



Early detection of parenting and developmental problems in toddlers: A randomized trial of home visits versus well-baby clinic visits in the Netherlands



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ABSTRACT

Objective. The early detection of parenting and developmental problems by preventive child health care (CHC) services in the Netherlands takes place almost exclusively at the well-baby clinic. This study assesses whether, compared to a visit to the well-baby clinic, a home visit improves early detection.

Methods. 4481 eligible 18-month-old children and their parents were randomized to either a visit to the well-baby clinic or a home visit in the period from December 2006 to January 2008. A CHC nurse held structured interviews using the validated Structured Problem Analysis of Raising Kids (SPARK). Differences in the percentage of children with high or increased risks of parenting and developmental problems as assessed by the SPARK were analyzed with ordinal regression. Secondary outcomes included the percentage of parents attending, parents' concerns, needs assessment by parents and CHC professionals and user experience.

Results. Response rates were 94.0% for the home visit group and 93.2% for the well-baby clinic group. Using the SPARK at home identified significantly more high-risk children compared to clinic visits (3.7 vs. 2.6%) and fewer children with increased risk (19.1 vs. 20.7%; overall $p = 0.028$). Home visits more often involved both parents and other children. At home, parents reported more concerns. Both parents and CHC nurses more often expressed the need for support and reported significantly better experiences at home.

Conclusions. Aided by a validated structured interview, CHC professionals detect more children with high risks of parenting and child-development problems during home visits than during clinic visits.

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Background and aims

An estimated 10–25% of children below the age of four experience varying degrees of problems related to parenting and/or psycho-social development (Bricker, et al., 2004; Briggs-Gowan, et al., 2004; Carter, et al., 2004; Reijneveld, et al., 2004; Staal, et al., 2011). This requires serious attention; the sooner an intervention takes place, the more effective it will be (Carneiro and Heckman, 2003; Hermanns, et al., 2005; Zerhouni, 2008). Early intervention should be based on accurate detection and suited to the problem identified (Committee on Psychosocial Aspects of Child

and Family Health and Task Force on Mental Health, 2009). For the early detection of parenting problems and developmental problems in young children, preventive child and youth health care (CHC) services offer an excellent environment: contact with these services is standard practice for young families in the Netherlands—families are automatically registered and services are highly accessible (Glascoe and Marks, 2011; Hoppenbrouwers, et al., 2010; Shuller, et al., 2004; Squires, et al., 2005).

To facilitate the early detection of parenting problems and developmental problems in young children, we recently developed and validated a structured interview: the Structured Problem Analysis of Raising Kids (SPARK) (Staal, et al., 2011; Staal, et al., 2013; van Stel, et al., 2012). It is aimed to promote shared decisions about further care made by parents and CHC professionals. The SPARK was developed in close collaboration with CHC nurses. This process and first results have been described in a previous publication (Staal, et al., 2011). The SPARK has proven to be a feasible and reliable instrument, with effective discriminative and predictive validity (Staal, et al., 2013; van Stel, et al., 2012).

In the Netherlands, early detection of parenting and developmental problems in CHC almost exclusively takes place at the well-baby clinic.

Abbreviations: ARCAN, Advice and Reporting Centers for Child Abuse and Neglect; CHC, Child Health Care; ITT, intention-to-treat; RCT, Randomized Controlled Trial; SPARK, Structured Problem Analysis of Raising Kids; YCA, Youth Care Agency.

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However, it is debated whether this is the best place; home visits may be more effective for early detection of parenting and developmental problems (Burgmeijer and Rijcken, 2001; Staal, et al., 2005). Assumed advantages of home visits are that more and better information may be obtained about a family's situation and housing conditions and about the interaction between child and parent(s), that more parents may attend and that parents and children may be 'more at ease', as they remain in their own familiar environment. However, evidence about the added value of home visits is lacking (Burgmeijer and Rijcken, 2001). During the past decades, home visits have been introduced and scaled down several times, so scientific evidence is needed to inform policy makers on this topic. This study addresses the question whether, compared to a visit to the well-baby clinic, a home visit improves the early detection of parenting problems and developmental problems in young children. To establish this, validated interviews were held on both locations. We also assessed user experience reported by parents as well as CHC professionals on both locations.

