 to 60 nurse home visits during pregnancy until the child's second birthday by trained and experienced VoorZorg nurses. These visits are well structured and address six domains: health status of the mother, child's health and safety, personal development of the mother, the mother as a role model, relation of the mother with her partner, family and friends and use of institutions. Before implementing VoorZorg on a large scale in the Netherlands we assessed the effectiveness through a Randomized Controlled Trial (RCT).

The overall aim of this thesis was to assess the effectiveness of VoorZorg in addressing risk factors during pregnancy and early childhood compromising fetal and early child development in high risk families. This aim was further operationalized as follows:

1. To describe the phases of implementation of VoorZorg and the design of the effect study (Chapter 2);
2. To describe the two-stage selection procedure to select women at increased risk for child maltreatment and to test whether this selection procedure was effective in including high risk women (Chapter 3);
3. To study the effect of VoorZorg on cigarette smoking, (adverse) pregnancy outcomes and breastfeeding (Chapter 4);
4. To assess the effect of VoorZorg on intimate partner violence perpetration and victimization during pregnancy and the first two years of life (Chapter 5);
5. To study the effect of VoorZorg on child maltreatment, home environment and children's externalizing and internalizing behavior (Chapter 6).

In this final chapter, we will present the main findings of this study and discuss methodological considerations of the VoorZorg study. In addition, implications for implementation and future research will be described. This chapter will end with key recommendations and concluding remarks.

Main Findings
The VoorZorg study consists of two parts: Part 1. The translation and cultural adaption of VoorZorg and developing the design of the effect study, and Part 2. the Randomized Controlled trial (RCT) to study the effectiveness of VoorZorg in a sample of high risk pregnant woman.

Part I: Design of the VoorZorg program

In **chapter two** the study protocol of the VoorZorg program is described. The implementation of VoorZorg consisted of three partly overlapping phases. Phase 1 was the translation and cultural adaptation of the Nurse-Family Partnership and the design of a two-stage selection procedure to select women at an increased risk for child maltreatment. Phase 2 was a pilot study to examine the conditions for implementation of the VoorZorg program including the training of nurses. Phase 3 was the evaluation of VoorZorg in an RCT to assess the effect of this program in a sample of high risk women and compared to usual care.

The two-stage selection procedure
In **chapter three** we discussed the necessity to start a selective intervention targeting child maltreatment as early as possible in families who are at increased risk for abusing their child. For this purpose it is necessary to use the appropriate selection procedure to identify those families at risk for whom the intervention was developed. We constructed a two-stage selection procedure to identify young, high risk women early in pregnancy who are eligible for inclusion in the VoorZorg program. The first stage of the selection procedure was conducted by professionals, such as midwives, gynecologists, general practioners and street corner workers. These professionals use the following five criteria: 1. low education level, 2. age ≤25 years, 3. maximum gestational

age of 28 weeks, 4. pregnant with the first child, and 5. able to understand the Dutch language. Women who met these five criteria went through the second stage selection performed by a trained VoorZorg nurse. The VoorZorg nurse interviewed women at their homes and checked whether women had at least one of the following additional risk factors: 1. no or little social support, 2. a history or 3. present situation of domestic violence or neglect, 4. psychological symptoms, 5. financial problems, 6. unemployment 7. housing difficulties, 8. alcohol use, smoking or drug use during pregnancy, 9. having a non-realistic approach about motherhood. As part of the selection procedure nurses had to consult an expert committee in case of doubt on whether to include a woman.

In this chapter we also tested with validated questionnaires whether participants were at increased risk for child maltreatment. Participants were included at an average age of 19 years. A high percentage of the participants was single, had a history of domestic violence or in their current relationship, had financial problems, or had no occupation. 98% had more than three risk factors, which increases their risk for abusing their child significantly. We conclude that with the two-stage selection procedure women with an increased risk of abusing their child were selected early in pregnancy.

Part II: Evaluation of the VoorZorg program

In Part II of this thesis the results of the effect study of VoorZorg in addressing risk factors for early child maltreatment compared to usual care are described.

