Towards effective implementation strategies for ultrasound hip screening in child health care

Meet the parents

Marjon Witting

TOWARDS EFFECTIVE IMPLEMENTATION STRATEGIES FOR ULTRASOUND HIP SCREENING IN CHILD HEALTH CARE

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MARJON WITTING

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PROEFSCHRIFT

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Prof. dr. M.J. IJzerman
Dr. M.M. Boere-Boonekamp

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To see far is one thing,
going there is another

Constantin Brâncuşi (1876-1957)

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CHAPTER 1

GENERAL INTRODUCTION

DEVELOPMENTAL DYSPLASIA OF THE HIP

Developmental dysplasia of the hip (DDH) is a common problem in early childhood with serious long-term consequences if left untreated or treated late. DDH refers to a spectrum of hip disorders and includes dysplastic, subluxated, dislocated and unstable hips (Figure 1) [1-2]. Dysplastic hips are characterized by a shallow acetabulum (hip socket). A hip is subluxated when there is a partial loss of contact between the femoral head (ball) and the acetabulum and dislocated when the contact between the femoral head and acetabulum is completely lost. In an unstable hip, the femoral head is located within the acetabulum, yet can be dislocated or subluxated in case of provocation. Several factors have consistently shown to increase the risk for DDH, including female gender, breech position in the last trimester of pregnancy and/or at birth and family history of DDH [4-7].

Incidence rates of DDH are estimated to vary between 1.5 to 20 cases per 1000 life births, depending on various factors, such as diagnostic criteria and timing of the examination [8]. In the Netherlands, a large cohort study reported an incidence rate of 3.7% [9].

If left untreated, DDH may lead to chronic pain in the hip, lower back and knee, impaired walking and (premature) degenerative joint disease [4, 10]. The goal of treatment for DDH is therefore to achieve normal growth and development of the hip by obtaining and maintaining hip reduction [10]. The most commonly used abduction device for treatment of infants up to the age of six months is the Pavlik harness [7]. Usually, in infants older than six months of age or in infants in whom the non-surgical method did not achieve the desired effect, a closed surgical reduction is required.

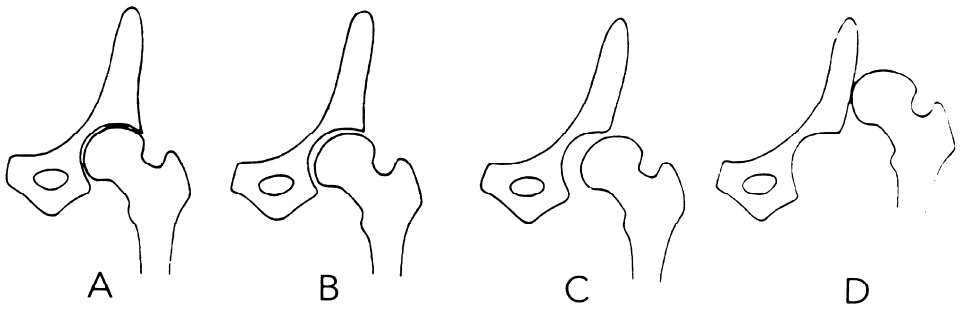

Figure 1. Schematic representation of disorders of developmental dysplasia of the hip [3]
A = normal, B = mild dysplasia, C = subluxation, D = dislocation

SCREENING FOR DDH

Physical examination and identification of risk factors

Universal newborn screening is considered essential for early detection and treatment of DDH. The most commonly used method for detection of DDH in infants involves physical examination of the hips. In the neonatal period this screening consists of the Ortolani and Barlow maneuvers. The Ortolani test attempts to relocate a dislocated hip back into the acetabulum [11], whereas Barlow's test is used to detect a dislocatable hip [12]. Other clinical signs that arouse suspicion of DDH after the neonatal age include limited abduction, asymmetry of skin folds and a difference in knee height, which is also known as the Galeazzi sign [5]. Physical examination is often combined with identification of risk factors (female gender, breech position in the last trimester of pregnancy and/or at birth and family history of DDH) [4-5].

Ultrasound screening

Ultrasound (US) imaging for DDH was introduced in the 1980s by Graf [13] (Figure 2). This method is based on the morphologic assessment of the hip. His technique has been widely adopted in many European countries [14-15]. Harcke's method, which is widely used in the USA and in the UK, is characterized by a dynamic evaluation of hip stability [16].

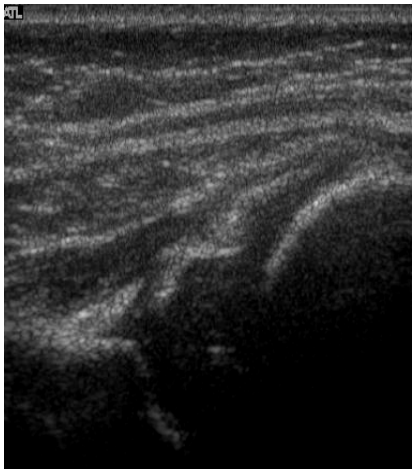

Figure 2. Ultrasound image of a normal hip

Advantages of US screening include the non-involvement of radiation [6, 13], the non-invasiveness [6, 13], a reduction in surgical interventions because of early diagnosis [17-18], a lower number of underdiagnostics compared to clinical screening [19] and a reduction of the duration of treatments [20]. Disadvantages of US screening are the increased treatment rates with the risk of overtreatment [5, 20-22], the operator dependency [5, 21-23] and the limited ultrasound availability [5, 22]. Proponents of US screening state that the risk of overtreatment related to US screening is more acceptable than the chance of underdiagnosis associated with the clinical screening [6, 19, 24].

Only a few economic evaluations have been published about screening for DDH. The general conclusion that can be drawn from the available studies is that the costs of US screening are comparable to or lower than those of other screening strategies [25-26].

PREVENTIVE CHILD HEALTH CARE IN THE NETHERLANDS

Under the Social Support Act (Wet Maatschappelijke Ondersteuning - WMO), local governments are responsible for setting up parenting support [27]. Municipalities are responsible for five areas related to parenting and growing up: information and advice, identification of potential problems, guidance and counseling, light pedagogical support and care coordination at the local level [28]. This program is carried out by Youth and Family Centers (Centrum voor Jeugd en Gezin - CJG) that are also responsible for providing child and youth health care (described in the Basic Program of Preventive Child Health Care - Basistakenpakket Jeugdgezondheidszorg). By 2011, all 430 municipalities need to have at least one Youth and Family Center. Until that time, preventive child health care (CHC) is also provided by home care organizations via CHC centers. The financing of preventive CHC is complex and is made up out of three sources: municipality funds, the Broad Purpose Grant Youth and Family Center for realization of one center per municipality and the Exceptional Medical Expenses Act (Algemene Wet Bijzondere Ziektekosten - AWBZ) for financing of the National Immunization Program (Rijksvaccinatieprogramma) [29].

The goal of preventive CHC is monitoring the physical, social, psychological and cognitive development of infants and signaling possible health problems. The Basic Program of Preventive Child Health Care describes all the ‘products’ that should be offered in a standardized way to children aged 0-19 years [30-31]. The program includes for example monitoring of growth and development, assessment of need for care, screening for health problems, the national vaccination program and health education. The program is carried out by trained CHC physicians and CHC nurses during well-child visits. Participation in the well-child

visits is very high, with 95% of the parents visiting the CHC center every contact moment [32-33].

Screening for DDH by a CHC physician is one of the tasks included in the Basic Program of Preventive Child Health Care. The current screening method is based on physical examination of the infant and identification of risk factors during the first six months of life. Approximately 20% of all referrals of infants aged 0-4 years in preventive CHC are based on a suspicion of DDH [34-35]. Screen-positive infants are referred to the general practitioner (GP), who decides if additional diagnostics by a secondary care facility is necessary. In the Netherlands, two studies, described in the following two paragraphs, focused on the effectiveness of different screening techniques for DDH.

Effectiveness of clinical screening

Boere-Boonekamp et al. [9] evaluated the validity of the standard clinical assessment protocol for DDH screening in the Netherlands among a birth cohort of 2105 infants born in 1992 and 1993. The infants were physically screened by CHC physicians during regular well-child visits at the age of one, three, four and five months. High-risk infants (positive family history of DDH and breech position in last trimester of pregnancy and/or at birth) and infants with an abnormal physical examination were referred to their GP. At the age of seven months, all infants received an US reference examination. This study found an incidence of 3.7% of DDH among the participating infants (N = 2066). Of all the infants screened for DDH, 19.2% (n = 397) were referred to the GP. In fifty-five of these infants, the diagnosis was confirmed immediately and in another seven infants the diagnosis DDH was confirmed after the US reference examination. In ten screen-negative infants, abnormalities were found after the US reference examination and confirmed by an orthopedic surgeon, resulting in a sensitivity of the screening of 76.4%. The fact that at least one out of seven infants is missed based on the current screening protocol is “hardly acceptable”. The authors argue that improvements in the current screening protocol for DDH will not lead to substantial better results and therefore emphasize the need for further study into the use of US screening.

(Cost)effectiveness of ultrasound screening: the Soundchec 1 study

To investigate the effects and cost-effectiveness of US screening for DDH, a large prospective cohort study among 6259 newborns was conducted in 1998 and 1999 in the Netherlands (the Soundchec 1 study) [26]. In the intervention group, 5170 infants were screened using US at the age of one, two and three months. Infants received an extra US examination at the age of eight months to detect any missed abnormality. To compare the effectiveness of US screening with the current CHC screening, the results of the intervention group were compared with the

outcomes of the historical control group from Boere-Boonekamp et al. [9]. In the intervention group, 359 infants were referred for additional diagnostic evaluation. In total, 270 infants were treated for DDH of which 239 were detected by US, leading to a sensitivity of the US screening program of 88.5%. The referral rate was 7.6%. The authors conclude that US screening detects more infants with DDH than the current screening method. Together with the higher sensitivity, the referral rate is also considerably lower in the group of infants screened with US.