Methods

Design

We set up a non-blinded trial in which 18-month-old children were randomized for either a visit to the well-baby clinic or a home visit. All children living in the Dutch province of Zeeland in the period from December 2006 to

January 2008 were eligible for participation. Once a month, the municipal population register was consulted to identify all children who would reach the age of 18 months in the following month.

A practice assistant entered the children in a secured online randomization module provided by the Data Management Department of the Julius Center for Health Sciences, University Medical Center Utrecht. This module automatically randomized the children for a home visit or a well-baby clinic visit, stratified on CHC nurse (Fig. 1). Randomization results were communicated to the CHC nurses and the research team. The CHC nurse contacted parents for their child's regular check-up at 18 months and included an information letter explaining the aim of the visit and the study. For both locations (home and clinic), time available for the SPARK was 30 min.

Visits started with the SPARK, with the primary goal of assessing parents' concerns and deciding together which care was needed by the child and its parent(s). Interviews were followed by a request for informed consent to use recorded information for scientific research. This specific order of events was a deliberate choice; it could have been uneasy for the parents and the CHC nurse to discuss parents' concerns and necessary care after informed consent had been denied. As the situation concerned a regular visit that required active participation by parents and CHC nurse, blinding was impossible. The Medical Ethical Review Committee of the University Medical Center Utrecht gave a positive advice for this study, including the consent procedure (protocol number 06-290/C dated October 31, 2006). The study was registered at the Netherlands Trial Register (<http://www.trialregister.nl>), NTR1413.

The research team recorded all deviations from the randomization schedule, and nurses were asked to explain deviations. To ensure maximum response, parents who had not responded to the initial invitation were contacted via