Cigarette smoking, pregnancy outcomes and breastfeeding
In **chapter four** we described the short-term effects of VoorZorg during pregnancy and the first 6 months of life of the child on maternal cigarette smoking, pregnancy outcomes, and breastfeeding. Maternal cigarette smoking is one of the most preventable causes of adverse pregnancy outcomes. The V-MIS, a set of Minimal Intervention Strategies for midwives based on the Integrated Change model was shown to be effective in reducing cigarette smoking during pregnancy and the first six weeks after birth in a general population sample of pregnant woman [3]. Although V-MIS was incorporated in the VoorZorg intervention, the effectiveness of V-MIS in reducing cigarette smoking among high risk pregnant women was not yet determined. Therefore, and because Olds had found important intervention effects for mothers who reduced smoking during pregnancy, we wanted to determine whether VoorZorg is effective in addressing cigarette smoking among high risk pregnant women[4]. The current study showed that VoorZorg is effective in reducing the number of women who smoked during pregnancy and during the first two years after birth. The number of cigarettes smoked a day during pregnancy was also reduced in both groups compared to the start of pregnancy but not significantly different in VoorZorg compared to control condition. During the first two months of life of the child, participants receiving VoorZorg smoked significantly fewer cigarettes a day and did not smoke in the presence of the baby.
In this chapter we also assessed the effect of VoorZorg on pregnancy outcomes. There were no intervention effects on mean birth weight and gestational age. Furthermore, VoorZorg was not different in addressing adverse pregnancy outcomes, like low birth weight or babies being small for gestational age, compared to the control condition.

The third aim of this chapter was to measure whether more mothers receiving VoorZorg initiated breastfeeding after childbirth and had longer breastfeeding duration as it has many health benefits for the child and facilitates the mother-child interaction. The current study showed that the prevalence of women who initiated breastfeeding was similarly high in both control and intervention group. At six months after birth, the prevalence of women who still breastfed their child was significantly higher among women in the intervention group compared to the control group, and was similar to the general Dutch population.

In conclusion, VoorZorg is effective on reducing cigarette smoking during pregnancy and the two months after birth, and the duration of breastfeeding compared to the control group was longer. No effect was found on pregnancy outcomes.

Intimate partner violence (IPV)

Chapter five describes the effect of VoorZorg on IPV victimization and perpetration at 32 weeks of pregnancy and 24 months after birth. IPV is considered as a form of child maltreatment and is known to affect the health and development of the child. Furthermore, in families where IPV is present, children are at increased risk to be abused.

IPV victimization

We studied whether VoorZorg is effective on reducing IPV victimization. IPV victimization occurs when the participating mother is the victim of violence and her partner is the violator. Four different types of IPV were measured. These analyses showed that at 32 weeks of pregnancy all participants in control and intervention condition were victims of level 1 psychological aggression, which indicates that it can be a situational couple violence, which may be present in many relationships. However, women in the intervention condition reported significantly less level 2 psychological aggression, which is a more severe form of psychological aggression. In addition, physical assault and level 1 sexual coercion were significantly lower in the intervention group. The prevalence of level 2 sexual coercion and the prevalence of injury after a fight were equal in both groups. The results showed also that in the intervention group significantly fewer participants were victims of more than two forms of violence compared to the control group.

At 24 months after birth the prevalence of women experiencing level 2 physical assault was significantly lower in the intervention condition.

IPV perpetration

IPV perpetration is when the participant uses violence towards her partner. At 32 weeks of pregnancy, women in the intervention group reported using significantly less psychological aggression and physical assault. Furthermore, they inflicted significantly fewer injuries to their partners. Sexual coercion was the least common form of violence used by participants. There was no significant difference between the groups. Furthermore, in the intervention group significantly fewer participants used more than two forms of violence towards their partner compared to the control group. At 24 months, after applying multiple imputation analyses, we found that the prevalence of sexual coercion was significantly lower amongst women receiving the VoorZorg program. Multilevel logistic regression analyses showed that physical assault decreased significantly over time in the intervention group and was significantly lower than in the control group.