Based on these results, a decision-tree analysis was used to evaluate the effectiveness of several US screening strategies [26]. Three strategies were considered: (1) US screening at the age of one, two or three months, (2) US screening at the age of one and three months and (3) selective US screening of high-risk infants at the age of one month. These strategies were compared with the current CHC screening [9] and with a combination of the current screening and US screening. The results showed that US screening at the age of three months was the best performing screening strategy. It had the lowest rate of missed cases (0.6%), the lowest referral rate (4.5%) and the lowest treatment rate (3.2%).

The last part of the Soundchec 1 study comprised of a cost-effectiveness analysis of three screening strategies for DDH: (1) general US screening at the age of three months, (2) selective US screening at the age of three months and (3) the CHC current screening. The costs of the screening strategies per infant screened were €70.6, €52.1 and €82.0 respectively and per screen detected case €2278, €2171 and €2929 respectively (2002 prices). Although selective US screening seemed to be the most cost-effective strategy, it had the lowest detection rate. The higher costs of the general US screening were mainly caused by the time parents had to spend in attending the screening. Since the authors expected that parents are motivated to attend the screening, it was concluded that general US screening for DDH is the most effective screening strategy in the Netherlands.

THE IMPLEMENTATION OF ULTRASOUND SCREENING: THE SOUNDCHEC 2 STUDY

Assessment of clinical effects and cost-effectiveness, such as studied in the Soundchec 1 study, can be useful for supporting health care policy. Through these tools, health care policy decision-makers can assess the economic and potential value of the innovation and decide on future implementation. However, the results of these assessments might be relatively uncertain, since they do not accurately reflect the value of the innovation once being implemented [36-37]. Neither do these studies consider the actual cost of implementation [37]. Additional data gathering, by means of a pilot implementation, is necessary to gain a full understanding of the 'real-world' factors that influence implementation. Moreover, a pilot

implementation can reveal other factors that can influence clinical and economic outcomes. Yet, the step from scientific evidence to implementation of innovations in health care is generally seen as a challenging process [38-42].

In the Soundchec 2 study, a pilot implementation was set up in three home care organizations responsible for preventive CHC. The first CHC organization, Carinova, was situated in a rural area in the Netherlands (Salland). The screening was performed in eight CHC centers spread over this area. The other CHC organizations, Zuwe and Aveant, were both situated in the urban area of Utrecht. The five screening locations in Utrecht were situated in different socio-economic areas, including a high-income inner city area, a low-income inner city area and three relatively new suburban areas. Zuwe and Aveant organized the screening together and are therefore considered as one organization.

Study population and invitation procedure

A total of 5521 infants born between August 2007 and December 2008 were invited to visit the CHC center for an US examination of the hips at the age of three months. At the first well-child visit to the CHC center, at the age of one month, parents received an information brochure about the screening. At the age of two months, parents visiting Carinova received an invitation at home, including a date, time and location for the screening. Parents visiting Zuwe and Aveant made an appointment at the CHC center with the assistant. The different invitation strategies resulted from individual protocols within the organizations. Between the age of three and four months, the infants participated in the screening. Participation in the screening was voluntary and all parents signed an informed consent form.

The screeners

The US examinations were performed by three specialized CHC physicians and five CHC nurses (Figure 3). Two CHC nurses who dropped-out during the study were replaced by two radiographic technicians experienced in US screening for DDH. The training of the screeners comprised of a two-day theoretical instruction in US screening based on the method of Graf [13] and was provided by a pediatric radiologist, an orthopedic surgeon and a CHC physician. The training was followed by four months of training 'on the job' under supervision of five experienced radiographic technicians. Three meetings with the screeners were organized during the screening period to refresh theoretical instructions, discuss relevant and practical issues and to exchange experiences.

Figure 3. Ultrasound screening for developmental dysplasia of the hip at a child health care center

Ultrasound screening

For each area, one laptop computer including a Terason t3000 US system equipped with a 12-5 MHz linear array probe was provided. An US examination was made of both hips of the infant and subsequently categorized into three categories: normal, abnormal (Graf 2B, 2C, D, 3 or 4) or technically insufficient. Infants with an abnormal US on one or both sides were referred to the GP or to the orthopedic surgeon for additional diagnostic procedures. If it was not possible to evaluate the hip because of a technically insufficient image, another appointment was made for a repetition of the screening. If the images resulting from this second screening were still not sufficient, the infant was referred. After the US screening appointment, the screeners uploaded the images on a secured website, created for the Soundchec 2 study. A pediatric radiologist had access to this website and re-evaluated all images. His assessment was used as the reference standard for the quality of the screening. If his evaluation of the image differed from the evaluation of the screener, action was undertaken in two instances. If the radiologist assessed the image as abnormal while the screener made a normal judgment, parents were contacted and received a referral to the GP or to the orthopedic surgeon. If the radiologist evaluated the image as technically insufficient and the screener as normal, parents were invited for an extra visit to the CHC center.

Referral policies

Referral routes differed between the CHC organizations. In collaboration with the health care insurers in Salland (Carinova), it was possible to directly refer the infants to the orthopedic surgeon without parents first having to visit the GP. In Utrecht (Zuwe and Aveant) this direct

referral route could not be established because it was not possible to receive consent of the most important health care insurer in that area in time for the pilot implementation. Here, parents were first referred to their GP and subsequently to the orthopedic surgeon.

Participants and outcomes of the Soundchec 2 study

A total of 4099 of 5521 infants participated in the study, leading to a participation rate of 74.2%. In Salland, 2577 parents were invited and 2370 infants subsequently received an US screening (participation rate 92.0%). In Utrecht, 2944 parents received an invitation of which 1729 parents participated (participation rate 58.7%).

Table 1 shows the results of the screening. Data on 4045 infants were available since results of 54 infants (44 in the rural area and 10 in the urban area) were missing (1.3%) which is probably due to registration problems. The referral rate was 15.6% in the rural area and 5.8% in the urban area. The rate of missed cases was 0.5% in the rural area and 0.9% in the urban area. The sensitivity of the US screening program in detecting infants with DDH was 91.3% (285/312; 95% confidence interval 87.7% to 94.0%) with a rate of 95.3% (223/234; 95% confidence interval 91.7% to 97.5%) in the rural area and a rate of 79.5% (62/78; 95% confidence interval 69.1% to 87.1%) in the urban area.

Additional information related to the inter- and intra-observer agreement and the cost-effectiveness of the US screening is reported in another thesis published on the Soundchec 2 study [43].

Table 1. Screeners' evaluation of US images in comparison to the re-evaluation by the radiologist

	Evaluation radiologist			
Evaluation screeners	DDH	No DDH	Technically insufficient	Total
Rural area				
DDH	223 (61.6%)	120 (33.1%)	19 (5.2%)	362
No DDH	10 (0.5%)	1835 (94.1%)	106 (5.4%)	1951
Technically insufficient	1 (7.7%)	5 (38.5%)	7 (53.8%)	13
Total	234 (10.1%)	1960 (84.3%)	132 (5.7%)	2326
Urban area				
DDH	62 (62.6%)	33 (33.3%)	4 (4.0%)	99
No DDH	15 (0.9%)	1542 (96.5%)	41 (2.6%)	1598
Technically insufficient	1 (4.5%)	7 (31.8%)	14 (63.6%)	22
Total	78 (4.5%)	1582 (92.0%)	59 (3.4%)	1719
Total group				
DDH	285 (61.8%)	153 (33.2%)	23 (5.0%)	461
No DDH	25 (0.7%)	3377 (95.2%)	147 (4.1%)	3549
Technically insufficient	2 (5.7%)	12 (34.3%)	21 (60.0%)	35
Total	312 (7.7%)	3542 (87.6%)	191 (4.7%)	4045

Note: percentages are calculated per row.

AIM OF THE THESIS

For a screening to be (cost)effective, an optimal screening participation is considered essential. Effective implementation strategies are therefore necessary to stimulate participation in the screening. The aim of this thesis was to investigate the determinants related to the implementation of US screening for DDH and, particularly, the determinants associated with parental participation in and satisfaction with the screening. The results of the separate studies are a valuable addition to the economic and clinical evidence demonstrated in the Soundchec 1 study. In practice, the results can support health care policy-makers in their decision-making concerning national implementation of the screening and provide them with effective implementation strategies.

THESIS OUTLINE

The present thesis will first provide a theoretical overview in which the focus will be on the challenge of implementing innovations in health care. Special attention will be given to the innovation process and the determinants that are associated with this process (chapter 2). Before implementing an innovation in health care it is essential to identify determinants that can enhance or impede the process of implementation. One way of gaining insight into these determinants is organizing group discussions with the most important stakeholders. In chapter 3, the results of this focus group study will be described. Chapters 4 - 7 of this thesis focus on parental participation in the screening and satisfaction with the received care. The aim of the study presented in chapter 4 was to examine the psychosocial determinants related to parental participation in the screening. Chapter 5 presents the results of a study into the most effective way to invite parents to the screening. In this chapter, the influence of gain-framed and loss-framed messages on parental participation in the screening was assessed. Chapter 6 deals with the satisfaction of parents with the US screening and with factors that determine their satisfaction. The desirability of direct referral to the orthopedic surgeon is studied in chapter 7. The aim of this chapter was to assess the parental satisfaction with direct referral and indirect referral to the medical specialist in case DDH is suspected. The thesis is completed with chapter 8, discussing the main conclusions, providing implementation strategies and considering methodological issues.