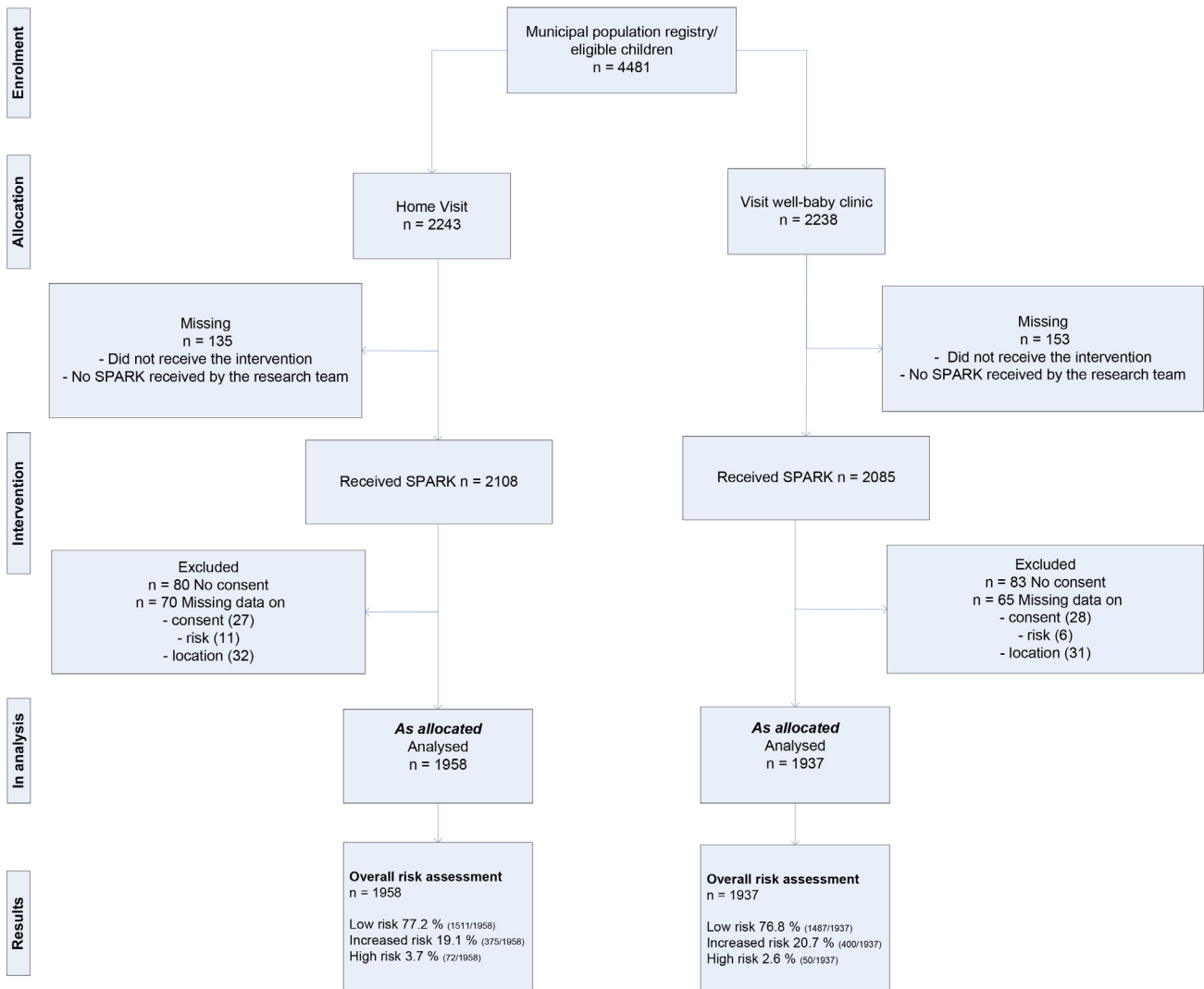


Fig. 1. Flow diagram of a randomized trial of home visit versus well-baby clinic visits in the Netherlands: Early detection of parenting and developmental problems in toddlers.

standardized protocol used in daily practice indicating how to handle non-attending parents, with or without notice.

To assess user experience, we administered a short questionnaire used earlier by Caris (Caris, 1997) on CHC nurses' skills to increase parents' parenting competences. Parents and nurses gave their opinions about the quality of the visit through questions about nurses' skills (divided into active listening, active talking and interview skills), reduction of tension and participation of parents. During November 2007, parents and CHC nurses were asked to complete this questionnaire online after each visit.

Outcome measures

The primary outcome concerned differences in the percentage of children with high or increased risks of parenting and developmental problems as assessed by the SPARK. Secondary outcomes included the percentage of parents attending, parents' concerns, needs assessment by parents, needs assessment by CHC professionals and user experience.

The SPARK is an interview held by CHC professionals with one or both parents about their concerns and resulting in a joint decision about any form of further care. During the SPARK development study, nurses were trained in using the tool during a four-hour training session followed by supervision sessions. A full description of the SPARK is available in the development paper (Staal, et al., 2011). In short, the SPARK consists of a structured dialogue on 16 subject areas covering the child, its family and the child rearing environment (Table 2). The SPARK uses a three-step model: Step 1: detection of concerns; Step 2: clarifying the characteristics and impact of the concerns in dialogue with the parents and discussing needs for support; Step 3: analysis and shared decisions on what to do next. After a visit, the CHC nurse makes an overall risk assessment based on information retrieved during the interview and on an elaboration of factors that might positively or negatively influence the risk assessment. These factors involve observation of parent-child interaction, growth, developmental status, the environment, and manifest problems.

A cross-sectional study with a 1.5-year follow-up showed the SPARK to be a feasible, valid and reliable instrument (van Stel, et al., 2012). The validation study was conducted with the second half of the children included in the RCT described in this article. Inter-rater reliability among trained nurses was good to excellent, with intra-class correlations varying between 0.6 and 1.0 for all SPARK topics and 0.93 for the risk assessment (van Stel, et al., 2012). The SPARK's risk assessment proved to be a strong predictor for confirmed reports of child abuse and neglect made to the Advice and Reporting Centers for Child Abuse and Neglect and also for confirmed reports made to the Youth Care Agency in the 1.5 years after completing the SPARK (odds ratio of high versus low risk: 16.3). The specificity and negative predictive value of risk for a confirmed report were high (high risk: 0.97 and 0.99, increased risk: 0.80 and 0.99) (Staal, et al., 2013).

