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ZonMw

Costs and benefits of the StartingTogether App for home visits in preventive child health care

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Costs and benefits of the StartingTogether App for home visits in preventive child health care

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Date	31 maart 2019		
Authors	O. Blanson Henkemans, K. van der Ploeg	E. Burger-Pols,	E. Vlasblom,
Project number	060.16762		
Report number	R11482		
Contact TNO	Olivier Blanson Henkemans		
Telephone	+31 (0)888 66 61 86		
E-mail	olivier.blansonhenkemans@tno.nl		

Healthy Living
Schipholweg 77-89
2316 ZL Leiden
P.O. Box 3005
2301 DA Leiden
The Netherlands

www.tno.nl

T +31 88 866 90 00

infodesk@tno.nl

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Summary

Background: The StartingTogether program (in Dutch SamenStarten) is a family-centred method for early identification of social-emotional and behavioural problems in young children. The StartingTogether App (ST App), offering textual and visual conversational support for nurses and parents and tailored education and information on social services. Earlier study showed that this app contributes to parents' satisfaction with home visits. The hypothesis is that also may have an positive effect on effectiveness of home visiting programs on child outcomes.

Methods: To validate this hypothesis, a study is conducted on the costs and benefits of the ST App, in terms of health care time (e.g., number of home visits and contacts between families and PCH), costs of the app, and effectiveness in resolving family issues and improving children's' development.

Results: In terms of costs, the costs associated with the implementation and licensing costs of the ST App may be earned back in three and a half years. In our study, the amount of contact time is required to resolve family issues and to meet care needs is less with the ST App, compared with usual care. This means that after three to four years, healthcare organizations whose nurses use the ST App, will start to reduce the costs of their care. In terms of other non-monetary benefits, significantly more care needs and family issues were identified with the ST App, compared to usual care. Parents in the ST App group were adhering significantly more often to the nurse's advice on how to cope with the most severe family issues and or care needs, as compared to usual care.

Conclusions: This study shows that the benefits of the ST App outweigh the costs. Main benefit was the reduction in the required number of contact (e.g., face-to-face, telephone, e-mail) to resolve family needs or issues. Moreover the app leads to higher adherence in parents to advice regarding the more severe issues.

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1 Background

In the Netherlands, approximately 10% of young children experience emotional and behavioral problems, such as displaying disruptive behaviour, being socially withdrawn, or lacking concentration (Hornman et al., 2016). Two out of five parents have concerns about their young child's psychosocial development for which they feel professional assistance is needed (ref Crone et al., 2016). Many children grow up in a stressful environment, for example due to marital conflict, economic hardship, or parent psychological distress (Masark et al., 2017). The combination between these child problems, parental concerns and less favourable environmental context in which they grow, up have a large impact on the child's development and wellbeing (Britto et al., 2017). Early identification and intervention on social-emotional and behavioural difficulties, supporting parents and optimizing the environment of the child are vital in providing all children with an optimal start in life (Black et al., 2017).

In the Netherlands, the Dutch preventive child health care (PCH) are tasked with monitoring of the child's development, to early detect health and social problems, and to provide advice and information on health, growing up safely, and are tasked with parental concerns of raising children. PCH professionals, including doctors and nurses, monitor children's development during routine assessments at well-child clinics and offer additional interventions whenever necessary (Siderius et al., 2016).

The StartingTogether (ST) program (in Dutch SamenStarten) is a family-centred intervention method for PCH, which aims to contribute to the early identification of social-emotional and behavioural problems in children, aged 0-4 years (Tan et al., 2008). The program focuses on building a relationship of trust between the professional and the parent(s), mapping the situation in which the child is growing up, and empowering parents, by expanding their knowledge and improving their skills and self-efficacy (Dijkstra et al., 2004). The program is based on the evidence-based Sure Start program in the UK. Similar to the Sure Start program, ST offers parenting support through home visits and, if necessary, referral to social services in the community. Home visits have been proven to be an effective approach for providing parental support, stimulating children's development and improving their health (Peacock et al., 2013). In the Netherlands, this family-centred care approach (also referred to as FCC-JointStart) has been found to contribute to better attuning PCH to the parents' preferences (Hielkema et al., 2014) and more and earlier identification of risks for social-emotional problems and of families that need additional care (Reijneveld et al., 2017)).

Home visit play a key role in the ST program for outreaching and parent empowering child health care. However, previous evaluations of the program in the Netherlands showed that nurses experience a number of challenges during these visits (Tan et al., 2008; Dijkstra et al., 2004), namely:

1. Identifying the family situation and parents' associated care needs can be arduous. Parents have difficulties verbalizing their needs. Also, nurses are overwhelmed by a multiplicity of family issues and lack knowledge of how to resolve these issues;
2. Nurses lack materials, such as a guide for conversational techniques, to provide information and communication tailored to the family situation and care need;
3. Nurses do not always have the interventions at their disposal to apply during the home visit;
4. Parents are not always referred to relevant social services. An overview of the available services in the community is missing.

These challenges obstruct the identification of personal and environmental factors, influencing the children's social-emotional and behavioural development. Also, they hinder the empowerment of parents and their ability to cope with their family situation independently.

2 StartingTogether App

To mitigate the challenges experienced during the ST home visits, the StartingTogether App (ST App) was developed. It is a Webapp, running on for example a Tablet PC, which the nurse uses during the home visits, in collaboration with the parent. It covers: 1) textual and visual conversational support for nurses and parents, 2) education and information on social services in the community, tailored to the care need and the living location, 3) email reports of the home visit for both the parents and the nurse and 4) tools for the nurse to prepare the home visit. See section Intervention for further details.

A previous study showed that the ST App contributes to the positive experience with the PCH home visits and improves communication between nurses and parents (Blanson Henkemans et al., 2018). Also, results suggested that application of the ST App in home visits improves parents' knowledge and skills to cope with their family issues, and reduces rates of potentially redundant care. Especially for home visits to parents with a low educational level, the app had an additional value.

3 Aim

The positive evaluation of the ST App by nurses and parents warrants further investigation. Decision makers, when considering the implementing of the ST App, require further information on the costs of the implementation and the benefits of using the ST App. Therefore, our research aim is to establish the costs and benefits of the ST App and aid PCH-organisations and policy makers to make well informed decisions about the application of the ST App.

4 Methods

4.1 Cost-effectiveness analysis

To fulfil our research aim, we conducted a *Cost-effectiveness analysis* (CEA). This method is a form of economic evaluation that has become a central policy tool in many health care systems (Thomas & Chalkidou, 2016). It can typically help decision-makers with fixed resources to compare programmes that produce different outcomes. It aims at offering an informed decision on which programme or combination of to choose to maximize the total health benefits produced.

Decision-makers might be reluctant to spend money on implementing eHealth applications, especially when there is uncertainty about its benefits. CEA in eHealth enables policy makers and decision makers to determine if the eHealth application is worthwhile. Also, CEA provides a basis for developing business models to fund the development and implementation of innovative eHealth applications. In order to provide decision makers insight into the costs and benefits of the ST App, we will perform a CEA on the ST App.

4.2 Study design

The study consisted of a Randomized Controlled Trial (RCT) to evaluate the effectiveness of the ST App when applied during home visits. The research questions are:

- A. What is the effect of the ST App for PCH applied during home visits on the efficiency of signalling care needs, offering advice and referral and the empowerment of parents to cope with their family issues?
- B. What are the costs and benefits of the use of the ST App?