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CHAPTER 2

FROM SCIENCE TO CLINICAL PRACTICE:
THE ART OF GETTING THINGS DONE

INTRODUCTION

Ultrasound (US) screening for developmental dysplasia of the hip (DDH) is an innovation in preventive child health care (CHC) in the Netherlands. The implementation of this new screening method in preventive CHC is expected to provide health benefits for infants and to save on costs [1]. However, the implementation of innovations in health care is generally considered a challenging process [2-6]. A large gap exists between scientific evidence on the one hand, and actual care on the other. Evidence-based results about best practice in health care do not always lead to desired behavior on the part of health care providers [3, 7-9]. Failure to use scientific evidence can have adverse outcomes, such as unnecessary costs, underuse of effective care, overuse of inadequate care and errors in health care provision [10]. Therefore, it is essential that implementation research is conducted to facilitate the transition from science to practice and to ensure that the desired change does actually take place [11]. Domitrovich and Greenberg [12] provide five rationales for conducting implementation research:

- Gaining knowledge about what actually happens during an intervention, such as the quality of the program and exposure of the intervention to the target population;
- Establishing the internal validity of an intervention (did the program produce change?);
- Gaining insight into the dynamics of an intervention, such as relations between users and the obstacles they face;
- Gathering of feedback that can be used for quality improvement;
- Contributing to the knowledge about 'real-world' implementation of interventions.

This chapter provides a theoretical overview of the innovation process and the challenge of implementing innovations in health care. First, all the phases in the innovation process are described. Second, the determinants related to the innovation process are described and a framework is introduced that is used in the studies described in this thesis. Furthermore, this chapter focuses on the specific characteristics of the implementation of innovations in preventive CHC and it reviews three case studies in the Netherlands.

THE INNOVATION PROCESS

An innovation is formulated by Rogers as: "An idea, practice, or object that is perceived as new by an individual or other unit of adoption" [13, p. 12]. With regard to health care innovations, Omachonu and Einspruch provide the following description: "The introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety,

outcomes, efficiency and costs" [14, p. 5]. In the innovation process, several key stakeholders are involved for whom the innovation should be beneficial. These stakeholders and their needs, wants and expectations are presented in Table 1.

Table 1. Key stakeholders of the health care innovation process [14]

Stakeholders	Needs, wants and expectations
Physicians and other care givers	- Improved clinical outcomes - Improved diagnosis - Improved treatment
Patients	- Improved patients' experience - Improved physiological well-being - Reduced waiting time - Reduced delay
Organizations	- Enhanced efficiency of internal operations - Cost containment - Increased productivity and quality - Outcomes improvement
Innovator companies	- Profitability - Improved outcomes
Regulatory agencies	- Reduced risks - Improved patient safety

The innovation process consists of four main phases:

- Dissemination: the process through which the innovation is communicated;
- Adoption: the decision of a person/organization to make use of an innovation;
- Implementation: the usage of the innovation;
- Continuation: the decision of a person/organization to (dis)continue using the innovation.

Dissemination

The first phase of the innovation process is the dissemination of the innovation. Effective dissemination is an important precondition for effective implementation [15]. Systematic and well-planned dissemination is therefore needed to inform the most important stakeholders about the innovation. Dissemination strategies focus on creating interest in and knowledge about the innovation, stimulating a positive attitude and triggering the willingness to change existing practices [15]. In this phase, it is necessary to use active approaches to encourage the

implementation of evidence-based results, such as reminders, interactive educational meetings or a multifaceted approach, including a combination of interventions [16]. Passive dissemination of information, such as the mailing of educational materials, is generally ineffective and only results in minor changes in practice.

Adoption

Following the dissemination of the innovation, the individual or organization can decide to make use of, or to adopt, the innovation. This is the second phase of the innovation process. In the adoption phase, there should be an acknowledgment of an unmet need and a decision to try a certain innovation as a means of fulfilling this need [4]. Adoption of innovations by individuals is generally considered to be a complex process in which several actions and feelings play an important role [5]. Adoption by organizations can be even more complex since several hierarchical levels in the organizational have to be considered and a greater number of people are involved in the formal decision-making process. Several aspects throw light upon why individuals or organizations pass on to the adoption of an innovation. Innovations that are perceived as having a high relative advantage, being compatible with the current practice and existing values and easy to use and understand, that can be tried on a limited basis and of which the results are visible, generally have a higher chance of being adopted [13].

Implementation

The third phase of the innovation process is the implementation of the innovation. This is the use of the innovation in the daily routines of an individual or organization [15]. Strategies in this phase focus on the integration of the innovation into these routines. Elements of effective implementation include the systematical approach and planning of implementation activities, cooperation with several stakeholders during the development and refinement of the innovation, analysis of the target population and setting prior to the start of the implementation and striving for long-term effects [15]. Main activities in the implementation phase include the training of staff members, technical assistance to solve problems, evaluation of the implementation process, evaluation of the cost-effectiveness and patient outcomes, and feedback and refinement of the intervention [17].

Continuation

The final phase of the innovation process is the (dis)continuation of use of the innovation by the individual or organization. On an individual level, feedback on performance can be used to motivate users to continue using the innovation [18]. In order to prevent early termination of use of the innovation in organizations, it is important that the innovation is integrated into the

organizational policy [17-18]. Financial and organizational changes have to be made to maintain the intervention, such as securing funding and the training and supervision of new personnel.

DETERMINANTS RELATED TO THE INNOVATION PROCESS

Many researchers in the implementation field highlight the importance of the identification of factors that might challenge or promote the implementation of innovations [2-4, 6, 15, 17, 19]. Identification of the determinants and accommodation of these determinants in the implementation strategy are essential for successful implementation. Several determinants that can influence the innovation process have been proposed. For example, Grol and Wensing [6] emphasize that planning of implementation should take into account characteristics related to the individual professional, the patient, the social context, the organizational context and the economic and political context. In a systematic review by Cochrane et al. [3] which focused on the barriers related to the gap between knowledge and actual clinical practice, an extensive list of determinants was compiled. This list included barriers related to cognition and behavior, attitude and emotion, the health care professional, the evidence, the patient, support or resources and the system and process. Based on an extensive literature review, Greenhalgh et al. [5] created a unifying conceptual model including the determinants of diffusion, dissemination and implementation of innovations in health service organizations. The model highlights six themes: (1) the innovation, (2) the adoption/assimilation process, (3) communication and influence, (4) the inner (organizational) context, (5) the outer (inter-organizational) context and (6) the implementation process.

Another comprehensive framework, which is relatively similar to the one provided by Greenhalgh et al. [5], was created by Fleuren et al. [2] (Figure 1). This framework represents the innovation process combined with determinants related to this process. In every separate phase in the innovation process (dissemination, adoption, implementation and continuation) the desired change can be impeded. The transition from one phase to the following phase can be influenced by the innovation determinants. These determinants are divided into:

- Characteristics of the innovation (e.g. compatibility with existing work procedures and triability);
- Characteristics of the adopting person (user) (e.g. available knowledge and skills and self-efficacy);
- Characteristics of the organization (e.g. hierarchical structure and organizational size);
- Characteristics of the socio-political context (e.g. rules and legislation).

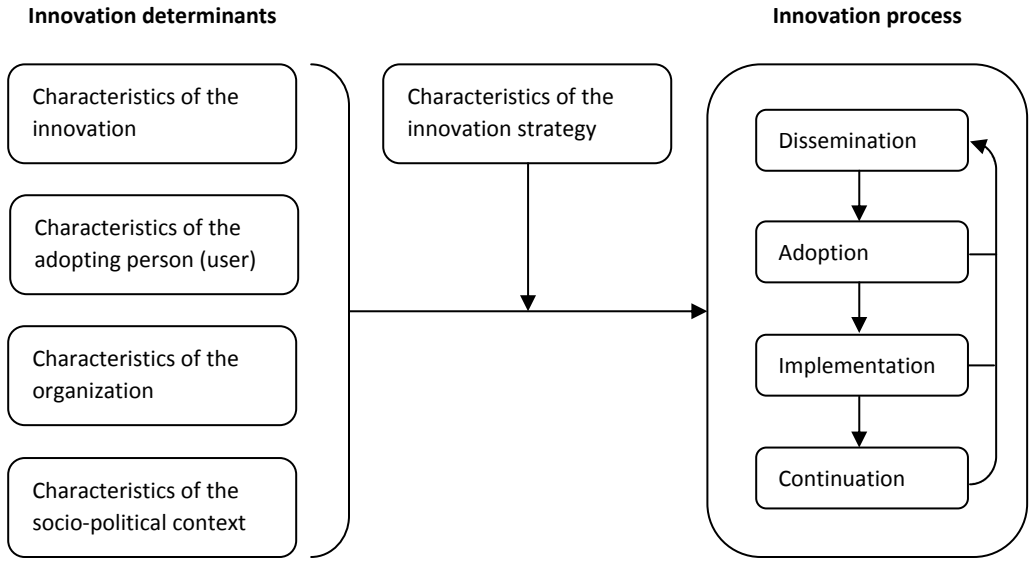

Figure 1. Framework representing the innovation process and related categories of determinants [2]

IMPLEMENTATION OF INNOVATIONS IN PREVENTIVE CHILD HEALTH CARE

Best-practices and knowledge of implementing innovations in general health care can guide the implementation of innovations in preventive CHC. Health care policy decision-makers may face the same challenges when implementing developmental surveillance services and screening in preventive CHC. However, an important difference should be acknowledged, namely the target population. Implementation studies in general health care mostly focus on benefits that can be obtained for people who are ill or who are suffering from a disease. On the contrary, clients in preventive CHC are largely healthy infants who receive preventive care based on decisions of their parents. Thus, implementation strategies might need to be adapted to this specific setting and target population.

In order to promote high quality early developmental surveillance and screening, a strategy for successful implementation was formulated by the American Academy of Pediatrics (AAP) [20]. This strategy included the following recommendations:

- Commit to better and earlier evaluation of children who are at risk, both developmentally and medically;
- Be prepared to work together across disciplines, identifying and bringing together key stakeholders;
- Address potential shortages or lack of availability of early intervention resources;
- Seek out reliable and valid screening tools;
- Identify optimal times and locations for screening;
- Plan and provide professional training and education;
- Standardize simple and effective processes for referral and feedback between medical homes and community providers who serve young children;
- Ensure appropriate payment for surveillance, screening, and evaluation;
- Expand evidence on the effectiveness of developmental surveillance.