Sample size calculation and statistical analysis

Based on risk scores found in the developmental study of the SPARK (Staal, et al., 2011) and what we assume to be a relevant difference, a difference of 3% in high + increased risk between home and clinic visits was used to calculate sample size. Detecting 3% difference with an alpha of 0.05 and a power of 0.90 required 2006 children per group (Friedman, et al., 1998). Taking 10% non-response into account meant that 4400 children needed to be included.

Population characteristics were analyzed using descriptive statistics. Differences in characteristics between risk groups and differences in attendance and place of visit were assessed using χ^2 , Anova or a Mann-Whitney *U*-test. The difference in the number of children with high, increased and low risks between the two locations was computed using ordinal regression analysis with a proportional odds model (O'Connell, 2006). The allocated visit and the stratification variable (nurse performing the visit) were used as independent variables. Due to the unequal distribution of the response categories, negative log-log was the most appropriate link function (lower categories more probable) instead of the better known logit link function (Garson, 2012; Norusis, 2005). Several authors have argued that no odds ratios can be obtained from a negative log-log model (Garson, 2012; Norusis, 2005). As a direct interpretation of the effect estimate is impossible, we used the observed (raw) difference in frequencies to interpret the difference between the trial arms. As randomization was done for the entire population before requesting consent, we did not have data from the group of non-responders and could not use the data from the no-consent group. The remaining group was analyzed on an intention-to-treat basis (Hollis and Campbell, 1999). Additionally, we performed a per-protocol analysis (i.e.

omitting the deviations from randomization). Furthermore, in order to understand the observed difference in risk assessment between home and clinic visits, we described which factors positively or negatively influenced the overall assignment of risk between the two conditions. User experience of parents as well as CHC nurses was analyzed using descriptive statistics. Differences in experience between location (home or clinic) were assessed using a Mann-Whitney *U*-test. Data analysis was carried out using SPSS version 20. A *p*-value below 0.05 was considered significant.

Results

During the study period, 4481 eligible children resided in the province of Zeeland. Of this group, 2243 were randomized to a home visit and 2238 to a visit to the well-baby clinic (Fig. 1). For 288 children (6.4%: 288/4481), no data were available. This was partly because parents were not or could not be invited (for example due to an omission by the CHC nurse or because the address in the municipal population register was incorrect) and partly because the research team had not received the SPARK (135 home visit vs 153 well-baby clinic visits). For another 135 children, the SPARK was incomplete: the CHC nurse had not included consent, risk or place of visit (70 home visit vs 65 well-baby clinic visits). For 163 children (3.6%: 163/4481), no consent was given (80 home visit vs 83 well-baby clinic visits). Analysis was carried out on 3895 children (1958 home visit vs 1937 well-baby clinic visits). Population characteristics were similar in both groups; these are presented in Table 1.

Of the planned home visits, 90.0% ($n = 2018$) were performed at home, 0.9% ($n = 20$) were performed at the clinic, 3.1% ($n = 70$) were excluded from analysis because of missing data and 6.0% ($n = 135$) were not performed due to non-response. Of the visits to the well-baby clinic, 87.4% ($n = 1956$) were performed at the clinic, 2.9% ($n = 64$) were performed at home, 2.9% ($n = 65$) were excluded from analysis because of missing data and 6.8% ($n = 153$) were not performed due to non-response. The difference in deviation from the assigned location proved to be significant ($p < 0.0001$). Reasons mentioned by nurses for deviating from the assigned location were strong suspicions that a parent would not show up at the clinic, the wish to see the home environment, the wish to observe child and parent interaction in their own home, miscommunication, and finally parents insisting on changing the location of the visit. A closer look at the group that deviated from the assigned location ($n = 84$) showed a different distribution of risk assessment and consent. This group contained more children with increased (36.9%: 31/84) and high risks (9.5%: 8/84); for 15 children, no consent was given (17.9%: 15/84). These differences were strongest in the group that deviated from assignment to the well-baby clinic.