We hypothesize that the ST App has an effect on duration and frequency of contact between healthcare professionals and parents, on the compliance with advice and referrals by parents, on the effectiveness of care within six months. More specifically our hypotheses are that compared to usual care:

1. The ST App will require extra time during the first home visit and preparation, but less time for registration afterwards.
2. The ST App will lead to less frequent and shorter follow-up contacts.
3. Parents who use the ST App will comply more often with advice from the PCH professional.
4. Parents who use the ST App will comply with referrals made by PCH professionals more often.
5. Parents will report more family issues and/or care needs with the ST App.
6. The family issues and/or care needs are resolved equally often or more often within six months when using the ST App.
7. The severity of the family issues and/or care needs has reduced equally or more within six months when using the ST App.

4.3 Recruitment of participants

The participants were PCH nurses in the Dutch region of Noord-Holland Noord. They made home visits to parents with children aged 0-4 years in which family issues and/or care needs were identified. A total of 9 PCH teams (approximately 80 nurses) were invited to participate in the study, of which all teams were included and of which 50 nurses volunteered to participate. Reasons not to participate included lack of time or capacity to participate in the study. There were no exclusion criteria.

4.4 Intervention

The ST App has been described extensively elsewhere (Blanson Henkemans et al., 2018). In short, the ST App is a visual conversation support application for nurses and parents. The parents first select one or more pictograms that illustrate the topic(s) they want to discuss with the nurse, eliciting a conversation about their family situation. Then, they value these issues with the use of emoticons. Parents can rate their current emotional state and their desired emotional state on a scale. They then determine their personal care needs. These ratings are meant to promote self-reflection, prioritization of their needs and self-activation. Also, they can determine what they can do themselves, with the help of their social environment, to achieve their desired future emotional state. In the final step, nurses and parents discuss and choose relevant educational materials (i.e. websites, flyers and videos), and social services in the community, tailored to the family's situation, need and living location. This is meant to facilitate shared decision-making (Stiggelbout et al., 2015). The session is saved on a server of the supplier of the ST App and with the parent's consent, a report is sent to the nurse for registration in the child healthcare file. Parents can access the session through a login code, for example for a follow-up session. The ST App is based on context mapping and solution focused (brief) therapy (SFBT) (Sleeswijk-Visser et al., 2005; Kim, 2008).

Since the implementation in 2013, the ST App has been improved on a number of aspects. These improvements are based on the outcome of the previous study and on multiple co-design sessions with the user group, i.e., nurses and parents. Results of the previous study showed a number of issues. Namely, the overall usability could be improved, nurses had some difficulty starting with the app and introducing it to parents, it needs to better fit their care process, including parents setting personal goals, and multiple consultations with parents to monitor goal achievement and additional care needs, ensuring the privacy of the parent, and finally there was a need for a content management system (CMS) to manage the educational materials in the app (Blanson Henkemans et al., 2018). In the co-design session, we proposed multiple designs of functions addressing these issues. Participants could collectively decide which design best matched their preference and if necessary, how it could be further refined to improve the apps usability.

The original interaction flow was used as a template for the improved app, covering: 1) selecting pictograms representing the topic they would like to discuss; 2) rating the pictograms do explain how they feel about the topic; 3) providing education materials; 4) keeping a record of the home visit; 5) e-mail the record to the parent and nurse. To begin with, we improved the usability of the app. We changed the look-and-feel (i.e., shapes, colours, texts, frames) to provide a better overview. Also, we made it more responsive (i.e., increased step-by-step interaction with meta-information in the different functions) to make the app more intuitive in use. Moreover, we added an introduction page (Figure 1) with two videos, displaying testimonials of parents about the app. This was to make it easier for nurses to introduce the app and explain its goal and working and motivate using the app through other parents' previous positive experiences. The rating function was changed as follows. In the original version, the parent could specify per topic their feeling across four emotion scales (i.e., sad/happy, angry/calm, insecure/secure, and shameful/proud). Parents' emotion did not always match one of these four scales, obstructing the conversation with the nurse. As a result, we decide to only offer one scale, i.e., the overall level of happiness, on a scale from 1 through 10. Taking into consideration the requirements to set goals by parents, as illustrated in Figure 2, per topic it now was made possible to define the current level of happiness and the goal level (e.g., at the moment the happiness level is 3 and the goal level is 8). Also, topics could be prioritized, based on the levels of happiness. After determining topics and level of happiness, on the summary page, parents and nurses could describe the family situation and care needs (Figure 3). In regard to providing education materials, parents and nurses were offered multiple search options. The first one was based on the selected pictogram.

Pictograms were tagged (e.g., pictogram displaying a woman breastfeeding had the tags breastfeeding, nutrition, and baby milk) and when this topic was selected, on the educational material page, relevant websites, video's folders and organizations available in the app were displayed. Second, users could search materials by entering a keyword to search all materials in the app. Finally, if no adequate materials were available in the app, users could browse the internet through the app. All selected materials, including new websites found on the internet could be added to the report (Figure 3). The app also came with a CMS for the PCH organization to add new materials and edit and remove existing educational materials.