A review by Regalado and Halfon [21] found that studies that assess the efficacy of several routine developmental surveillance services and screening activities are often small-scale and limited to one location. In order to promote child development, the authors emphasize the importance of studies to assess the efficacy and feasibility of implementation of developmental services on a wide-scale. A number of factors were identified in the review that are considered to impede the effective provision of developmental services, including training and expertise of pediatricians, adequate reimbursement and organizational barriers [21]. Other factors related to the provision of developmental surveillance and screening include structural barriers (e.g. timing of well-child visits and accessibility to health care), cost for developmental screening, physician and child characteristics (e.g. physicians' sex) and limited sensitivity and specificity of existing screening methods [22]. At the level of the physician, Pinto-Martin et al. [23] suggest several barriers for implementing developmental screening, including lack of time, lack of adequate reimbursement, fear of finding a positive screen and the discomfort of communicating bad news to parents, fear of referral of a false-positive infant leading to distress and anxiety, and not seeing the benefits of performing the screening.

Three case studies in the Netherlands

The organization of preventive CHC in the Netherlands through home care organizations or municipalities via Youth and Family Centers is unique in Europe [24]. In the following paragraphs three case studies will be presented as examples of the implementation of

innovations in preventive CHC in the Netherlands. The first case focuses on a systematic approach that is used to implement guidelines in preventive CHC. The second case describes the results of a pilot implementation of a national hearing screening program and subsequently the 'real-world' implementation of this screening. The third case concerns the recent implementation of the human papillomavirus (HPV) vaccination for adolescent girls.

Implementation of guidelines in preventive CHC

Since 1998, several guidelines for preventive CHC have been developed and implemented [25]. Included in these guidelines are evidence-based approaches for the execution of the 'products' of the Basic Program of Preventive Child Health Care (Basistakenpakket Jeugdgezondheidszorg). The guidelines are implemented and evaluated in a systematic way along the framework of Fleuren et al. [2]. The first phase in the innovation process is the dissemination of the guideline through which awareness should be created among the intended users. In the adoption phase, the intended user decides if he/she actually wants to use the guideline. In the implementation phase, the guideline is used in practice and the objective of the final phase is to use the guideline as part of the daily routines. In every phase of the innovation process, several barriers can hinder the transition to the following phase. These barriers are related to the innovation (e.g. usability and comprehensibility of the guideline), the (future) user of the guideline (e.g. knowledge and skills), the organization (e.g. decision-making by the management and available time) and the socio-political context (e.g. financing and parental support). For national implementation of the guideline, it is essential that insight is gained into the determinants that influence the several phases in the innovation process. Based on a determinant analysis, innovation strategies can be adopted to the relevant determinants so as to allow for the successful future implementation of the guideline. In preventive CHC, pilot implementations -in which health care professionals and managers use the guideline for a couple of months- are used to get an overview of the most important determinants related to the innovation process of the guidelines. Moreover, monitoring and evaluation of the innovation process are intended to gain insight into the degree of dissemination, adoption, implementation and continuation (effect evaluation) in relation to the determinant analysis and the innovation strategies (process evaluation). Based on these evaluations, refinement of the guideline or the innovation strategies is possible. This systematic approach of identifying relevant determinants through a pilot implementation has been applied to several guidelines in preventive CHC, such as prevention of child abuse [26], toilet-trainedness [27], small body length [28], non-scrotal testes [29] and asthma [30].

Implementation of neonatal hearing screening

Hearing screening of the newborn is helpful to detect deafness and to prevent negative effects on the development of speech, language and social interaction [31]. In 1999 and 2000, a large pilot study was performed to gain insight into the feasibility and (cost)effectiveness of implementation of neonatal hearing screening in the Netherlands [32]. The pilot implementation focused on identifying determinants related to the organization, the parents and the screeners. Based on the results of the study, recommendations could be formulated for the innovation strategy for the national implementation of the hearing screening. These recommendations included suggestions for the referral of the infant, advise about ways to maintain screening skills and suggestions for the monitoring and quality control of the screening.

After this pilot implementation, the neonatal hearing screening was nationally implemented between 2002 and 2006 [33]. Protocols, manuals, a uniform administration system, training sessions and a quality control system were aspects that were included in the implementation strategy. During the implementation process, all of these aspects were closely monitored. Moreover, satisfaction surveys among parents, screeners and managers were conducted. The results showed a high degree of implementation, which could be demonstrated from a high parental participation rate, a high positive predictive value of the screening, an excellent quality control system and good parental and screener satisfaction. Based on the national implementation of newborn hearing screening, recommendations could be formulated for continuation of the screening.

Implementation of the human papillomavirus vaccination for adolescent girls

Cervical cancer is caused by persistent infection with high-risk HPV and is the second most common cancer affecting women worldwide [34-35]. HPV vaccination is considered an important primary prevention approach [35]. In 1997, prior to the implementation of the HPV vaccination in the Netherlands, a report was published by the National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieu – RIVM) [36], in which several factors were identified that could hinder or promote implementation. The feasibility of the implementation of the HPV vaccination could be influenced, among other factors, by the price of the vaccine, the attitude and knowledge of adolescents and parents regarding the need for vaccination and the availability of a proper infrastructure for implementation to increase participation rates.

Following the implementation of the HPV vaccination in the Netherlands in 2010, several evaluation studies were conducted in order to identify important determinants related to the implementation. Evaluation of vaccination coverage for the first cohort of adolescents showed

a 56% and 53% uptake for the first and second dose [37]. Although many parents and daughters do have a positive opinion in relation to the vaccination, the question remains as to why the participation rate was far below the expected and desired rate. One of the reasons that is proposed, is the existence of the so-called 'wild-tales' [38]. HPV vaccination critics from the medical world and the Dutch Association for Conscientious Vaccination (Nederlandse Vereniging Kritisch Prikken) received a lot of attention in the media, sometimes even to a greater degree than the regular campaign message of the National Institute for Public Health and the Environment. Therefore, Van Keulen et al. [38] recommend the development of more accurate communication strategies. Positively formulated messages are considered important to inform people about the vaccination and to prepare people for negative messages. New media and social networks can be used as information channels for the dissemination of information about the vaccination. Moreover, medical specialists should fulfill the role of experts in communication with mothers and daughters since they are considered to be a reliable information source.

Several socio-demographic and psychosocial determinants related to getting the vaccine have been reported [37-39]. Factors related to non-participation are for example: living in one of the four largest cities in the Netherlands, both parents born outside the Netherlands, living in an area with a low socioeconomic status and living in a municipality in which more than 15% of the residents vote for the Reformed Political Party (SGP) [37]. Van Keulen et al. [38] found that vaccination uptake was related to mothers' and daughters' attitude, ideas about the vaccination (e.g. safety, sexuality and trust in the government), subjective norm, risk perception, anticipated regret, perception of relative effectiveness of the vaccination, habits and outcome expectations (e.g. infertility and fear of the injection). Moreover, it was found that parents who were unsure about the negative side effects, who assumed the vaccine to be unsafe and who had doubts about the effectiveness, were less likely to have their daughters vaccinated [39]. Practical barriers, such as distance to the vaccination location, did not influence participation. To date, studies monitoring and evaluating the implementation of the HPV vaccination are still ongoing.

CONCLUSION

This chapter showed that implementation of scientific evidence in (child) health care is considered a challenging process. A theoretical overview was given of the innovation process and the determinants related to this process. Furthermore, three case studies describing the implementation of innovations in preventive CHC in the Netherlands were discussed. The identification of determinants related to the innovation process was emphasized as being

essential to optimize the innovation strategy and to facilitate the implementation of the innovation. The evidence-based framework of Fleuren et al. [2], including characteristics related to the innovation, the adopting person (user), the organization and the socio-political context, will be applied in the forthcoming chapters of this thesis. First, the framework will be used in a focus group study to identify the most important determinants related to the implementation of US screening for DDH (chapter 3). After creating an overview of these determinants, the focus of this thesis (chapters 4 – 7) will be on one of the determinants in the framework: the user of the innovation. Two users can be determined in light of the screening, namely the screener who creates the images and the parents who have the possibility to participate. In this thesis, the focus will be on the parents of the infant, as their support is essential for successful implementation of the screening.

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CHAPTER 3

IMPLEMENTING ULTRASOUND SCREENING FOR DEVELOPMENTAL DYSPLASIA OF THE HIP: A FOCUS GROUP STUDY

MARJON WITTING
MAGDA M BOERE-BOONEKAMP
MARGOT AH FLEUREN
RALPH JB SAKKERS
MAARTEN J IJZERMAN

SUBMITTED

ABSTRACT

Objective

Insight into the key determinants of an innovation is necessary for its successful implementation in health care. The aim of this study was to identify enhancing factors, impeding factors and preconditions, within a framework of innovation determinants, related to the implementation of ultrasound (US) screening for developmental dysplasia of the hip (DDH) in preventive child health care (CHC).

Methods

Four focus group interviews were conducted with key stakeholders, including (1) managers and staff doctors within CHC organizations, (2) CHC physicians, CHC nurses and radiographic technicians, (3) representatives of policy, professional and patient organizations, and (4) parents of newborns. Orthopedic surgeons, radiologists and general practitioners received a questionnaire. The results of the transcripts were classified into four categories of determinants (innovation, user, organization, socio-political context) and categorized into enhancing factors, impeding factors and preconditions.

Results

A frequently mentioned advantage of US screening compared to the current screening was a higher validity and reliability. Other advantages included the high accessibility to and familiarity with the CHC center for parents and the opportunity for specialization and differentiation for CHC professionals. Drawbacks included the time-investment for CHC organizations and the difficulty of learning to acquire the necessary skills to perform US screening. Several preconditions were identified: a model for organization of the screening, financial support for CHC organizations and thorough education of the screeners.

Conclusions

In formulating the strategy for a pilot implementation, the study of enhancing and impeding factors within the framework of innovation determinants was very useful. Parental information provision, the content of the training program for the screeners and the quality assurance are examples of results used in formulating the strategy.