In most cases, mothers were present (home visit 97.7%: 1911/1958 versus clinic visit 95.0%: 1841/1937; $p < 0.001$); fathers were present in fewer cases (home visit 18.6%: 364/1958 versus clinic visit 15.5%: 301/1937; $p = 0.011$). Both parents were present during 16.9% (330/1958) of the home visits and in 11.4% (220/1937) of the clinic visits ($p < 0.001$). Other children from the same family were also more often present at home (28.0%: 549/1958) than at the clinic (22.8%: 442/1937) ($p < 0.001$). Completing the SPARK took an average 34.1 min (sd 11.6 min.) at home and 25.2 min (sd 8 min) at the well-baby clinic.

The first step of the SPARK involves asking parents whether they have experienced any concerns. Topics mentioned the most were 'infancy review' and 'family issues' (Table 2; column 2). Parents generally reported their perceived concerns more often at home than during a visit to the clinic. The second step in administering the SPARK concerns asking parents as well as the professional about the currently perceived need for support. Parents expressed more need for support at home (Table 2; columns 3–4). The need for advice/consultation was most prominent in topics related to child-parent interaction (parenting, behavior) and health/development (emotional development, language/speech/cognitive development, somatic health, motor development) (Table 2; column 3): for each topic, 15–30% of the parents needed

Table 1
Population characteristics.

Child characteristics (percentages)	Home visit n = 1958	Well-baby clinic visit n = 1937	p-value ^a
Male/female	52.8/47.2	53.1/46.9	0.9
Place in family order:			0.05
First child	43.6	40.2	
Second child	35.0	37.3	
Third child	13.2	14.3	
Four or higher child	8.2 (max 12 children)	8.2 (max 15 children)	
Family characteristics:			0.3
2-parent household	92.1	93.0	
1-parent household	3.1	3.0	
Shared household	2.7	2.2	
Other (foster-family/adoption/divorcement/grandparents)	2.0	1.8	
Parent characteristics:			
Age mother (mean in year, sd)	31.95 (sd 4.9)	31.64 (sd 4.9)	0.3
Mother age < 20 yr by birth of this toddler	1.0 (n = 19)	1.5 (n = 30)	
Age father (mean in year, sd)	34.74 (sd 5.7)	34.38 (sd 5.5)	0.2
Father age < 20 yr by birth of this toddler	0.5 (n = 10)	0.7 (n = 13)	
Ethnicity: non-Dutch mother	8.4	7.7	0.4
Ethnicity: non-Dutch father	7.8	7.4	0.6
Language: non-Dutch used at home by mother	8.8	8.3	0.5
Language: non-Dutch used at home by father	7.7	7.1	0.5
Education:			0.3 mother 0.2 father
Low education	19.4 mother (including 2.1 very low)	20.7 mother (including 2.4 very low)	
	22.4 father (including 1.5 very low)	23.6 father (including 2.4 very low)	
Intermediate education	54.0 mother 49.0 father	53.9 mother 49.5 father	
High education	26.6 mother 28.6 father	25.4 mother 26.9 father	
Employment:			0.1 mother 0.7 father
Employed	69.8 mother 94.3 father	67.3 mother 94.6 father	
Unemployed	0.6 mother 0.7 father	0.7 mother 1.0 father	
Unemployable/unable to work	0.9 mother 0.8 father	0.3 mother 0.6 father	
Housewife/houseman	24.2 mother 0.6 father	27.7 mother 0.6 father	

* Using Kruskal–Wallis test, with exception of age: using ANOVA.

some kind of support. ‘Family issues’ scored highest in terms of intensive or immediate help needed. The third step of the SPARK concerns analysis and decisions on future steps. Most follow-up actions can be

taken by CHC professionals themselves within the framework of their regular contacts (home visit 79.9% versus clinic visit 77.9%); however, additional contacts were required for 19.9% versus 22.0% of the children.