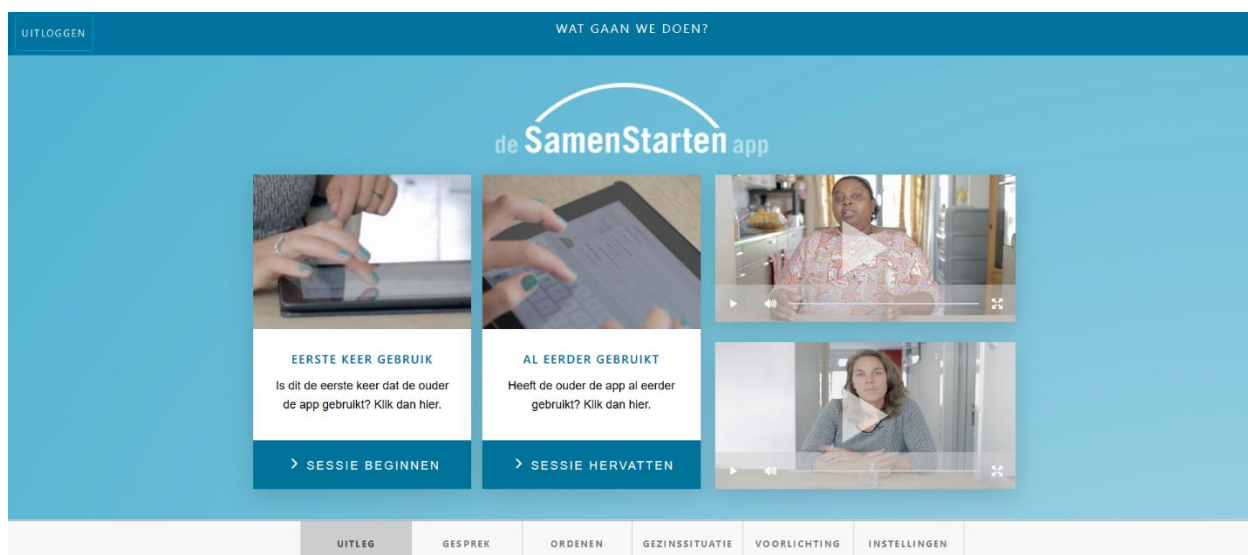


Figure 1. Opening page StartingTogether App



Figure 2. Selecting topics by parent to discuss with the PCH professional

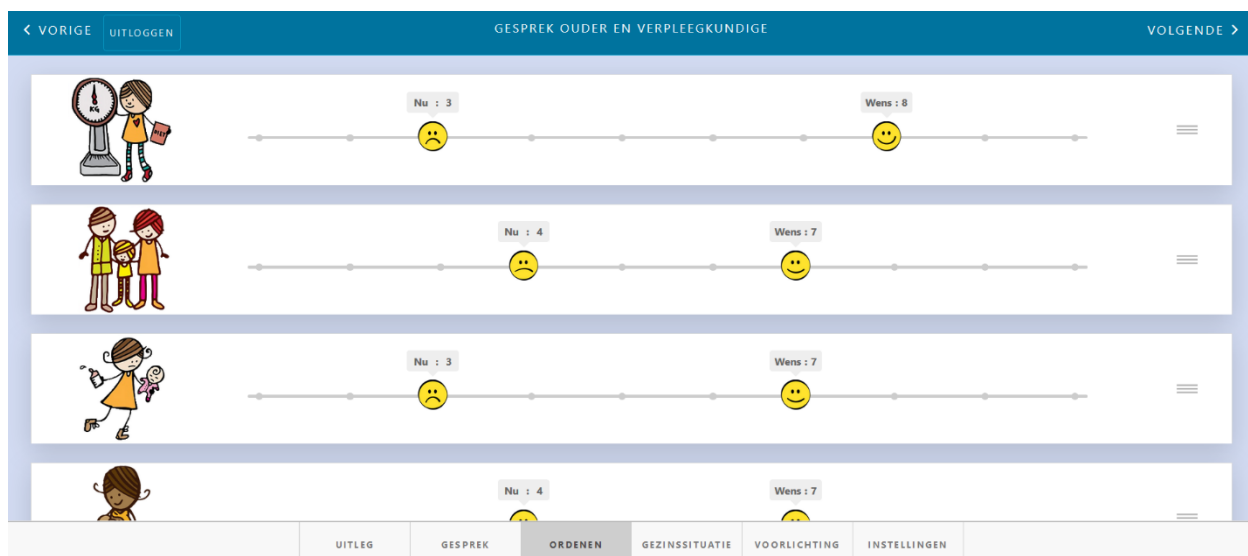


Figure 3. Per selected topic, scoring current situation and goal situation, and prioritizing the topics,

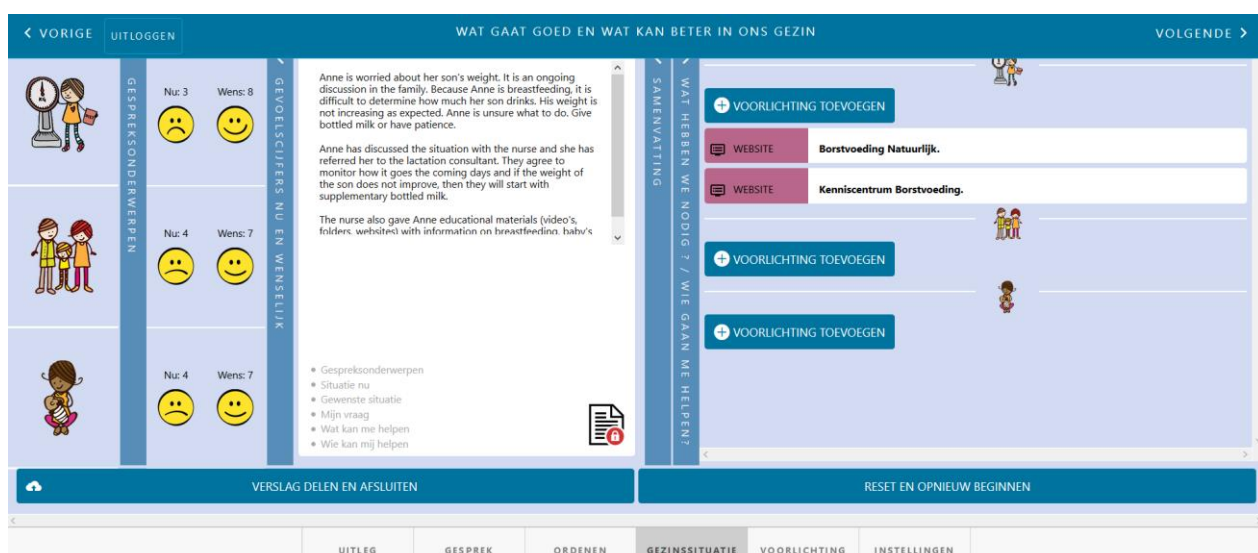


Figure 4. Selecting educational materials (right), writing a report of the home visit (center) and sending the report to parent and PCH professional

To adhere to privacy requirements, including those prescribed by General Data Protection Regulation (GDPR), such as permission of persons to process their data, throughout the app, parents were asked for an informed consent for recording the data in the app. On the introduction page, parents were informed about how the data was handled and they were asked for permission. At the end of the home visit, parents were first asked if they wanted the data collected to be deleted or if they wanted it to be stored only for them to access it and if they allowed the nurse to access the data for their dossier and follow-up consultations with the parent. Through the app, if data was collected, an icon was shown displaying a document with a lock, such as shown in Figure 4, in the centre textbox at the bottom at the right.

4.5 Care as usual

The professionals in the control group received an instruction on the study procedure. They performed home visits according to care as usual, which involves the Starting Together program (without the ST App).

4.6 Data collection

The RCT was conducted over a period of 21 months (October 2016 through January 2018). As illustrated in Figure 5, teams of nurses were assigned to the intervention group (STA), which made home visits with the ST App, or the control group, which made home visits as usual (CAU). We applied a stratified randomization method: five teams were randomly allocated to the intervention group and four teams were allocated to the control group. The sizes and characteristics (i.e., active in city or in rural area and type of clients in regard to background, socio-economic scores) of the different teams were comparable between the two groups. Per team there were between 1 and 6 nurses, who participated in the study. In the intervention group, 26 nurses participated, of which four dropped out early. In the CAU group 24 nurses participated, of which six dropped out early. Reasons of early drop out were obtaining a new position within or outside the PCH organisation (N=5), prolonged illness (N=2) or unknown (N=3). All participating nurses received a two-hour instruction on how to complete the survey and administer it to the parents. The STA nurses received a four-hour training to use the ST App, covering a theoretical and practical module, and a two-hour meeting after 2-3 months to assess and resolve any (technical) issues in using the app and exchange tips and tricks.

Over a period of 15 months the nurses in the STA condition made 59 home visits to unique families and the nurses in the CAU made 77 home visits to unique families. After each home visit and after each contact in the following 6 months, nurses completed an online survey about the home visit. After 6 months, they completed a concluding online survey. Also, data registered in the digital PCH file of the child was collected anonymously.

4.7 Background characteristics

Data on background characteristics of parents were collected in the first survey after the first home visit. Background characteristics (nurse-reported) were: child's age and gender (male/female), ethnic background (Dutch/non-Dutch); primary language spoken at home (Dutch/non-Dutch); education level (low/middle/high); and family composition. The parents' ethnic background were defined in accordance with the definition established by Statistics Netherlands (CBS 2016). Highest attained education level was categorized into: 1) low: elementary or lower levels of secondary education; 2) middle: higher levels of secondary education or intermediate vocational education; 3) high: higher vocational education and university education (CBS). Family composition was categorized as 1) child is living with both parents or 2) child is living with a single parent.

4.8 Outcomes

The survey after the first home visit covered the following topics and questions: if the app was used or not (only for intervention group), contact duration (of the visit itself, the preparation, the processing afterwards, including registration and consultation of colleagues, and the travelling time to parents), how often the PCH saw this family before, for the same indication, what are the family issues and/or care needs, the severity of each family issue and/or care needs, the expected term in which the family issue and/or care needs will be resolved, whether or not the nurse gave any advice and what type of advice has been given, whether or not the nurse made a referral and what type of referral was made.

The second survey, which was filled in after each following contact between the nurse and the family within six months after the first home visit, included the following questions: if the app was used or not (only for intervention group), type of contact (home visit, telephone or e-mail contact, PCH clinic visit, or other type of contact), contact duration (of the contact itself, the preparation, the processing and the travelling time to parents), indication of the contact, if the indication is related to the previous contact or if the indication changed, what are the current

family issues and/or needs for support, the severity of each family issue and/or care needs, the expected term in which the family issue and/or care needs will be resolved, whether or not the nurse gave any advice and what type of advice has been given, whether or not the nurse made a referral and what type of referral was made and if parents had complied with a previously made referral or advice.