7. General discussion

Child maltreatment reports, home environment and child behavior
In **chapter 6** we presented results of VoorZorg compared to the usual care on the following child related outcome measures: child maltreatment, home environment and children's internalizing and externalizing behavior. The primary outcome measure in this study was whether a child was reported to Child Protective Services (CPS) during pregnancy until three years after birth. A high percentage of children were reported to child protective services during this period. The percentage of children of mothers receiving the VoorZorg program with a CPS report of abuse was significantly lower compared to the control group (C: 19%, I: 11%). According to additional information by the CPS agencies, 93% of these reports were valid cases of child maltreatment substantiated by independent evaluations of CPS. This result indicates that child maltreatment and neglect is prevented by VoorZorg during pregnancy and early life.

Secondary outcome measures in this chapter were measured at 6, 18 and 24 months after birth. We assessed the home environment of the child measured with the Infant Toddler-Home Observation Measurement of the Environment (IT-HOME) inventory and children's internalizing and externalizing behaviour measured with the Child Behaviour Checklist (CBCL/1.5-5). The analyses showed that at 6 and 18 months after birth, VoorZorg had no effects on total HOME score. However, at 24 months after birth, total HOME score was significantly higher for women receiving VoorZorg, indicating a more enriched and more supportive home environment. We also applied secondary analyses for the HOME where we corrected for the time variable. These results showed no significant difference on total HOME score between both groups over the three measurements (6, 18 and 24 months after birth). For the CBCL/1.5-5 outcome we found that at 24 months after birth, the prevalence of children having externalizing behaviour was not statistically different between both groups. However, the prevalence of internalizing behaviour was significantly lower in the intervention group. The difference between control and intervention group was especially visible on the subscales somatic complaints and withdrawn behaviour.

Summary of the results of the RCT
In conclusion, our study showed that VoorZorg, the first translated and culturally adapted Nurse-Family Partnership outside the US evaluated by independent researchers, identifies the appropriate population of pregnant women at risk for child maltreatment. Furthermore, VoorZorg effectively improves the conditions for a favorable child development and growth through effects on cigarette smoking, breastfeeding duration, intimate partner violence (a form of child maltreatment), child maltreatment, long-term home environment and internalizing behavior. VoorZorg is not different on pregnancy outcomes and externalizing behavior in early life compared to the control condition. With these results we can conclude that VoorZorg is an evidence-based program for the primary prevention of child maltreatment as well as for associated risk factors for maltreatment among young high risk pregnant women.

Methodological considerations
We conducted a single blind, parallel-group, randomized controlled study from 2006 to 2009. In these paragraphs we will discuss methodological issues in our study.

Participants: recruitment of high risk pregnant women
A two-stage selection procedure was used to recruit women in our study. A shortcoming of our study is that the professionals conducting the first stage of selection did not document how many women were approached, how many declined to participate in the trial, and their reasons for declining. Although we used personal interaction to recruit women, which is known to increase response rates, it is important to measure how many women refused to participate or were excluded by the professionals at each stage and why they declined[5]. In a separate pilot study amongst pregnant women in Amsterdam, approximately 50% of all women who met the first stage criteria were included in the trial. This percentage is confirmed by colleague-researchers in the United Kingdom who are also evaluating NFP. Information about the reasons for non-participation should be examined to enhance the feasibility of the program. Another limitation regarding recruitment is that a relatively low percentage (6%) of Turkish and Moroccan women, the main immigrant populations in the Netherlands, were included in the intervention. We do not know why the number of these ethnic groups is low in our study. One reason might be that those young – unwanted – pregnant women marry within their cultural minority and are supported by other extended family members. Additionally, it is possible that women from these ethnic backgrounds were less often recruited by the professionals. Again, this issue should be addressed in a future study to enhance the feasibility for minority populations. These limitations can have an influence on the external validity and generalizability of the study.