Table 2
Parents’ concerns and perceived need of support.

Domains: (percentages)	Parents’ concerns:	Perceived need of support			
		Concerned/very concerned ^b	From parents view ^a :		From professional view ^a :
		Information wanted/personal advice/counseling ^b	Intensive help/immediate intervention required ^b	Information/personal advice/counseling ^b	Intensive help/immediate intervention required ^b
Infancy review ^c	17.1/14.6	8.0/6.1	0.8/0.8	9.1/7.8	0.6/0.7
Health and development					
Somatic health	6.8/5.9	14.1/12.9	0.8/0.6	19.8/18.7	0.6/0.7
Motor development	1.6/1.3	14.5/11.0	0.5/0.2	24.4/20.4	0.4/0.4
Language, speech and cognitive development	1.1/0.8	24.4/20.7	0.1/0.2	43.0/38.8	0.1/0.3
Language use of parents ^d	0.2/0.2	3.6/3.3	0.1/0	7.0/7.3	0/0.1
Emotional development	2.6/3.4	25.0/23.1	0.2/0.3	41.1/37.8	0.3/0.3
Child–parent interaction					
Contact between child and others ^e	0.9/0.5	9.2/8.6	0.2/0.1	17.4/15.7	0.1/0
Child behavior	4.5/5.3	30.7/28.4	0.4/0.6	49.5/45.1	0.4/0.9
Parenting approach	2.7/2.5	25.5/23.3	0.6/0.6	38.1/36.9	0.7/0.9
Developmental stimulation ^f	0.5/0.5	14.2/11.9	0.2/0.1	28.8/24.3	0.2/0.1
Time spending ^g	1.0/1.1	7.4/6.5	0.4/0.2	14.4/12.8	0.4/0.2
Family and environment					
Living environment ^h	4.0/2.8	3.3/3.0	1.1/0.5	8.8/6.1	0.5/0.5
Social contacts ⁱ	1.8/1.3	3.8/3.1	0.2/0.3	7.6/5.9	0.2/0.3
Day care for child	1.6/1.9	3.1/2.5	0.4/0.2	6.3/5.2	0.3/0.2
Concerns communicated by others	1.5/1.0	3.3/2.8	0.2/0.2	5.7/5.2	0.2/0.4
Family issues	9.7/8.8	8.7/8.4	1.8/1.1	15.0/14.5	2.1/1.5
Was any topic forgotten?	1.6/0.8	6.6/3.6	0.2/0.1	7.3/4.5	0.2/0.2

^a The 6-point assessments of parents and professional were dichotomized for readability; category ‘no help needed’ was omitted.

^b Home visit (n = 1958)/visit well-baby clinic (n = 1937).

^c Reviewing past issues and discussing any problems from the infant period that are still relevant.

^d Second language, mother tongue.

^e Both children and adults.

^f And early pre-school education.

^g How the child spends his/her time.

^h In and outside the home.

ⁱ And informal support.

Table 3
Factors elaborated by CHC-nurses before risk assessment.