INTRODUCTION

Developmental dysplasia of the hip (DDH) is the generic term for dysplastic hips with or without (sub)luxation [1-3]. Early detection of DDH allows the normal development of the hip [3-4] and gives the best chances for effective treatment [2, 4]. Worldwide, various screening strategies have been recommended for the early detection of DDH in infants [5]. The most commonly used method includes physical examination and identification of risk factors to determine the need for additional imaging of the hips with ultrasound (US) or X-ray. In the early eighties, Graf [6] introduced US screening for DDH. Nowadays, in several European countries, US is an accepted method to screen for DDH [7-8]. Advantages are the non-invasiveness, non-involvement of radiation, ease of use [6, 9] and its imaging possibilities of bony structures as well as soft tissues.

In the Netherlands, screening for DDH based on physical examination in the first six months of life has been part of the preventive child health care (CHC) program for decades. In case of a positive screening result, the infant is referred to the general practitioner (GP) and subsequently sent to the medical specialist for additional imaging. In 1998 and 1999, a large prospective cohort study was carried out to investigate the effectiveness of US screening for DDH. A scenario analysis showed that universal US screening at the age of three months in CHC centers, compared to the current screening method, is more effective due to a higher sensitivity and a decreased referral rate [10]. Other research showed a reduction in surgical procedures when using routine US screening [11-12].

Although US screening for DDH shows to be more effective compared to the current screening practice, this does not guarantee a successful implementation in health care. The introduction of innovations in health care is widely recognized as a complex process [13-17]. There are often major discrepancies between best evidence and practice, sometimes resulting in a large variation between users [18-20]. Therefore, the effectiveness of US screening will largely depend on whether screening in daily practice is feasible. A detailed understanding of critical determinants among the potential users/stakeholders is a prerequisite for designing an innovation strategy and adapting this strategy to these determinants [13-16, 21]. An innovation process comprises of four main phases, which can be seen as points at which the desired change may not occur: dissemination, adoption, implementation and continuation (Figure 1). The transition from one phase to the next can be affected by various determinants, which can, according to Fleuren et al. [13], be divided into four categories: characteristics of the innovation (e.g. relative advantage, complexity), characteristics of the adopting person (user) of the innovation (e.g. available knowledge and skills), characteristics of the organization (e.g. available expertise, staff turnover) and characteristics of the socio-political context (e.g. rules and legislation).

A pilot implementation was set up to explore the feasibility of future national implementation of US screening for DDH in preventive CHC among infants aged three months in the Netherlands. This paper describes a focus group study into the enhancing factors, impeding factors and preconditions, within the framework of innovation determinants, among relevant stakeholders. The focus group study is the first phase of the pilot implementation and contributes to the formulation of the innovation strategy.

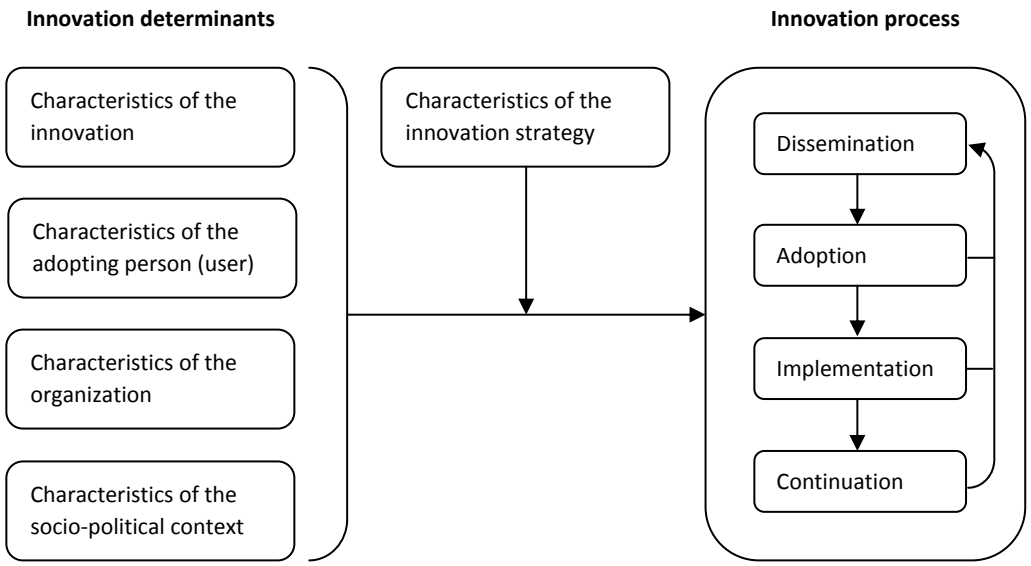

Figure 1. Framework representing the innovation process and related categories of determinants [13]

METHODS

Design

In 2007, four semi-structured focus group interviews were conducted with the key stakeholders. Focus group interviews use the interaction of the participants, like listening to other ideas, arguing, and asking questions, to generate new ideas on a specific issue [22-23]. The first focus group comprised of managers and staff doctors of several CHC organizations ('managers/staff'). The second focus group consisted of CHC physicians, CHC nurses and radiographic technicians, the disciplines that were going to perform the US screening ('screeners'). The third focus group comprised of representatives of policy, professional and patient organizations: the Dutch Center for Youth Health Care (NCJ), the association of patients

with DDH (VAH), the Radiological Society of the Netherlands (NVvR), the sector organization for health care entrepreneurs (ActiZ), the sector organization for health care insurers (ZN) and the scientific organization for CHC physicians (AJN) ('national organizations'). Parents of newborns (≤ 6 months) participated in the fourth focus group ('parents'). A fifth focus group of orthopedic surgeons, radiologists and GPs was planned, but due to organizational difficulties replaced by a questionnaire survey ('specialists').

Recruitment of participants

Participants in the managers/staff, screeners and national organizations groups were recruited by sending invitation letters. Parents of newborns were invited via letters distributed during a routine well-child visit. All the invitation letters described the aim of the focus group, gave general background information about the pilot implementation, included an application form and a reply-paid envelope. A written questionnaire, which followed the same structure and content as the planned specialist focus group interview, was sent to eighteen specialists.

The focus group sessions

Two moderators alternated in leading the sessions and two research assistants made detailed notes. The interviews were introduced with a short presentation about the pilot implementation and the aim of the focus group study. Each session took approximately two hours to complete. In all sessions, enhancing and impeding factors as well as preconditions concerning the implementation of US screening were discussed within the framework of the four innovation determinants (innovation, user, organization and socio-political context).

Analysis

All focus group discussions were recorded and transcribed in their entirety. Subsequently, the transcripts were independently analyzed by three of the authors. The data were first categorized into the four main categories of the innovation determinants and subsequently attributed into enhancing and impeding factors and preconditions. The same procedure was used to analyze the results of the questionnaires. Variations between the researchers were discussed in order to come to general agreement.

RESULTS

Participants

The number of participants in each focus group varied between six and ten, giving a total of 31 contributors. In the managers/staff focus group nine people participated. The screeners and the national organizations focus groups each had six participants. Ten people participated in the parents focus group. Twelve out of eighteen questionnaires sent to the specialists were returned.

General results

Overall, participants had a positive attitude towards the national implementation of US screening for DDH. In the parents group, participants stated that if they would have a choice of participating, they would all visit the US screening with their infant. The screening was clearly recognized as a benefit for their infant's health. Comparable results were found in the screeners group. In the event of national implementation, they were all willing to perform US screening. The managers/staff also supported the introduction of US screening. Their organizations would definitely implement the screening if it proved to be qualitatively better than the current screening method.

Determinants related to the innovation

In all focus groups, participants considered US screening to be a more valid method for detection of DDH compared to the current screening method. The latter was considered insufficient and unreliable for detecting DDH, resulting in too many false-positives and false-negatives. Another health benefit expressed was the reduced delay in additional diagnostics and treatment when DDH is suspected at the US screening. Finally, it was expected that the reduced number of referrals to the medical specialist and the reduction of false-negatives would result in cost savings. While most participants pointed out the higher validity of the screening, a number of participants stated that evidence was lacking with respect to the validity and that, if implemented in the future, the advantages of the screening should be made clearer.

A precondition mentioned was the high quality of the US equipment. The managers/staff, screeners and specialists emphasized the importance of the reliability and the ease of use of the equipment.

Determinants related to the user

Participants recognized US screening as a means for CHC professionals to specialize and further differentiate their work in preventive CHC. In addition, for CHC organizations, US screening is a new task they can offer to their employees. There was much discussion in the groups about the profession that should perform the screening when it is nationally implemented. In the screeners group, the radiographic technicians argued that for them performing US screening in preventive CHC is attractive, because it is a completely new working environment with predominantly healthy infants. The variety of working in the hospital and in preventive CHC was considered very appealing. In almost all groups, the participants mentioned that employing radiographic technicians for the screening has the advantage that their training could be less intensive because they are already experienced with the technique. A perceived barrier was their non-experience with having final responsibility in the diagnostic procedure, compared to the hospital situation in which this responsibility belongs to the radiologist. The advantage of appointing CHC professionals is their experience with offering preventive care, having final responsibility and the continuity for parents. One participant mentioned that he had doubts about the quality of the screening if it is performed by CHC nurses. The participants concluded that the most important criterion for choosing an occupational group should be the quality of the screening.

The screeners and national organizations groups expected it to be easy for all disciplines to perform US screening. Others had doubts about this ease and claimed it to be a difficult skill to acquire, especially for non-radiographic technicians. One of the preconditions for implementation is therefore an intensive training for the screeners, including training on the job, feedback and training in communicating bad news. Quality assurance was considered essential by the specialists and should be arranged nationally in, for example, an expertise center. In addition, it is necessary to define clear quality criteria for performing the screening and maintenance of competence.