Participants: follow-up rate
The percentage of participants lost to follow-up was high in our study, especially at 24 months (50%), a finding common in these high risk populations. The most important reasons for the high loss to follow-up are: 1. Women, especially in the control group, were not traceable by the interviewers, and some of them even not traceable by Youth Health Care organizations in their region. We always tried to update their contact details by letting them fill in a form with contact information and their social network, but even this strategy was not effective. 2. Participants declined to participate in the entire interview. 3. Participants were hard to reach for interviewers and it was laborious to make appointments for an interview. Even when clear appointments were made, there was a chance that participants were not at home. The high loss to follow-up is a further indication of the level of disorganization in this high- risk population. By applying attrition analysis we observed that attrition was at random and that results are thus still representative for the study population. However, we corrected for the high loss to follow-up by imputing missing data. For sensitivity analyses we applied different imputation techniques (last observation carried forward, multiple imputation analysis) to assess if different missing data handling methods yielded different results. We chose Multiple Imputation as the primary analysis as this technique resulted in a higher power and valid estimates.

Measurements: Self-reported questionnaires
In our study we used validated questionnaires and official records to assess the outcome measures. The data regarding child maltreatment and pregnancy health outcomes were obtained from independent official and medical records. However, a number of outcomes were based on self-reports, which can be prone to different forms of

bias, such as recall bias and social desirability bias[6]. Furthermore, women in the intervention group could be aware of the consequences of the risk factors and therefore may report less risk behavior. However, Olds et al. concluded in their study on the effectiveness of the Nurse-Family Partnership (NFP) that women in the intervention group were more likely to report the actual number of cigarettes they smoked a day which he verified with biochemical parameters[2]. In the current study we did not verify cigarette smoking with biochemical parameters because of time and financial constraints, and because cotinine in blood samples is not a reliable method as it may also measure passive smoking which would lead to false positive results, especially among this study population who are more likely to be surrounded by smokers[7]. We hypothesize that the findings in Olds' study are also applicable for our study and assume that the reported cigarette smoking behavior is similar to actual smoking behavior (chapter 4).

Measurements: Breastfeeding
We have measured breastfeeding initiation and duration, but did not assess whether women were giving exclusive or partial breastfeeding. WHO standards emphasize to differentiate between types of breastfeeding, but a recent study by Kramer et al showed that exclusive breastfeeding compared to partial breastfeeding had no additional effect on long term obesity and cognitive development[8]. Furthermore, we did not assess reasons for women to stop breastfeeding their child. If the reasons for stopping would have been known the VoorZorg program could be enhanced by addressing this subject more specifically. However, for the aim of the RCT, which is to study the effectiveness of the intervention, the measures were sufficient.

Measurements: Intimate partner violence
The revised Conflict Tactics Scale (CTS2) was used to measure Intimate Partner Violence (IPV). Although this questionnaire is the most used to measure IPV, some researchers have criticized the CTS2[9]. Reasons for critique are, among others, that the CTS2 asks for specific types of abuse, and women would therefore not report other types of violence. However, our measurement of four types of abuse at two levels of severity is a valid procedure to determine the effectiveness of the intervention[10]. A strength of the CTS2 is that in addition to victimization also perpetration of acts of abuse by the mothers is measured. Also, some argue that the CTS2 does not include questions addressing coercion, control or motives for conflict tactics, and does not measure exposure to sexual assault or violence from ex-partners. Although we think that this information is important to assess, it is not necessary for the aim of our RCT and was partly already assessed with other measures. Psychometric properties of this questionnaire are discussed in chapter 5.

Measurements: Child maltreatment
The occurrence of child maltreatment can be measured in different ways[11]. In the current study we used child maltreatment reports from Child Protecting Services in the Netherlands (Advies en Meldpunt Kindermishandeling). According to Shlonsky et al. this is the gold standard to measure the occurrence of child maltreatment[11]The benefit of those reports is that professionals and concerned non-professionals reported maltreatment independently of the intervention. However, a limitation of using CPS data is that it may be prone to surveillance bias, because mothers and children receiv-

ing VoorZorg are under more scrutiny, and liberal bias, when professionals tend to report less incidents or only more severe incidents of maltreatment. Nevertheless, although the validity of these reports may be hampered by surveillance bias, as well as liberal bias Chaffin and Bard (2006) and Reynolds (2009) concluded that the effect of these biases differed little in terms of reported incidents, severity and confirmation.