	Home visit (n = 1958)		Well-baby clinic visit (n = 1937)	
	Positive influence	Negative influence	Positive influence	Negative influence
Child				
Developmental delays/physical health problems from infant period	20.9% (409)	13.3% (260)	20.7% (400)	11.6% (224)
Motor development	55.5% (1087)	7% (137)	55.5% (1074)	5.9% (115)
Speech and cognitive development	48.2% (944)	11.2% (219)	46.4% (899)	10.6% (206)
Eating and drinking habits	29.9% (586)	13.4% (263)	25.3% (489)	10.6% (206)
Behavior	59% (1155)	6.3% (123)	57.5% (1113)	8.2% (159)
Interaction/exemplary behavior between parent and child	59.9% (1173)	3.7% (72)	55.5% (1076)	3.7% (72)
Child's attachment	55.9% (1094)	2.2% (42)	48.5% (940)	1.8% (35)
Other	6.5% (128)	5.9% (115)	3.2% (62)	7.6% (148)
Living environment				
Atmosphere at home	60.5% (1185)	2.2% (42)	35% (677)	2% (38)
Safety	29.7% (582)	3.2% (62)	5.8% (112)	1% (20)
Hygiene family members	35.4% (693)	0.7% (13)	15.2% (295)	0.6% (12)
Hygiene home	35.9% (703)	1.8% (36)	5.7% (111)	0.6% (11)
Furnishing	33.9% (663)	2.8% (54)	6.3% (122)	1.2% (23)
Parent(s)				
Difficult infant period experienced	16.9% (330)	15.9% (311)	18% (349)	14.4% (278)
Competence of parents	51.8% (1014)	4.6% (90)	46.1% (893)	5.5% (107)
Parents disagree among themselves	21.5% (420)	5.2% (102)	19.4% (375)	5.2% (100)
Amount of social support	40.3% (788)	6% (117)	35% (677)	5.8% (113)
Financial obstacles	14.2% (277)	4.1% (80)	11.3% (218)	3.6% (70)
Chronic health problem	10.5% (206)	4.7% (91)	8% (155)	4% (77)
Addiction	9.4% (184)	0.7% (14)	7.7% (149)	0.3% (6)
Psychiatric problems	8.3% (163)	3.9% (77)	7% (135)	2.8% (55)
Negative childhood experiences	8.7% (170)	3.6% (70)	7% (136)	2.9% (57)
Openness during the visit	49.6% (972)	1.4% (27)	44.1% (855)	2.2% (43)
Other	5.7% (111)	9.4% (184)	4.2% (82)	11.6% (224)

Finally, the professional formulates an overall risk assessment (Fig. 1). The probability of having a high, increased or low risk proved significantly different between the two locations ($p = 0.028$). The per-protocol analysis (omitting deviations from randomization) gave a similar outcome ($p = 0.030$). For high risk, the observed difference was 1.1% (home visit 3.7%, clinic visit 2.6%). Conversely, the observed difference for increased risk was 1.6% (home visit 19.1%, clinic visit 20.7%).

To better understand a CHC nurse's risk assessment, we investigated which factors nurses elaborated upon before assigning overall risk. The data in Table 3 suggest that the major difference between home and clinic lies in better observations of home surroundings (seeing, feeling and smelling a home's atmosphere, safety, hygiene and furnishing) and greater trust between parent and nurse (less openness shown by parents at the well-baby clinic and more problems reported during home visits, e.g. parental addiction or psychiatric problems, negative childhood experienced by parents, financial obstacles and chronic parental health problems).

The survey on user experience was completed for 211 contacts. Parents reported on 100 contacts and CHC professionals on 179 contacts. After incomplete surveys had been removed, 86 parent-completed and 177 CHC nurse-completed surveys remained. User experience showed that, according to nurses, parents were more active during interviews at home ($p = 0.046$), that nurses were more satisfied with home visits ($p = 0.014$), and that they felt more rushed during the interview at the clinic ($p < 0.001$). Parents reported higher satisfaction levels during home visits compared to visits to the well-baby clinic ($p = 0.017$).

Discussion

This study assessed whether, compared to visits to the well-baby clinic, home visits improve the early detection of parenting and developmental problems. Assuming that the CHC professional would already have identified high-risk children, we expected the largest difference to occur in the increased risk group. However, we found more high-risk children in the home visit group and more children with increased

risk in the clinic visit group. The 'extra' increased-risk children in the clinic may have been misclassified because less information was available. The clinical relevance of finding more high-risk children is that children in this group have multiple problems and are more problematic than children in the other groups, as shown by the many confirmed child maltreatment reports (Staal, et al., 2013). The percentage of children with problems as identified by the SPARK is in line with findings from literature (Zeijl, et al., 2005).