The third survey was filled in after six months after the first home visit. Nurses were instructed to call parents to determine the status of each family issue and/or care needs. Based on this phone call, they reported in the third questionnaire: the current status of previously reported family issues (resolved yes/no and current perceived severity) and whether or not parents had complied with a previously made referral or advice by the nurse. If parents were not available for a phone call, the nurse completed the survey based on their own observations. This was the case for 12 of the families (9%), of which 5 in the STA group.

In addition to the data in the survey, data from the PHC digital dossiers from the participating children were collected and analysed. Data covered the number of contacts between nurse and parents of the child, during the six months after the initial home visit, the type of contact, the duration of the contact, referrals, and if the family issue was resolved or not. Data was used to validate survey data and reduce missing values.

4.9 Calculation of costs

Costs were calculated from a PCH provider perspective. We used health encounters (contact duration and frequency) in a period of 6 months, as well as costs associated with the purchase of the ST App, to calculate differences in costs (Bergmo, 2015). The total duration of the first home visit, the preparation, registration afterwards and the duration and frequency of any of the next contacts (home visits, telephone contacts, e-mail contact etc.) were calculated in hours and multiplied by the hourly rate of nurses. The hourly rate of nurses was the actual hourly rate in 2018, as calculated by their employer (GGD Hollands Noorden) and consists not only of wages and taxes, but also includes overhead costs (e.g. costs of supporting staff and facilities).

Costs for using the ST App itself were based on implementation costs (training, practicing, intervision), licensing costs and service costs (helpdesk). Costs for mobile devices were not calculated because the ST App runs on devices already in use by PCH-organisations, including tablet PC and laptops (with touch screen). Implementation costs were based on one four-hour group training session with 10 nurses (i.e., price per training plus hours spend per nurse on the training), homework (estimated to be 1 hour), practicing by themselves (estimated to be 4 hours), one two-hour intervision session (i.e., price per intervision plus hours spent per nurse on the intervision) and other costs (travel costs, facilities). In total, implementation costs were estimated to be one time 914 euro per nurse. Licensing costs are 13.40 euro per month (i.e., hosting, maintenance, updates), per nurse and service costs (helpdesk) were 19.10 euro per months, per nurse. In total, the costs for licensing and service of the ST App are 390 euro per year, per nurse. This fee is based on the costs of the app with approximately 200 users. If the number of users increases, the fee per users will decrease, e.g., with 500 users the app would cost 25 euro, mounting to 300 euro per year, per nurse.

4.10 Sample size

A power calculation was performed to determine the appropriate sample size for detecting significant differences between the CAU and ST App group. Our main hypothesis was that the use of the ST App was associated with a lower frequency of follow-up contacts of home visits, compared to CAU. We expected to find half a contact moment difference between the ST App

group and CAU group. Based on our previous study, we estimated to find an average of three contact moments in the CAU group (SD=1) and an average of 2.5 contact moments in the ST App group (SD=1). Based on a sample size of 100 families in each group, this difference would be statistically significant ($p < 0.001$).

4.11 Statistical analyses

We performed Chi-square test or ANOVA for categorical variables, in order to analyse the difference between the control and intervention group in baseline characteristics.

To assess the effect of the ST App in comparison to the CAU group, multilevel analyses were applied to allow for dependency between the individual measurements within the PCH nurses (Pocock et al., 2002; Sun et al., 2010). Multilevel linear regression analyses were applied for continuous outcome variables and multilevel logistic regression analyses for dichotomous outcome variables. Each outcome variable was evaluated as a dependent variable in separate models, with the experimental group (i.e., ST App or CAU) as independent variable. For each outcome we present the results of the regression model, which includes a correction for cluster (i.e. PCH nurse; the intra-class correlation coefficient ranged from 0 to 0.44).

The analyses were conducted on data of families in the intervention group where the app had been used at least once (during the first home visit). A two-tailed p-value $\leq .05$ was considered as significant. IBM SPSS Statistics version 24 was used for analysing the data.

4.12 Imputation of missing values

The missing data were dealt with by multiple imputation by chained equations. The background variables that were included in the imputation procedure were ST App use, age of the child, family situation, educational level of mother, educational level of father, person. Imputed variables were number of specific contacts, duration of visits, duration of preparation, and duration of finalisation, travel duration, indications, number of needs, number of advices and number of referrals, severity, follow-up, number of closings. Imputed values were estimated with predicted mean matching, and performed for 50 imputations with each 50 iterations. The imputation procedure was performed in R statistical software using the mice package (van Buuren & Groothuis-Oudshoorn, 2009).

4.13 Ethics, consent and permissions

At the onset of the RCT, nurses and their team coordinators received a letter with information about the study (goal, results, data processing and rights) and an invitation to participate. The nurses and team coordinators, who were willing to participate in the study, gave their written informed consent. The study protocol was approved by the ethics committee of TNO (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek [Netherlands Organisation for Applied Scientific Research]) registered under the number 060.16762.

5 Results

5.1 Participants

PCH nurses from nine teams working in the northern part of the Dutch province of Noord-Holland participated in the RCT (Figure 5). In the ST App group, nurses from five different teams (N=22) visited unique 69 families, of which six data was incomplete and were excluded. In the CAU group, nurses from four teams (N=18) visited unique 77 families, of which six the data were incomplete and were excluded. The average age of the nurses in the intervention group was 45.6 years (SD=11.4) and in the control group 49.0 years (SD=11.2) ($p=.30$). All nurses expect for one were female and they all had a Bachelor degree in nursing. The majority of the nurses in the intervention and control group felt they had some experience with computers and tablets (96% and 100). Approximately 75 percent of the nurses in both groups used a tablet at work and regularly used apps.