A second limitation is that although reports are a reliable and verified data source it is recommended to collect data from additional sources to detect cases of child maltreatment. This is called triangulation and provides more reliable data, also because only 13% of cases of child maltreatment reached CPS[12,13]. This is especially necessary in prevalence studies rather than in RCTs [14]. Olds et al. used CPS reports and included data from emergency room visits and injuries. In the current study, inclusion of emergency room visits as an indicator of abuse and neglect was not feasible given the wide geographical distribution of participating subjects and hospitals. Euser et al. assessed child maltreatment by combining data from CPS with those of schools, well baby clinics, and General Practioners. Because of time constraints we were not able to use different sources to assess child maltreatment. The percentage of child maltreatment presented in our study may therefore be an underestimation of the actual prevalence of child maltreatment with only the more severe cases being reported to CPS. In addition, at the time of conducting this study it was not mandatory to report cases of suspected child maltreatment to CPS. However, professionals in institutions were requested to follow-up on guidelines in which they reported suspected cases to supervisors and discussed the consequences to increase awareness on this subject.

A third limitation is that we assumed that a CPS report is actually a case of child maltreatment. This assumption was based on additional information by CPS that 93% of CPS reports in the current study resulted in substantiated cases of maltreatment in independent CPS analyses, a finding which is generally also observed at the national level[15]. Furthermore, we checked this in a subgroup of children in our study population with a CPS report, this study showed that 96 % was indeed a valid case of child maltreatment.

Sample size calculation
Our primary outcome measure in this study is the prevention of child maltreatment. However, a-priori sample size calculation was based on finding an effect in smoking reduction or cessation, a precursor of effects of intervention on child maltreatment in Olds' study[4]. This might have led to miscalculation of the sample size where the power is underestimated or overestimated. This could bias the results. When the sample size is underestimated, the treatment effect would be smaller. In contrast, when sample size is overestimated and VoorZorg proves effective, some subjects unnecessarily received usual care instead of VoorZorg. We did a post-calculation of the sample size with intimate partner violence as outcome measure (unpublished data). These analyses showed that the sample size calculated a-priori on smoking was similar to the post-calculation on intimate partner violence. However, it is important to conduct a-priori sample size calculation on the primary outcome measure.

Reflections and future research

Recommendations
Recommendations for future interventions for young high risk families based on the findings of this study are described below.

For practice
The main question in this thesis is: *Should VoorZorg be implemented in the Netherlands to address risk factors during pregnancy and early childhood that compromise fetal and early child development among high risk pregnant women?* With the results described in this thesis we can say that the VoorZorg program, an intensive program from pregnancy until the child's second birthday, has showed to be effective on important outcomes like child maltreatment which is the main aim of the VoorZorg program. These results, together with results gained in the NFP study, show that nurse home visitations are effective in addressing problems prevalent in high risk families[2]. As David Olds pointed out: "*This pattern of results challenges the position that these kinds of intensive programs for targeted at-risk groups ought to be made available on a universal basis."[16]* VoorZorg should be implemented troughout the Netherlands. Even before the RCT results were published, several municipalities in the Netherlands released financial resources to appoint VoorZorg nurses in their region. The Netherlands Youth Institute, responsible for the implementation of VoorZorg, and municipalities which already participated under trial conditions, are very enthusiastic about the program.

We have studied a very complex population and observed several positive behavioral changes for participating mothers, but also for their children. With these results we have proved that a positive behavioral change is possible among this population of high risk women favoring the development of their children. However, the right intervention and the right tools are necessary for succeeding. With VoorZorg, these women are receiving an intervention in a sensitive period during pregnancy and the first two years of the child's life. Also important is that these women are approached in a positive way to empower them and that a trusting relationship is created between the VoorZorg nurse and the woman. These women are made aware of their own strength by supporting them and by increasing their self-efficacy. In addition, the VoorZorg nurse learned them that their positive behavioral change will affect their child in a positive way through their entire lifespan. Health care professionals should build on these key elements when reaching out to these vulnerable families.[17]

Early intervention
Health care professionals should be aware that primary prevention is more (cost-) effective than treatment at later age. Early intervention is important to address adverse childhood experiences and to prevent health and behavioral problems throughout the lifespan[1,2]. In this way professionals will contribute to a better future for the child and for the next generations. Furthermore, by reducing health problems, health related costs throughout the lifespan are reduced. In a study on the cost effectiveness of VoorZorg, it was concluded that VoorZorg was indeed cost-effective[18]. Therefore, early intervention should remain the focus of Youth Health Care for the prevention of adverse childhood experiences.