Currently, CHC physicians perform the physical hip screening during regular well-child visits. If US screening is nationally implemented, this physical screening will be replaced. Some participants stated that it might be difficult to omit the physical hip examination from the routines of CHC physicians because they consider it part of their work. However, it was also mentioned that by omitting the physical screening, more time is left for other tasks during regular well-child visits.

Participants in most groups expected that parents would have a positive attitude regarding US screening, leading to high participation rates. Busy schedules, working times and traveling distance would not discourage them from participating. However, limited willingness of parents to participate was also considered an impeding factor by some of the participants.

Suggested reasons for this were the need for an extra visit of parents to the CHC center, the possibility that parents would not see the benefit of the screening, not possessing a car and time-constraints. A perceived advantage of the screening for parents is their familiarity with the US technique, since they already obtained an US exam during their pregnancy.

Determinants related to the organization

Both managers/staff and screeners agreed on the added value of national implementation of US screening for preventive CHC. For CHC organizations, evidence-based improvement of screening for DDH establishes a more professional image among parents and for other health care organizations. The screeners and parents strongly believed that CHC centers are the appropriate place for programmed screening of infants in comparison to a hospital. CHC centers were considered familiar and easily accessible to parents.

From the point of view of some of the managers/staff, the organization of national implementation of the screening was a concern. They expected that time investment for planning and organization of the screening activities would be high. Therefore, they considered it desirable that a model for the organization of the screening would be made available to support managers in making decisions on how to organize the screening in the most optimal way. The foundation of this model should be the balance between customer friendliness and efficiency. For example, do organizations accept longer traveling times for parents if organized at one central location or is it necessary to perform the screening at more locations to reduce traveling times? The model should also take into account the degree of urbanization of the service area. An urban area may require another way of organizing the screening than a rural area. In addition, clear protocols including information on inclusion criteria of infants and which actions should be undertaken in case of non-participation are necessary. Finally, extra budget for implementation of the screening in CHC organizations was considered essential as well as financial support for continuation of the screening.

The managers/staff and parents groups emphasized the importance of effective information provision to parents. Parents should be informed about DDH, the screening procedure, the results of the screening and treatment for DDH. This information should be provided in person at the CHC center as well as in a brochure. For non-native speakers, the information should also be available in other languages.

Determinants related to the socio-political context

It was proposed that if US screening is going to be implemented in the Netherlands, the screening should be regulated by law by including it in the Population Screening Act and in the Basic Program of Preventive Child Health Care. Not directly related to implementation of the

screening, but important to some of the participants, was the current variety in treatment of DDH by orthopedic surgeons. The participants stated that a uniform treatment policy should be formulated.

One of the barriers mentioned by the screeners and national organizations groups was the possibility that the screening could have financial consequences for radiologists, since additional imaging in the hospital might not be necessary if an US is already performed in preventive CHC. However, the radiologists who filled in the questionnaires did not perceive this as a barrier. Another impeding factor mentioned by the national organizations group was the possible resistance of orthopedic surgeons to the implementation of US screening in preventive CHC. They thought that orthopedic surgeons might prefer to keep diagnostic procedures in the hospital setting. However, in the specialists group in which the orthopedic surgeons were represented, this line of thought was not confirmed.

DISCUSSION

It can be concluded that all participants were supportive of the implementation of US screening for DDH. The screening was seen as a more valid method for detection of DDH compared to the current screening method. Diagnosis and treatment of infants with DDH was expected to take place in an early phase, resulting in better health outcomes. In the future, costs for the screening were expected to decrease due to a decline in referrals and missed cases. This is in agreement with a study of Roovers [24], who found that US screening at the age of three months is less costly than the current screening.

Most participants were positive about offering the screening to parents in CHC centers. However, some participants mentioned the possibility of conducting the screening at a hospital, where the expertise and equipment are already available. The advantages of CHC centers compared to the hospital included the familiarity and easy accessibility to parents. Data from the Netherlands also illustrate that parents highly appreciate CHC centers and are emotionally attached to this form of health care [25]. Preventive CHC in the Netherlands provides a good infrastructure for programmatic prevention, because of the high attendance rates, easy accessibility and the fact that parents perceive well-child visits as self-evident [26].

In implementation research, lack of time and budget, is seen as an important barrier to implementation [21]. In this study, this was also mentioned as an important impeding factor. Time is needed for planning, for organizing the screening, for inviting parents etcetera. To reduce this time investment, a model for planning of US screening is desirable. In addition, CHC organizations have to be financially supported to implement the screening. Since health benefits and subsequently cost benefits will be achieved in hospital care and not in preventive

CHC itself, a proper financial system should be developed to finance the screening. In addition, a good organization and funding is a precondition for a high attendance rate [27].

Research shows that experienced DDH screeners are needed to achieve reliable outcomes, resulting in a reduction of check-ups and overall treatment rate [12, 28]. Standardized training and regular quality controls are considered important conditions for obtaining and maintaining qualified screeners [28-29]. The majority of the participants in this study considered a thorough training of screeners an essential precondition for implementation. After following the training, the screeners should meet predefined quality criteria and they should maintain there experience with a minimum of screening activities per month. Moreover, it was believed that a national expertise center should monitor the execution and quality of the screening.

In the Netherlands, the participation rate of regular well-child visits to the CHC center is high, namely 95% [26]. In line with this, most participants thought that the participation rate in the US screening would probably be high as well. However, possible barriers for participation in the screening were also considered, including time constraints, the need for an extra visit to the CHC center and not seeing the value of the screening. An important precondition mentioned by the managers/staff and the parents is effective information provision to parents. In line with other research on parental information provision [30], it is recommended that a qualified employee should inform parents verbally about the screening and subsequently provide them with a brochure to read at home.

A disadvantage of this study lies in the sampling bias. It is possible that people who were supportive of the screening were more willing to participate. For example, all parents and screeners were in favor of implementation and mainly mentioned enhancing factors while giving less attention to impeding factors. This bias was not noticed in the managers/staff and national organizations groups. In addition, the selection of participants in the managers/staff and screeners groups was based on geographical distance from the location of the focus group. Since the focus groups were conducted in an urban area, CHC organizations located in rural areas might have been underrepresented in these two focus groups.

This study shows some important enhancing factors and impeding factors and preconditions, within the framework of innovation determinants, related to the implementation of US screening for DDH in the Netherlands. The results were very useful for the formulation of an implementation strategy for the pilot study. First, the advices on parental information provision were used to design the brochures and subsequently to plan the diffusion of the brochures. Second, a thorough training for the screeners was organized in the pilot implementation, including training on the job and feedback on their performance. Third, CHC organizations were provided with extra budget to implement the screening and to take care of the extra planning activities. Finally, a radiologist checked all screening results to ensure

the quality of the screening. With the results of the second phase of the ongoing implementation study, it will be possible to formulate a well-grounded advice about strategies for future national implementation of the screening.

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CHAPTER 4

PSYCHOSOCIAL PREDICTORS OF PARENTAL PARTICIPATION IN ULTRASOUND SCREENING FOR DEVELOPMENTAL DYSPLASIA OF THE HIP

MARJON WITTING
MAGDA M BOERE-BOONEKAMP
MARGOT AH FLEUREN
RALPH JB SAKKERS
MAARTEN J IJZERMAN

SUBMITTED

ABSTRACT

Objective

Ultrasound (US) screening for developmental dysplasia of the hip (DDH) is an innovation in preventive child health care (CHC) in the Netherlands. Parental participation in the screening will be essential for the success of the implementation of the screening. The aim of the current study was to investigate whether psychosocial determinants (attitude, subjective norm, self-efficacy, perceived susceptibility, perceived severity, perceived effectiveness) predicted parental participation in the screening.

Methods

A cross-sectional survey was conducted. Using a questionnaire, several background variables and psychosocial variables were collected. Blockwise logistic regression was used to analyze the relations.

Results

A total of 703 questionnaires of participating parents and 393 questionnaires of non-participating parents were received. When controlling for the background variables, attitude, subjective norm, self-efficacy, perceived susceptibility and perceived effectiveness predicted parental participation in the screening. Perceived severity did not predict participation.

Conclusions

Psychosocial determinants influenced parental participation in the US screening for DDH. Health care policy decision-makers and CHC professionals should consider these determinants when organizing US screening for DDH in order to stimulate parental participation.

INTRODUCTION

Screening for developmental dysplasia of the hip (DDH) is important to prevent adverse effects in the development of the infant. Early detection of DDH is part of the preventive child health care (CHC) program in the Netherlands. The current screening is performed by a CHC physician and takes place several times during the first year of life. The protocol consists of physical examination of the hip and identification of risk factors (family history of DDH and breech position in the last trimester of pregnancy and/or at birth). In German-speaking countries, the golden standard for screening for DDH is based on ultrasound (US) examination of the hips [1]. Advantages of US screening for DDH include a high detection rate and a low referral rate [2] and a reduction in operative procedures because of early detection [3-4].

Based on the positive outcomes associated with US screening for DDH in the Netherlands [2], a pilot implementation was set up to gain insight into the feasibility and (cost)effectiveness of US screening at the age of three months in preventive CHC. Although participation rates in preventive CHC are generally very high, with almost 95% of the parents visiting the CHC center on a regular basis [5-6], it is unknown whether parents will participate in this new screening. As it is not part of the regular well-child visits, parents had to make a separate decision to attend the US screening. Therefore, it is very relevant to assess the determinants related to the (non)participation of parents in the screening.

Several theories describe psychosocial determinants that influence the performance of (health) behaviors. The theory of planned behavior [7] suggests that intentions and (health) behaviors can be explained by three key determinants: attitude toward the behavior, subjective norm and self-efficacy. These factors are considered to influence the intention to behave accordingly and to actually realize the behavior. The first factor describes the attitude toward the behavior, which is related to the set of a person's positive and negative beliefs about performance of a particular behavior [8]. The second factor is the subjective norm, which includes the likelihood that important others approve or disapprove the behavior and the motivation to comply with these individuals or groups. The last factor is self-efficacy, which refers to the perceived capability of carrying out a particular behavior. The general assumption of the theory of planned behavior is that the more positive the attitude and subjective norm regarding the behavior are and the greater the self-efficacy is, the stronger the intention should be to perform the health behavior. Socio-demographic factors and knowledge are assumed to indirectly influence health behaviors through the psychosocial determinants [9]. Having knowledge about a health risk can be a precondition for performing the behavior, but is often not sufficient for actual performance.