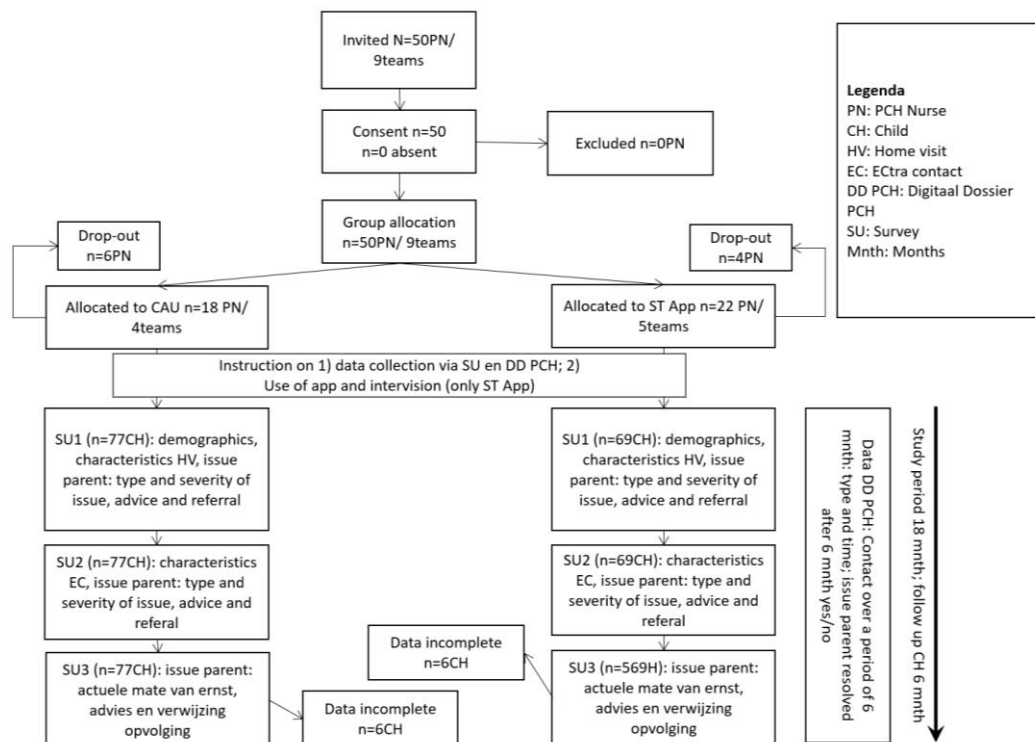


Figure 5. Flow chart of study design

As listed in Table 1, the nurses visited parents with different countries of birth (such as, the Netherlands, Indonesia, Surinam, Morocco and Turkey) and educational levels (ranging from none to Master degree). Parents spoke different languages at home (such as, Dutch, Turkish and Arabic). The average age of the visited children in the control and the intervention group was, respectively, 4 and 6 months. The country of birth, educational level of the parents and age of the child did not differ significantly between the groups. The language spoken at home did differ significantly, as parents of children in the ST App group spoke more often another language than Dutch at home ($p<.05$).

Table 1 Baseline characteristics of child, mother and father of the study sample (n=126)

	CAU n=71	ST App n=63	p-value ¹
Child characteristics			
Male gender (vs. female) (%) (missing n=11 in CAU group)	41 (68.3)	27 (42.9)	.176
Age group (%) (missing n=14 in CAU and n=3 in ST App group)			.414
0 – 6 months	20 (35.1)	13 (21.7)	
7 – 12 months	3 (5.3)	6 (10.0)	
12 – 18 months	4 (7.0)	11 (18.3)	
19 – 24 months	8 (14.0)	8 (13.3)	
25 – 30 months	9 (15.8)	7 (11.7)	
31 – 36 months	3 (5.3)	7 (11.7)	
37 – 42 months	6 (10.5)	4 (6.7)	
43 – 48 months	4 (7.0)	4 (6.7)	
Child is living with both parents (vs. single parent) (%) (missing n=14 in CAU and n=1 in ST App group)	47 (82.5)	50 (80.6)	.573
Language spoken at home (%) (missing n=16 in CAU and n=3 in ST App group)			.042
Dutch	48 (87.3)	41 (68.3)	
Other (i.e., Arabic, Bahasa Indonesia, Berber, Hindu, Turkish)	9 (16.4)	19 (31.7)	
Characteristics of the mother			
Ethnic background (%) (missing n=14 in CAU and n=1 in ST App group)			.623
Dutch	41 (71.9)	42 (67.7)	
Non-Dutch (i.e., Indonesia, Morocco, Surinam, Turkey)	16 (28.1)	20 (32.3)	
Education level (%) (missing n=14 in CAU and 1 in ST App group)			.368
Low	7 (12.3)	10 (16.1)	
Mid	22 (38.6)	25 (40.3)	
High	26 (45.6)	23 (37.1)	
Characteristics of the father			
Ethnic background (%) (missing n=14 in CAU and 1 in ST App group)			.254
Dutch	44 (77.2)	42 (66.7)	
Non-Dutch (i.e., Indonesia, Turkey, Surinam, Dutch Antilles)	13 (22.8)	20 (32.3)	
Education level (%) (missing n=14 in CAU and 1 in ST App group)			.989
Low	7 (12.3)	10 (16.1)	
Mid	22 (38.6)	20 (32.3)	
High	21 (36.8)	27 (43.5)	

¹p-value is based on Chi-square test or ANOVA to analyze the difference between the control and intervention group. Bold numbers indicate p < .05

Parents and nurses discussed topics derived from the five domains of the DMO-p. The parents and nurses spoke about one or a combination of the following topics: sleeping issues in the child; child's (mis)behaviour; parental stress; crying of the child; need for more free time by the parent; breastfeeding; relational issues between parents; relational issues between parent and child; eating habits; potty training; housing situation (e.g., moving, hygiene). Table 2 lists the level of the severity of the family issues per child and/or care needs at baseline and after

six months. Table 3 lists the expected term in which the family issue and/or care needs was expected to be resolved, at baseline. Level of severity of the issues and need and expected to resolve them were similar for both groups.

Table 2 Severity of family issues and/or care needs of parent, on a scale of 1, least severe to 10, most severe, at baseline and after six months (n=134)

	Condition	N	Baseline		After six months		Delta	
			Mean	SD	Mean	SD	Mean	SD
<i>Severity of least severe issue and/or needs</i>	CAU	71	3.80	1.89	5.69	3.95	2.20	3.01
	ST App	63	3.71	2.01	5.80	2.89	2.09	2.91
<i>Severity of most severe issue and/or needs</i>	CAU	71	5.64	2.27	6.89	3.02	2.50	2.86
	ST App	63	5.31	1.90	6.87	3.95	1.99	3.11
<i>Mean severity of all issues and/or needs</i>	CAU	71	4.60	1.82	6.37	2.71	2.44	2.92
	ST App	63	6.46	2.68	6.46	2.68	2.22	3.01

Table 3 Mean expected time needed (in months) to resolve and/or fulfill them, at baseline (n=134)

	Condition	N	Mean	SD
<i>Time needed to resolve least severe issue and/or needs</i>	CAU	71	4.51	5.59
	ST App	63	4.94	6.22
<i>Time needed to resolve most severe issue and/or needs</i>	CAU	71	11.21	10.82
	ST App	63	13.84	12.70
<i>Mean time need to resolve all issues and/or needs on average</i>	CAU	71	7.91	6.94
	ST App	63	8.65	6.64

5.2 First home visits

The following results are based on multiple imputed data. As listed in Table 4, nurses in the ST App group spent in total on average 100.96 minutes per home visit (i.e., preparation, visit and processing, including registration and consultation of colleagues), which is significantly more than nurses in the CAU group, who spent on average, 75.52 minutes per home visit. Nurses in the CAU group spent on average 11.71 minutes on preparations of the home visit whereas nurses in the ST App group spent 16.14 minutes, which is significantly more. Nurses in the ST App group spent significantly more time in the visit itself (63.33 minutes), as compared to nurses in the CAU group (48.40 minutes). Time spent on processing of the visit did not differ significantly between the CAU group (15.41 minutes) and the ST App group (21.49 minutes).

The average number of needs of parents, as assessed by nurses, in the group visited with the ST App (3.97) was significantly more than the average number of needs of parents in the group receiving CAU (2.17). While using the ST App more family issues were addressed and it took more time to discuss them per child.

Table 4 Mean time spend on home visits by nurses, ST App and in CAU group, per family, based on multiple imputed data (n=134)

	CAU	ST App	
	Mean (SD)	Mean (SD)	B (95% CI) ^a
	n=71	n=63	

<i>Time spent on preparation</i>	11.71 (10.45)	16.14 (9.62)	-4.512 (-8.340 – 0.684)*
<i>Time spent on home visit</i>	48.40 (20.62)	63.33 (16.55)	-14.110 (-22.866 – 5.353)**
<i>Time spent on processing</i>	15.41 (9.19)	21.49 (12.17)	-5.681 (-12.219 – 8.858)
<i>Total time</i>	75.52 (30.01)	100.96 (26.58)	-24.47 (-39.176 – 9.778)**
<i>Amount of needs</i>	2,1679 (1,49)	3,97 (2,18)	-1.862 (-2.527 – 1.197)***

^aAdjusted for PCH team cluster

*p <.05, **p <.01, ***p <.001

5.3 Adherence to advice PCH

We analysed the extent to which parents adhered to the advice of the PCH nurse, as assessed by nurses, on a scale from 1 “not adhered to advice at all”, through 10 “fully adhered”, over a period of 6 months. Also, we analysed how the level of adherence was related to the severity of the family issues and/or care needs. As listed in Table 5, parents in the ST App group were on average, in comparison to the CAU group, adhering more to the nurse’s advice on how to cope with the most severe family issues and or care needs. Concerning the adherence to advice related to the least severe issue or need and mean adherence to all advice combined, there was no difference between the two groups.