High- risk group
In this study we have identified a group of women with multiple risk factors. We did not expect that these women would have so many complex problems; 98 % had more than three risk factors (chapter 2). Their own history of growing up with low SES and abuse and/or neglect increases to the risk that they will abuse their children[19]. Furthermore, their current situation of poverty and intimate partner violence means that their child is at higher risk to be exposed to violence. Health care providers should be aware of this problem. These women need help tailored to their problems, and usual care alone is often not sufficient for this high risk population[20]. VoorZorg is an effective intervention that addresses these issues. Therefore, VoorZorg should be made available for all high risk pregnant women.

Untraceable women
In our study we came across a serious issue in terms of research and health services which is that a number of women were untraceable, not only for the researchers but also for Child Health Services. Because these services are well organized and families are usually highly compliant, it is hard to understand that so many mothers and children at high risk for abuse are untraceable. Tracing their whereabouts and monitoring children's health and mental development are prerequisite to the prevention of child maltreatment. The current study shows that in VoorZorg a higher retention is achieved, meaning that the nurses have a lasting relationship with these mothers at risk, enabling them to deal with the many challenges of raising a young child. We recommend that it should be made legally possible to track more of these mothers and children by Child Health Services, for example through their Citizen Service Number (Burger Service Nummer, BSN).

For research

Follow-up research
Although we have studied many outcome measures in this thesis, more research is needed to study long-term effects of the VoorZorg intervention Study. In the ACE study, Felitty et al showed that early intervention may have positive results during lifetime[21] whereas Olds et al. demonstrated that even in children whose fathers and mothers received intervention as a young child, positive effects were measured [2,22]. So far, we can conclude from the current study that VoorZorg is effective in the first three years of life, which is an important phase for the health and (later) development of the child and for the prevention of child maltreatment. Positive results are also expected at older ages of the child. So it is important to continue following this population of mothers and their children to demonstrate future effects of VoorZorg.

Address loss to follow-up
A high loss to follow-up among young high risk women and their children was observed[23]. Several researchers acknowledged this to be a limitation in their study, but - to the best of our knowledge - no researchers came up with an effective solution to remedy this issue. Little et al. described solutions for limiting loss to follow up, but these solutions do not always apply for high risk families[24]. An effective solution for this high risk population is needed, because a high loss to follow up can be detrimental as

it may affect the outcomes and generalizability of the study, especially when attrition is not at random. In our study, we encountered a high loss to follow up several times. Solutions for the VoorZorg study were: first, to train the interviewers to motivate the participants to stay in the study by using motivational interviewing. A second solution was that we contacted the participants at each follow up moment even if they declined to be interviewed at an earlier moment. A third solution was that we let them fill in a contact form with contact details of themselves and their social network. A fourth solution was that we had a bonus for the interviewers if they interviewed all women in their region, to increase the interviewers' motivation. This resulted in more women willing to participate. We did not study other solutions because of time and financial constraints. One idea was to create a website where participants could exchange information or tips with other participants. Social media can play an important role as they are often used by adolescents. Furthermore, we thought about an increase of incentives, such as a present for the child at their birthday to increase involvement with the research program and decrease attrition. Further research on this issue as well as exchange between researchers is recommended to address reasons for drop out and enhance the involvement of participants.

Recruitment of common ethnic groups
We observed that the percentage of Turkish and Moroccan women participating in the study is relatively low. Although the prevalence of teen mothers in this population is lower compared to other ethnicities in the Netherlands, there is a need for intervention in this population[25]. At the moment we are conducting qualitative research to study determinants of Moroccan and Turkish women to participate in the VoorZorg study. A possible solution to recruit Moroccan and Turkish is to create a trust relationship between the VoorZorg nurses and the woman already during the selection procedure and give more specific information. In addition, because the family is very important in this culture we have to study if and how we can involve the parents in the selection procedure. This subject should be investigated.