We observed a significant difference in deviations from protocol: more visits planned at the clinic were performed at home than the other way around. The reasons for deviating from protocol showed how CHC nurses act in daily practice. If they suspected that a parent of a probably high-risk child would not show up at the clinic, they performed a home visit. The nurses considered seeing a probably high-risk child more important than carrying out the study as instructed, despite instruction, control and feedback received from the research team.

Our findings support the assumed advantages of a home visit. More and better information can be obtained about family situations and housing conditions and about parent-child interaction; more parents are reached, and parents and children feel 'more at ease' in their own familiar environment. Additionally, parents with simple parenting questions seemed to profit from a home visit, as they reported more concerns at home and asked more information or advice.

The small number of children that could not be contacted is indicative of the strength of CHC in the Netherlands, which reaches up to 98% of all children in their first year and 90% of all children between 1 and 4 years of age. Home visits for the entire population are well known. If such visits with SPARK are only initiated upon indication (as suggested by policy makers to keep costs down), we doubt whether such high response rates will be maintained, because home visiting programs on indication face barriers in terms of gaining access to people's homes, as demonstrated in a review by Peacock (Peacock, et al., 2013).

For the SPARK interview itself, we observed a difference in duration. During home visits, additional time was available for starting any interventions agreed upon by parent and nurse. This was impossible in the clinic, due to strict planning, tight schedules and the challenge of keeping toddler, parent and nurse concentrated in a clinic setting for more

than 30 min. During clinic visits, new appointments needed to be made to take additional action. We assume that the additional time available explains most of the observed difference in duration.

Administering the SPARK takes more time than what is generally available during regular visits to a Dutch clinic. Furthermore, home visits require travel time and involve costs. Therefore, the outcome of the SPARK in extended visits to the clinic should be compared with a risk assessment of parenting and developmental problems made during regular visits. Cost-effectiveness also needs to be assessed.

Existing instruments developed for use in home visiting programs include the scale developed by Grietens, et al. (2004) and the Home Observation for Measurement of the Environment (HOME) (Caldwell and Bradley, 1984). Both are observation instruments, with the Grietens scale aimed at the detection of child abuse and the HOME at assessing the home environment. Compared to the SPARK, these tools lack the broad scope on parenting and development, and they lack the joint perspectives of parents and professionals. A number of systematic reviews and meta-analyses discuss the effectiveness of home visiting programs for disadvantaged families (Olds, et al., 2007; Sweet and Appelbaum, 2004), with a focus on preventing child maltreatment (Geeraert, et al., 2004; MacLoad and Nelson, 2000) or on children's health and developmental outcomes (Peacock, et al., 2013). However, selection for these home visiting programs does not include any assessment of home environments and context.

Our study has several limitations. First, there were deviations from randomization. We would have preferred a 'contamination-adjusted intention-to-treat analysis', as this better estimates the efficacy of the intervention (i.e. location) in children and parent(s) who actually receive it (Sussman and Hayward, 2010). Compared with an ITT analysis, such an analysis better reflects how nurses work in daily practice, but it proved impossible to combine with ordinal regression analysis. Second, although the province of Zeeland closely resembles other parts of the Netherlands, it is not representative of highly urbanized multi-ethnic areas found elsewhere in the country. The usefulness and validity of the SPARK in such areas need to be assessed. Third, due to financial constraints, we were unable to assess the long-term impact of the SPARK on health outcomes or costs. Long-term outcomes and cost-effectiveness need to be assessed in further studies. Still, our research shows that the SPARK does indeed offer a number of advantages, such as improved detection of parenting problems at an early stage and care suited to parental needs.

Conclusions

CHC professionals using a validated structured interview detect more children with high risks of parenting and child-developmental problems during a home visit than during a visit to the clinic.

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Potential conflict of interest

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Contributor's statement

Ingrid Staal conceived the study, participated in its design and coordination, collected the data, participated in their statistical analysis and

drafted the manuscript. Henk van Stel conceived the study, participated in its design and coordination, performed its statistical analysis and helped to draft the manuscript. Jo Hermanns and Guus Schrijvers participated in the design of the study and critically revised the manuscript for important intellectual content. All authors have read and improved the final manuscript.

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