Table 5 Adherence to advice for family issues and/or need parent (1, not adhered to advice at all, through 10, fully adhered to advice, as rate by nurses), for most and least severe issues and overall (n=134)

	CAU	ST App	
	Mean (SD)	Mean (SD)	B (95% CI) ^a
	n=71	n=63	
<i>Adherence to advice related to least severe issue and/or needs</i>	8.36 (.68)	7.38 (2.40)	0.989 (-0.528 – 2.506)
<i>Adherence to advice related to most severe issue and/or needs</i>	7.00 (.00)	8.33 (.75)	-1.369 (-1.903 – 0.836)***
<i>Mean adherence to all issues and/or needs</i>	7.68 (.68)	7.98 (1.54)	-2.297 (-1.246 – 0.6515)

^aAdjusted for PCH team cluster

***p <.001

5.4 Family issues resolved within 6 months

As listed in Table 6, during the observed six months period, nurses with the app, had contact with parents on average 3.27 times (SD=2.98). Nurses providing CAU had contact with parents on average, 4.66 times SD=4.41), which was significantly more than the ST App group. The average total time nurses were in contact with parents did not differ significantly between the ST App (M=145.58 minutes; SD=82.58) and CAU (157.12 minutes; SD=105.31). The number of families for which the issues and/or needs resolved in six months was comparable for both groups, namely 84% in the CAU group and 75% in the App group.

Table 6 lists the severity of issues and needs on average between baseline and after six months, concerning the least severe and most severe issues and the mean severity. On a ten-point scale, the severity of issues decreased in both the ST App group and the CAU group.

When we compare the CAU and STA App groups, the extent of decrease of severity was not significantly different.

Table 6 Mean frequency of and time spend on home visits by nurses and number of issues resolved, ST App and in CAU group, per family, based on multiple imputed data (n=134)

	CAU	ST App	OR/ B (95% CI) ^a
	Mean (SD) or % "yes" (n)	Mean (SD) or % "yes" (n)	
	n=71	n=63	
<i>Number of contacts</i>	4.66 (4.41)	3.27 (2.98)	1.616 (0.0923 – 3.140)*
<i>Time spend on contact</i>	157.12 (105.31)	145.58 (82.58)	2.353 (-39.358 – 44.064)
<i>Change in severity of least severe issues and/or needs</i>	2.20 (3.01)	1.99 (3.11)	0.237 (-1.200 – 1.675)
<i>Change in severity of most severe issues and/or needs</i>	2.50 (2.86)	2.09 (2.91)	0.387 (-1.078 – 1.852)
<i>Change severity of all issues and/or needs</i>	2.44 (2.92)	2.22 (3.01)	0.274 (-1.190 – 1.738)
<i>Issues resolved after 6 months</i>	.84 (.37)	.75 (.44)	0.661 (0.000 – 0.004)

^aAdjusted for PCH team cluster

*p <.05, **p <.01, ***p <.001

5.5 Comparing costs and benefits

As listed in Table 7, the total average time a nurse spends on health care for a child over a period of six months is 297 minutes (SD=354.63). For nurses with the ST App, on average, this is 259 minutes (SD=275.14) and for nurses providing CAU this is 335 minutes (SD=400,05) (t(134): 2,07, P=.037). Preventive child health care with the ST App in this study costs 77 minutes less per child. The hourly rate of a nurse working for GGD Hollands Noorden is 64 euro. This implies that preventive child health care with the ST App costs 82 euro less per child.

When we compare the costs with the benefits, we can see as listed in Table 8, that in year one and two of ST App use, the costs are higher than the benefits, respectively 487 and 61 euros. However, after year 3, the benefits are higher than the costs, namely 366 euros. After approximately 3.5 years, the total benefits are higher than the total costs made for the licence and implementation of the app.

Table 7. Overview of time and costs of preventive child health care with and without the ST App

Consultation time (duration in minutes*frequency), per professional, per child						
	Face-to-face consult (including first home visit) (SD)	Consult by e-mail (SD)	Consult by phone (SD)	Inter-collegial consultation	Referral	Total
ST App	116.80 (74.20)	33.33 (36.14)	38.44 (26.21)	17.00 (9.27)	25.00 (30.51)	258.57 (275.14)
CAU	141.56 (59.83)	23.72 (12.28)	75.71 (19.47)	42.70 (20.00)	17.50 (7.64)	335.13 (400.05)
Delta	49.53	-19.22	74.54	51.4	-7.50	76.58
Consultation costs (in euro in 2018: consultation time in minutes*hourly rate), per professional, per child						

CAU	151.00	25.30	80.76	45.54	18.66	357.4
ST App	124.59	35.55	41.00	18.13	26.67	275.8
Delta	26.41	-10.25	39.76	27.41	-8.00	81.6

Table 8. Cumulative costs and benefits per user (e.g., nurse), when visiting 10 children per year (with a follow up of 6 months), using the ST App 1 through 5 year

Scenario: 200 users and app licence fee is 35 euro				
Time	Total*			
		Implementation	ST App license	Benefits
Year 1	€ -487.36	€ 914.00	€ 390.00	€ 816.
Year 2	€ -60.73	€ 914.00	€ 780.00	€ 1633.
Year 3	€ 365.91	€ 914.00	€ 1.170.00	€ 2449.
Year 4	€ 792.54	€ 914.00	€ 1.560.00	€ 3266.
Year 5	€ 1.219.18	€ 914.00	€ 1.950.00	€ 4083.

6 Discussion

This study aimed to compare the costs and the benefits of the ST App and care as usual. We hypothesized that the ST App has an effect on duration and frequency of contact between healthcare professionals and parents, on the compliance with advice and referrals by parents, on the effectiveness of care within six months. In terms of costs, the costs associated with the implementation and licensing costs of the ST App may be earned back in three and a half years. In our study, the amount of contact time is required to resolve family issues and to meet care needs is less with the ST App, compared with usual care. This means that after three to four years, healthcare organizations whose nurses use the ST App, will start to reduce the costs of their care. In terms of other non-monetary benefits, significantly more care needs and family issues were identified with the ST App, compared to usual care. While it also took more time to discuss the issues and needs per child during the first visit with the ST App, compared to usual care, the total contact time to resolve the issue or care need was significantly less. Parents in the ST App group were adhering significantly more often to the nurse's advice on how to cope with the most severe family issues and or care needs, as compared to usual care. There were no significant differences between the severity of the care needs and family issues at baseline, in the amount of resolved issues and reduction of the severity of the issues in six months' time and in the adherence to the nurses advice for less severe issues.

In this study we show that nurses identified more care needs when using the ST App. There are several possible explanations for this finding. First, the ST App might allow for a more structured identification and discussion of parental needs. Other research has shown that structuring information gathering on parental needs allows professionals to identify more parental care needs and provides information beyond their professionals viewpoint (Staal et al., 2016).

Another potential explanation for identifying more needs with the ST App is that parents might find it easier to disclose and verbalize more needs, because the app provides visual cues of potential areas of needs. Previous research on the ST App showed that the textual and visual conversational support helped parents to express their needs (Blanson Henkemans et al., 2018).