Evidence-based research
It is important to promote evidence based research in the Dutch Youth Health Care. Prinsen has described several interventions in the Netherlands that aimed at supporting parents in raising their child. However, most of these interventions were practice-based, rather than evidence-based[26]. Therefore, Prinsen concluded that we need more evidence-based programs in the Netherlands. These interventions are known to increase patient adherence to a program. Furthermore, it is better for the government to invest in evidence-based interventions [27]. The Academic Collaborative Centers in Child Health Care, collaboration between University Medical Centers and Youth Health Care Centers, can contribute to generate evidence-based research that can be implemented in daily care.

Pre-VoorZorg
More research is needed on how to improve pregnancy health outcomes among high risk families, because in the current study no effect was found of VoorZorg on pregnancy related health outcomes. In the NFP study, Olds et al. observed positive results only among a subgroup of young adolescents[28]. It is therefore necessary to enhance

NFP and VoorZorg with results of other studies in community health.

One suggestion is to start before the onset of pregnancy because starting during pregnancy may be too late to change certain behavior affecting pregnancy outcomes, like infections, cigarette smoking and alcohol use. In the Netherlands there is a growing interest in preconception care for - well-organized - families who would like to have a child.[29] But for this poorly organized high risk population who usually do not plan their pregnancy, we could introduce "Pre-VoorZorg" where high risk women are targeted in secondary school before they are pregnant. Such a program should not only address "safe sex" and contraception, but also educate these youngsters on the effect of risky health behavior on pregnancy outcomes and how it may affect the mental and physical health of their future child. With Pre-VoorZorg we can cover two important periods: 1) the preconception period and 2) pregnancy and the first two years of life.

International platform

The NFP intervention is at the moment evaluated in several countries. And with the positive results already shown in NFP and further substantiated in VoorZorg, it is to be expected that even more countries will start to evaluate this program. The Netherlands has organized a platform together with England and Germany to exchange information on NFP. And, an international platform has been established with the US, Canada and Australia, and European countries that are implementing the NFP. This platform can be expanded to all countries who are (willing to) implement(ing) this program. Together, these countries can learn about implementation of the program and what is needed to adapt the program to fit in their country. Furthermore, all countries evaluating the NFP can pool together their data to learn from each other and improve the program.

Key recommendations for implementing the Nurse Family Partnership

In the years that the VoorZorg study was conducted we have learned that if an intervention is being studied on a large scale it is important to consider the following key points:

- Sufficient financial resources are required for the implementation of the program and the effect study
- Communication between stakeholders is a must (also for obtaining data for monitoring the program)
- A platform is required for international partners who are evaluating the NFP
- Trained and qualified staff are necessary for the implementation of the program and the effect study
- Regular monitoring and improving the NFP program is required
- A trusting relationship between the mother and nurse are required
  It is key to stay in contact with the target population to address their needs and to improve the program where and if necessary
- And - most important - that there is a well-organized plan for adaptation, implementation and RCT about which stakeholders have expressed a commitment which they hold for a prolonged period of time.

General Conclusion

VoorZorg, a theory and practice-based nurse home visiting program, starting early in pregnancy until the child's second birthday, is effective in addressing risk factors operating during pregnancy and early childhood that compromise fetal and early child development. High risk women that received VoorZorg smoked fewer cigarettes, breastfed longer, and were less often victims and perpetrators of violence. In addition, child maltreatment was lower among women receiving VoorZorg and children were less likely to have internalizing behavior, which might be the first indication of a reduction in anxiety and stress in these young children due to the decline in IPV and child maltreatment. Furthermore, their home environment appeared to be enriched and better attuned to their needs. With these results we can conclude that VoorZorg is an evidence-based program for the primary prevention of child maltreatment as well as for associated risk factors for maltreatment among young high risk pregnant women and should be implemented throughout the Netherlands and should be extended to other countries as well.

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