Other factors often associated with the performance of health behaviors are the perceived susceptibility/vulnerability and the perceived severity of the health problem, as

described in theories such as the health belief model [10-11] and the protection motivation theory [12-13]. These theories propose that people who consider themselves at risk for a particular condition and who perceive the condition as serious have a higher motivation to prevent themselves against this risk. Another central determinant in the health belief model and the protection motivation theory is the perceived effectiveness of the health behavior to reduce the risk. People who perceive the health behavior as effective are more likely to perform the particular behavior.

The determinants described in the various psychosocial models have been successfully used to predict health intentions and behaviors, such as screening for cholesterol [14], screening for Down Syndrome [15], vaccination against the human papillomavirus [16-17], reduction of childhood fever with medications [18] and mammography screening [19]. All these health behaviors involve individual decisions.

The aim of the present study was to predict participation in the US screening for DDH of parents as representative of the infants, by applying psychosocial determinants described in the theory of planned behavior, the health belief model and the protection motivation theory (Figure 1). In addition, we included several background variables in the model: the organization in which the screening was performed, socio-demographic variables and parents' knowledge of DDH and of US screening. Information about the factors that determine parental participation is relevant to improve future participation in US screening for DDH.

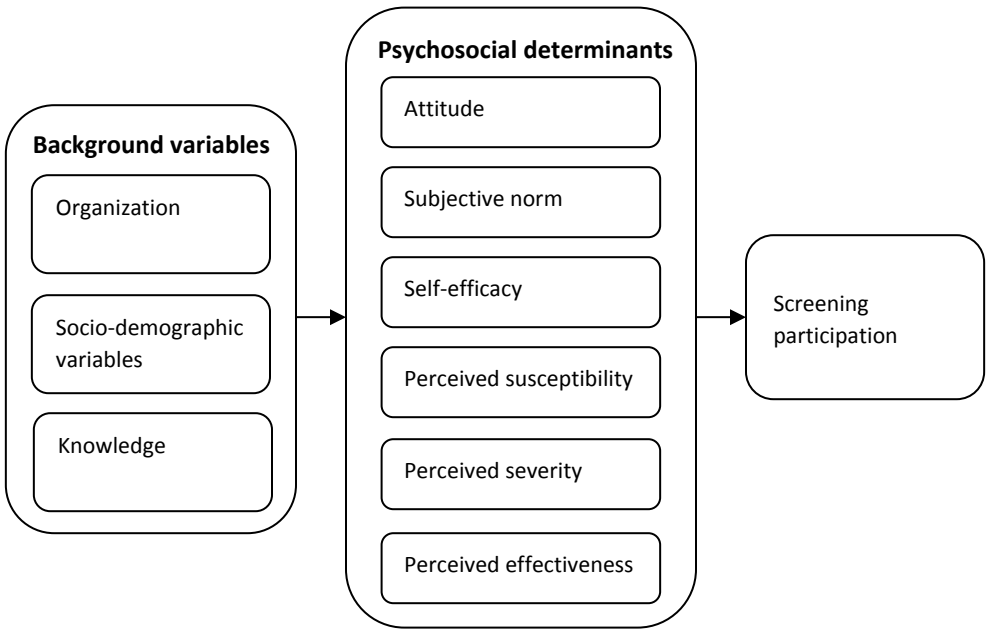

Figure 1. Predicting parental screening participation from psychosocial determinants

METHODS

Participants and procedure

The study population consisted of parents of all infants aged three months who were invited for an US screening at a CHC center of two CHC organizations between November 2007 and April 2009. One of the organizations was located in a rural area (organization A) and the other organization was located in an urban area (organization B). We included a sample of the parents that participated in the screening and all parents who had decided not to participate in the screening.

A questionnaire was developed to measure the background variables and the psychosocial determinants. A pre-test was performed to assess the comprehensibility of the questionnaire and to register the required time to fill it out.

The US screener handed out the questionnaire after the screening to 1140 parents participating in May and June 2008 and in November and December 2008; 622 of these parents (54.6%) visited organization A and 518 parents (45.4%) organization B.

Since the group of non-participants was expected to be much smaller than the group of participating parents, it was decided to include the parents of all infants who did not participate in the screening during the research period (November 2007 to April 2009). The questionnaire was sent to the home address of these 1057 non-participating parents when their infant was six months old. Of these parents, 263 (24.9%) visited organization A and 794 (75.1%) organization B.

Measures

Screening participation

Participation in the screening could be determined based on registration of (non)participation at the CHC center during the US screening and on informed consent forms that were filled out by all parents of newborns. This variable was scored 0 “did not participate in the screening” and 1 “participated in the screening”.

Background variables

The organization in which the screening was performed was used as a background predictor for participation, since screening procedures might have differed between the organizations (1 = organization A, 2 = organization B). Furthermore, the following socio-demographic variables were collected from the parents: age, educational level (low, middle and high) and the country of birth of both parents. The last background variable was parental knowledge, which was assessed with two measures. First, parents were asked whether they were aware of the

information brochure that was given to them at their first well-child visit to the CHC center. They had four answering options: (1) "No, I do not know the brochure", (2) "Yes, I know the brochure but I never read it", (3) "Yes, I read the brochure superficially" and (4) Yes, I read the brochure in depth." A dichotomous score was created based on these answering options (1 = did not read the brochure, 2 = did read the brochure). The second measure was the content knowledge about DDH and US screening. This was assessed by asking parents to answer three questions (the correct answer is underlined). The first question was: "If 1000 infants will be screened for hipdysplasia, in how many cases hipdysplasia will be diagnosed?" Parents had five answering options: (1) "10", (2) "30", (3) "50", (4) "100" and (5) "I don't know". The second question was: "How is the screening being performed?" There were three possible answers: (1) "with X-ray", (2) "with ultrasound" and (3) "I don't know". The last question was: "If the outcome of the screening at the CHC center is abnormal, this definitely means that the infant suffers from hipdysplasia." Again, there were three answering options: (1) "true", (2) "false" and (3) "I don't know". The questions were rated as 1 "false" or 2 "good". An answer "I don't know" was considered false and therefore was rated with 1. Scores were accumulated with a higher score denoting more knowledge.

Attitude

Parents were asked to rate their attitude about US screening for DDH in response to the following question: "For me, ultrasound screening for hipdysplasia is …" by rating 1-5 on seven items anchoring: "very bad - very good", "very frightening - not frightening", "not useful - very useful", "very unimportant - very important", "very unsafe - very safe", "not obvious - very obvious" and "not comforting - very comforting". Scores were accumulated and averaged, with a higher score denoting a more positive attitude. This seven-item concept had a high internal consistency (alpha = 0.89).

Subjective norm

Subjective norm was measured by first asking parents to rate from 1 "definitely no" to 5 "definitely yes" on the following question: "To what extent did the following people expect you to participate in the ultrasound screening: (1) your partner and (2) the health care professionals at the CHC center?" Second, parents were asked to rate 1 "very little" to 5 "very much" on the following question: "Considering participation in the ultrasound screening, how seriously did you take the opinion of the following people: (1) your partner and (2) the health care professionals at the CHC center?" To determine the subjective norm for the influence of the partner and the health care professionals, the score on the first item was multiplied by the score on the second item for both groups. Subsequently, these two scores were counted up

leading to a total score on subjective norm with a higher score denoting a higher subjective norm.

Self-efficacy

Self-efficacy was assessed by a two-item scale ranging from 1 “totally disagree” to 5 “totally agree”: “I expected that I had to arrange a lot to participate in the screening with my infant” and “I expected that it would cost me a lot of time to participate in the screening with my infant.” The scores on these items were reversed, with a higher score implying a higher self-efficacy. This concept had a good internal consistency (alpha = 0.81).

Perceived susceptibility

Perceived susceptibility was measured with one item: “How high did you, before the screening, think the chances were that your infant was suffering from hipdysplasia?” There were eight answering options anchoring (1) “chance of 1 on 10.000” to (8) “chance of 1 on 5”. Therefore, a higher score on this item implied a higher perceived susceptibility.

Perceived severity

Perceived severity of DDH was measured with three items ranging from 1 “totally disagree” to 5 “totally agree”: “If hipdysplasia is diagnosed in an infant this is very severe”, “Hipdysplasia has several negative consequences for the development of the infant” and “The idea that my infant could have hipdysplasia made me very anxious.” The higher the average score on this concept, the more severe parents perceived DDH. The scale had sufficient internal consistency (alpha = 0.63).

Perceived effectiveness

This concept was measured with three items on a five-point scale ranging from 1 “totally disagree” to 5 “totally agree”: “Ultrasound screening is a good method to detect hipdysplasia”, “I have more trust in ultrasound screening for detection of hipdysplasia than in the current screening for hipdysplasia at the child health care center” and “With ultrasound screening the chances are higher that hipdysplasia will be detected compared to the current screening at the child health care center.” The sum of these items was averaged and a higher score denoted a higher perceived effectiveness. The alpha of this scale was 0.76.

Data analyses

Means, standard deviations and frequencies were calculated for all variables. Chi-square tests and independent sample t-tests were used to compare the results of the participants and non-participants. Bivariate associations between (non)participation, the background variables and the psychosocial variables were examined using Pearson's correlation coefficients and Phi tests. To investigate whether the psychosocial determinants predicted parental participation, a two-step blockwise logistic regression was performed. In this analysis, participation in the screening was regressed on the psychosocial determinants after controlling for the effects of the organization, socio-demographic variables and knowledge. Multiple imputation was used to handle missing data (n = 432, 39.4%) for all variables with one or more missing values, resulting in five complete datasets.