The result that resolving family issues and parental needs took significant less time with the ST App could be caused by the ST App allowing for better understanding of the problem or care needs of professionals, so that appropriate solutions could be offered. Even though we do not have information on which solutions were offered to parents, we do know that nurses who used the ST App perceived that parents were adhering significantly more often to the nurse's advice on how to cope with the most severe family issues and or care needs, as compared to usual care. A potential explanation for better adherence could be that by using the ST App, parents feel that they are involved in the decision making process. Shared decision making has been theorized to improve outcomes, even though scientific evidence for this is still limited (Wyatt et al., 2015). Shared decision making tools, however, have been identified to facilitate shared decision making in several other studies (Boland et al., 2019).

Previous research on the ST App showed that this intervention was especially valuable for home visits to parents with a low educational level. Parents with low educational level were less satisfied with home care visits than parents with a high educational level in care as usual, while when using the ST App, parents with low educational level were equally highly satisfied as parents with a high educational level. In this study, 22% of parents with a non-Dutch background participated. However, we did not find that having a lower educational level or having a migration back ground (i.e., factors which are often related to low health literacy)

explained variance in the effect of the ST App. This could be explained by further involvement of different groups in the further development of the app, which may have been beneficial of different groups in regard to usability and impact on the evaluation of the home visit.

Based on the positive results when using the ST App, we recommend that more organizations start using the ST App. It seems most feasible to implement the ST App in organizations who already use the Starting Together program. However, we expect that even in PCH organizations who do not use the Starting Together program, implementation of the ST App will eventually lead to better care and reduced costs.

Future research should focus on further implementation of the ST App, both nationally and internationally. In addition to this application, also other digital instruments for PCH professional- parent communication are developed in the Netherlands, such as the Digital GIZ and 360° ChilDoc, struggle with the same issues as the ST App. Examples of barriers for implementation are lack of awareness of policy makers of benefits of these instrument, lack of basic financial resources for digital innovation, difficulty to integrate in IT-systems in use, such as the digital dossier, and the novelty of these innovations for professionals. Future research thus should focus on collectively working on the increase of awareness with stakeholders, organizing basic funds for digital innovation in PCH, standardisation in IT-systems and a generic training plan for professionals. This is in line with the goal of the Health Deal I-JGZ, which will be made in the second quarter of 2019.

6.1 Strengths and limitations

A strength of this study was the implementation and use of the ST App in a realistic setting. We expect that further implementation in other organizations will be very similar to the implementation process and use of the ST App in different organizations. The results are expected to be generalizable to other organisations because nurses were working in diverse settings, with diverse populations, for example rural and urban areas, with parents with both high and low socioeconomic status, etc. Also, because we used nurses as the primary source of data gathering, we were not hampered by parental characteristics for not participating in the study (such as low literacy skills). However, using nurses potentially makes our results less reliable, because nurses who reported outcomes were not blinded to the study condition.

Another strength is that in this study we applied a multilevel analyses were applied to allow for dependency between the individual measurements within the PCH nurses. In the previous study on the effect of the ST App on home visits, due to privacy reasons, this was not possible (Blanson Henkemans et al., 2018). However, in the current study, we made an extra effort at the onset of the study to enable identification of nurses who provided data and for which family. This was done without breaching the participants' privacy, i.e., through coding in the survey. A limitation of our study was that costs could not be calculated for all factors. For example, we did not take into consideration the costs and savings of (non)adherence of parents to the nurses' advice, including higher costs of care (e.g., after referral). Nor to (future) costs or savings due to early resolving of issues and/or needs.

Also, we looked at the changes in family needs within a six months study period. What happens after these six months remains unknown. It is possible that issues that were resolved within the six month study period will return and require more contact time again. Also, a difference between CAU and ST App may lead to a difference in costs in the future. This could not be incorporated in our current study.

7 Conclusions

This study shows that the benefits of the ST App outweigh the costs. In fact, after three and a half years, the costs are reduced each year when using the app, because less contact moments are required for solving or reducing family issues. Other benefits of using the ST App include addressing more family issues in the first home visit and that the adherence to the nurses' advice is higher in more severe family issues when using the ST App.

8 References

- Blanson Henkemans, O.A., Keij, M., Grootjen, M., Kamphuis, M., Dijkshoorn, A. (2018). Design and evaluation of the StartingTogether App for home visits in preventive child health care. *BMC Nursing*, Volume 17, Number 1, Page 1
- Bartholomew LK, Parcel GS, Kok G, Gottlieb NH, Fernández ME. *Planning Health Promotion Programs: An Intervention Mapping Approach*, 3rd Edition. San Francisco, CA: Jossey-Bass; 2011.
- Beauchaine TP, Neuhaus E, Brenner S, Gatzke-Kopp L. Ten good reasons to consider biological variables in prevention and intervention research. *Dev and Psychopathol.* 2008;20:745–74.
- Bergmo, T. S. (2015). How to measure costs and benefits of eHealth interventions: an overview of methods and frameworks. *Journal of medical Internet research*, 17(11).
- Black, M. M., Walker, S. P., Fernald, L. C., Andersen, C. T., DiGirolamo, A. M., Lu, C., ... & Devercelli, A. E. (2017). Early childhood development coming of age: science through the life course. *The Lancet*, 389(10064), 77-90.
- Boland, Laura, et al. "Barriers and facilitators of pediatric shared decision-making: a systematic review." *Implementation Science* 14.1 (2019): 7.
- Bos N, Sturms LM, Schrijvers AJ, van Stel HF. The Consumer Quality index (CQ-index) in an accident and emergency department: development and first evaluation. *BMC Health Serv Res.* 2012;12:284.
- Brinkman WP, Neerincx MA. Applying situated cognitive engineering to mental health computing. *CHI 2012*, 2012.
- Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., ... & MacMillan, H. (2017). Nurturing care: promoting early childhood development. *The Lancet*, 389(10064), 91-102.
- Bronfenbrenner U, Ceci SJ. Nature-nurture reconceptualized in developmental perspective: a bioecological model. *Psychol Rev.* 1994;101(4):568–86.
- Chaudhry, B., Wang, J., Wu, Shiny, Maglione, M., Mojica, W.; Roth, E., Morton, S.C, Shekelle, P.G. Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Annals of Internal Medicine*, 2006; 144:742-752.
- Creswell JW, Plano Clark VL, Gutmann ML, Hanson WE. Advanced mixed methods research designs. In Tashakkori A, Teddlie C (eds.) *Handbook of Mixed Methods in Social and Behavioral Research*. 2003:209–240. Thousand Oaks, California: Sage Publications
- Crone, M. R., Zeijl, E., & Reijneveld, S. A. (2016). When do parents and child health professionals agree on child's psychosocial problems? Cross-sectional study on parent-child health professional dyads. *BMC psychiatry*, 16(1), 151.
- Delnoij DM, Ten Asbroek G, Arah OA, De Koning JS, Stam P, Poll A, et al. Made in the USA: the import of American Consumer Assessment of Health Plan Surveys (CAHPS) into the Dutch social insurance system. *Eur J Public Health.* 2006;16:652-9.
- Dijkstra N, Detmar S, Schoenmakers A, Öry F. Samen Starten: ondersteunings-behoefte van ouders bij het opvoeden van jonge kinderen [StartingTogether: needs for parental support in parents with young children]. Leiden: TNO Preventie en Gezondheid, 2004.
- Dunst, C.J., Trivette, C.M. Meta-analytic structural equation modeling of the influences of family-centered care on parent and child psychological health. *International Journal of Pediatrics*, 2009; 1-9.
- Dunst, C.J., Trivette, C.M., Hamby, D.W. Meta-analysis of family-centered helpgiving practices research. *Journal of mental retardation and developmental disabilities research reviews*, 2007; 13; 370-378.
- Fleuren MA, Paulussen TG, Van Dommelen P, Van Buuren S. Towards a measurement instrument for determinants of innovations. *Int J Qual Health Care.* 2014;26(5):501-10.

- Free, C., Philips, G., Watson, L., Galli, L., Felix, L., Edwards, P., Patel, V., Haines, A. The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *Plos Medicine*, 2013;10(1): 1-26.
- Gemeente Amsterdam. Eerste bestuursrapportage 2014 Amsterdam [First policy report 2014 Amsterdam], Municipality of Amsterdam, 2014.
- Gibson CH. The process of empowerment in mothers of chronically ill children. *J Adv Nurs*. 1995;21:1201–10.
- Harrison, T.M. Family-centered pediatric nursing care: state of the science. *Journal of Pediatric Nursing*, 2010;25(5):335-343.
- Hielkema, M, De Winter AF, Feddema E, Stewart RE, Reijneveld SA. Impact of a Family-Centered Approach on Attunement of Care and Parents' Disclosure of Concerns: A Quasi-Experimental Study. *J Dev Behav Pediatr*. 2014;35(4):292-300.
- Hornman, J., de Winter, A. F., Kerstjens, J. M., Bos, A. F., & Reijneveld, S. A. (2016). Emotional and behavioral problems of preterm and full-term children at school entry. *Pediatrics*, e20152255.
- Kangas E, Kinnunen T. Applying user-centered design to mobile application development. *Commun ACM*. 2005;48(7):55–9.
- Kim JS. Examining the Effectiveness of Solution-Focused Brief Therapy: A Meta-Analysis. *Res Social Work Prac*. 2008;18(2):107–16.
- Lindberg, B., Nilsson, C., Zotterman, D., Söderberg, S., Skär, L. Using information and communication technology in home care for communication between patients, family members, and healthcare professionals: a systematic review. *International Journal of Telemedicine and Applications*, 2013:1-32.
- Lindhiem, O., Bennett, C.B., Rosen, D., Silk, J. Mobile Technology Boosts the Effectiveness of Psychotherapy and Behavioral Interventions: A Meta-Analysis. *Behavior Modification*, 2015; 39(6);785-804.
- Lustria ML, Cortese J, Noar SM, Glueckauf RL. Computer-tailored health interventions delivered over the Web: review and analysis of key components. *Patient Educ Couns*. 2009;74(2):156-73.
- Masarik, A. S., & Conger, R. D. (2017). Stress and child development: a review of the family stress model. *Current Opinion in Psychology*, 13, 85-90.
- Melhuish, E., Belsky, J., Leyland, A.H., Barnes, J. Effects of fully-established Sure Start Local Programmes on 3-year-old children and their families living in England: a quasi-experimental observational study. *Lancet*. 2008;372:1641-1647
- Olin SS, Hoagwood KE, Rodriguez J, Radigan M, Burton G, Cavaleri M, Jensen PS. Impact of Empowerment Training on the Professional Work of Family Peer Advocates. *Child Youth Serv Rev*. 2010;32(10):1426-9.
- Peacock S, Konrad S, Watson E, Nickel D, Muhajarine N. Effectiveness of home visiting programs on child outcomes: a systematic review. *BMC Public Health* 2013;13:17.
- Pocock SJ, Assmann SE, Enos LE, Kasten LE. Subgroup analysis, covariate adjustment and baseline comparisons in clinical trial reporting: current practice and problems. *Stat Med* 2002 Oct 15;21(19):2917-2930. [doi: 10.1002/sim.1296] [Medline: 12325108]
- Regber S, Mårild S, Johansson Hanse J. Barriers to and facilitators of nurse-parent interaction intended to promote healthy weight gain and prevent childhood obesity at Swedish child health centers. *BMC Nurs*. 2013;12(1):27.
- Reijneveld, S. A., Hielkema, M., Stewart, R. E., & de Winter, A. F. (2017). The added value of a family-centered approach to optimize infants' social-emotional development: A quasi-experimental study. *PloS one*, 12(12), e0187750.
- Rutherford RB Jr, Quinn MM, Mathur SR. *Handbook of Research in Emotional and Behavioral Disorders*. New York, NY: The Guilford Press, 2004.

- Romão, T. Challenges in Designing Smarter Mobile User Experiences. FICT, 2016;7. Accessed April 5th, 2017: <http://journal.frontiersin.org/article/10.3389/fict.2016.00007/full>
- Siderius, E. J., Carmiggelt, B., Scheenstra-van Rijn, C., & Heerkens, Y. F. (2016). Preventive Child Health Care within the Framework of the Dutch Health Care System. *The Journal of pediatrics*, 177, S138-S141.
- Sleeswijk Visser F, Stappers PJ, van der Lugt R, Sanders EB-N. Contextmapping: Experiences from practice. *CoDesign*. 2005;1(2):119–49.
- Staal, Ingrid IE, et al. "Early detection of parenting and developmental problems in young children: Non-randomized comparison of visits to the well-baby clinic with or without a validated interview." *International journal of nursing studies* 62 (2016): 1-10.
- Stiggelbout, A. M., Pieterse, A. H., & De Haes, J. C. J. M. (2015). Shared decision making: concepts, evidence, and practice. *Patient education and counseling*, 98(10), 1172-1179.
- Suh WS, Lee CK. Impact of shared-decision making on patient satisfaction. *J Prev Med Public Health*. 2010;43(1):26-34.
- Sun X, Briel M, Walter SD, Guyatt GH. Is a subgroup effect believable? updating criteria to evaluate the credibility of subgroup analyses. *BMJ* 2010 Mar 30;340:c117. [doi: 10.1136/bmj.c117]
- Tan N, Bekkema N, Öry F. Toepasbaarheid van opvoedingsondersteuning voor Marokkaanse en Turkse gezinnen in Nederland, in het bijzonder van het programma Samen Starten/DMO-P [Applicability of parental support for Moroccan and Turkish families in the Netherlands, specifically the program StartingTogether/DMO-p]. Leiden: TNO Preventie en Gezondheid, 2008.
- Thomas R, Chalkidou K. Cost–effectiveness analysis. In: Cylus J, Papanicolas I, Smith PC, editors. *Health system efficiency: How to make measurement matter for policy and management* [Internet]. Copenhagen (Denmark): European Observatory on Health Systems and Policies; 2016. (Health Policy Series, No. 46.) 6. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK436886/>
- van Buuren, S., & Groothuis-Oudshoorn, K. (2009). MICE: Multivariate Imputation by Chained Equations in R. *Journal of Statistical Software*, 45(3), 1–67. Retrieved from <http://www.jstatsoft.org/v45/i03/>.
- Vermeulen H, Berben S, Heinen M. Evidence based richtlijnen, werken volgens de laatste stand van wetenschap. *T JGZ*. 2017;49(4):67–68.
- Wentzel, J., van der Vaart, R., Bohlmeijer, E., van Gemert-Pijnen, J.E.W.C. Mixing online and face-to-face therapy: how to benefit from blended care in mental health care. *JMIR Mental Health*, 2016; 3(1):1-28.
- Wyatt, Kirk D., et al. "Shared decision making in pediatrics: a systematic review and meta-analysis." *Academic Pediatrics* 15.6 (2015): 573-583.
- ZonMw, 2017. Costs and effects of the StartingTogether App for the preventive child health care [Kosten en effecten van de SamenStarten App voor de Jeugdgezondheidszorg]. Accessed 26 July 2017, URL: <https://www.zonmw.nl/nl/onderzoek-resultaten/jeugd/programmas/project-detail/versterking-uitvoeringspraktijk-jeugdgezondheidszorg/kosten-en-effecten-van-de-samenstarten-app-voor-de-jeugdgezondheidszorg>