RESULTS

Participants

In total, 703 questionnaires of participating parents were returned (response 61.7%). In organization A, 427 questionnaires were sent back (response 68.6%) and in organization B, 276 questionnaires (response 53.3%). The response rate of the non-participants was 37.2%, with 393 questionnaires received. In organization A, 123 questionnaires were sent back (response 46.8%) and in organization B, 270 questionnaires (response 34.0%).

Table 1 shows the socio-demographic characteristics of the participants and non-participants. There was a significant association between educational level of the parents and participation in the screening. Additional chi-square tests showed that parents with a high educational level had a significant higher chance to be a non-participant than parents with a middle or a low educational level. The average age of the mothers and fathers in the participants group was 31.53 (SD = 4.38) and 34.30 (SD = 5.13) respectively. In the non-participants group the average age of the mothers was 32.78 (SD = 4.28) and of the fathers 34.92 (SD = 4.73). The difference between the average age of the mothers in the two groups was significant $t(1086) = 4.54$, $p < .001$. The average age of the fathers also differed significantly $t(1073) = 1.94$, $p = .05$. The majority of the parents in both groups originated from the Netherlands.

Table 1. Socio-demographic characteristics of the participants and non-participants

Characteristic	Participants		Non-participants		
	N	%	N	%	
Educational level mother					
Low	139	20.1	50	13.0	
Middle	239	34.6	115	29.9	
High	312	45.2	219	57.0	$\chi 2$ (2, N = 1074) = 15.73, p < .001
Educational level father					
Low	176	25.9	60	16.1	
Middle	227	33.4	100	26.9	
High	277	40.7	212	57.0	$\chi 2$ (2, N = 1052) = 27.13, p < .001
Country of birth mother					
The Netherlands	654	93.3	359	91.8	
Turkey, Morocco, DA, Surinam	10	1.4	9	2.3	
Other country	37	5.3	23	5.9	$\chi 2$ (2, N = 1092) = 1.33, p = .51
Country of birth father					
The Netherlands	647	93.2	344	91.0	
Turkey, Morocco, DA, Surinam	18	2.6	9	2.4	
Other country	29	4.2	25	6.6	$\chi 2$ (2, N = 1072) = 3.06, p = .22

Note: DA = Dutch Antilles.

Descriptive statistics and correlations

The descriptive statistics for the psychosocial variables are presented in Table 2. The independent t-test showed that parents who participated in the screening were significantly more likely to have a positive attitude towards the screening compared to parents who did not participate. Moreover, participating parents also perceived a higher social pressure to participate in the screening and they scored higher on self-efficacy. Finally, there was a significant difference between participating and non-participating parents in the perception of effectiveness of the screening. Parents who participated, believed the screening to be more effective than the current screening method compared to parents who did not participate.

In the participant group, 68.9% (*n* = 483) of the parents read the information brochure, compared to 51.0% (*n* = 198) of the parents in the non-participant group. This difference was significant $\chi^2(1, N = 1089) = 34.05$, $p < .001$. There was also a significant association between content knowledge and participation $\chi^2(3, N = 1061) = 53.98$, $p < .001$. Of the parents participating in the screening, 5.8% (*n* = 40) scored three points, 27.1% (*n* = 187) had four points, 49.1% (*n* = 339) scored five points and 18.0% (*n* = 124) scored six points. For the non-participating parents this was 18.9% (*n* = 70), 28.3% (*n* = 105), 43.7% (*n* = 162) and 9.2% (*n* = 34) respectively. Additional chi-square tests showed that all scores, except for the comparison

between score four and five differed significantly between the participants and non-participants.

Table 2. Descriptive statistics for the psychosocial determinants of the participants and non-participants

Measure	**Participants**			**Non-participants**			
	N	M	SD	N	M	SD	
Attitude	672	4.52	0.50	366	4.09	0.77	t(1036) = -10.80, p < .001
Subjective norm	547	28.85	9.78	255	22.51	10.41	t(800) = -8.39, p < .001
Self-efficacy	691	4.01	0.80	339	3.66	1.04	t(1028) = -6.08, p < .001
Perceived susceptibility	679	3.16	2.06	324	3.10	2.07	t(1001) = -0.43, p = .66
Perceived severity	699	2.96	0.76	376	3.00	0.79	t(1073) = 0.50, p = .62
Perceived effectiveness	699	4.05	0.62	374	3.69	0.76	t(1071) = -8.43, p < .001

In Table 3, Pearson's correlations between the background variables, the psychosocial determinants and screening participation are presented. Participation was marginally related with the background variables. Small to medium relations were found between participation and the psychosocial determinants. Perceived susceptibility and perceived severity were not significantly correlated with participation in the screening.

Table 3. Pearson's bivariate correlations for relations between independent variables and parental participation in the screening

Measure	1	2	3	4	5	6a	6b	7	8	9	10	11	12
1. Organization													
2. Age mother	.17**												
3. Age father	.10**	.67**											
4. Educational level mother	.40**	.19**	.10**										
5. Educational level father	.42**	.17**	.08**	.59**									
6a. Reading of brochure	-.11**	-.01	.00	.00	-.06*								
6b. Content knowledge	-.06*	.06*	.09**	.19**	.13**	.22**							
7. Attitude	-.16**	-.09**	-.07*	-.09**	-.08*	.03	.08*						
8. Subjective norm	-.12**	-.13**	-.08*	-.07*	-.03	.06	.02	.32**					
9. Self-efficacy	-.05	.00	.03	-.05	-.05	.00	.06	.28**	.13**				
10. Perceived susceptibility	-.14**	-.13**	-.07*	-.12**	-.09**	-.04	.00	.14**	.13**	.01			
11. Perceived severity	.10**	.02	.00	-.11**	-.07*	-.07*	-.16**	.04	.10**	-.07*	-.01		
12. Perceived effectiveness	-.08*	-.02	-.04	-.03	-.03	.05	.11**	.51**	.25**	.20**	.14**	.17**	
13. Participation in screening	-.28**	-.14**	-.06	-.12**	-.16**	.18**	.20**	.32**	.28**	.19**	.01	-.02	.25**

* p < .05; ** p < .01.

Codes: organization 1 = organization A, 2 = organization B; reading of the brochure 1 = did not read the brochure, 2 = did read the brochure; participation 0 = did not participate in the screening, 1 = participated in the screening.

Note: associations between two dichotomous variables (organization, reading of brochure and participation) were calculated with Phi tests.

Psychosocial predictors of parental participation in ultrasound screening

Using the model in Figure 1, a two-step blockwise logistic regression was performed (Table 4). Results showed that a positive attitude concerning the screening positively influences parental participation. Moreover, parents who participated in the screening were significantly more likely to have perceived social pressure from their partner and/or from health care professionals at the CHC center to visit the screening. A positive influence of self-efficacy on participation was also found. The higher the perceived capability of visiting the screening, the higher the chance was that parents participated. There was a negative relation between participation in the screening and perceived susceptibility. The less parents perceived their infant to be at risk for DDH, the higher the chances were that they participated in the screening. Finally, if parents thought that US screening was effective for detection of DDH, the chances were higher that they decided to participate. Perceived severity of DDH did not significantly influence participation in the screening.

Of the background variables, the age of the mother negatively influenced participation. Moreover, parents who visited the rural organization had a higher chance to participate in the screening compared to parents who visited the urban organization. Finally, a positive association was found between knowledge and participation: parents who read the information brochure and who had more content knowledge were more likely to participate.

Table 4. Blockwise logistic regression predicting parental participation in US screening for DDH (N = 1096)

Predictor variable	Step 1				Step 2			
	B	SE	OR	95% CI	B	SE	OR	95% CI
Organization	-.99**	.16	0.37	0.27-0.51	-.95**	.18	0.39	0.27-0.55
Age mother	-.07*	.02	0.94	0.90-0.98	-.06*	.02	0.94	0.90-0.99
Age father	.02	.02	1.02	0.98-1.05	.02	.02	1.02	0.98-1.06
Educational level mother								
Low								
Middle	-.30	.24	0.74	0.46-1.20	-.38	.26	0.69	0.41-1.15
High	-.20	.26	0.82	0.50-1.35	-.19	.28	0.83	0.48-1.42
Educational level father								
Low								
Middle	-.17	.23	0.85	0.54-1.34	-.31	.25	0.74	0.45-1.19
High	-.35	.25	0.70	0.43-1.15	-.45	.26	0.64	0.38-1.07
Reading of brochure	.52**	.14	1.68	1.27-2.21	.55**	.15	1.73	1.28-2.34
Content knowledge	.49**	.09	1.63	1.37-1.94	.45**	.10	1.56	1.29-1.89
Attitude					.65**	.15	1.91	1.42-2.57
Subjective norm					.04**	.01	1.04	1.03-1.06
Self-efficacy					.22*	.09	1.25	1.05-1.48
Perceived susceptibility					-.11*	.04	0.89	0.83-0.96
Perceived severity					-.04	.10	0.97	0.79-1.18
Perceived effectiveness					.34*	.13	1.41	1.09-1.82

* $p < .05$; ** $p < .001$.

Codes: organization 1 = organization A, 2 = organization B; reading of the brochure 1 = did not read the brochure, 2 = did read the brochure.

Note: R Squared = .24 (Cox & Snell), .33 (Nagelkerke).

DISCUSSION

The findings of this study provide strong empirical support for the influence of psychosocial determinants on parental participation in US screening for DDH. A positive attitude, a high subjective norm, a high self-efficacy, a low perceived susceptibility and a high perceived effectiveness were positively associated with parental participation in the screening. Perceived severity was not predictive of participation. These findings remained statistically significant after controlling for the organization, socio-demographic variables and knowledge.

A positive attitude was the strongest predictor of participation in the screening. This is supported by literature on the effects of attitude on intentions and behaviors of parents concerning their infants' health [16-18].

The finding that subjective norms significantly predicted participation is consistent with literature on the importance of the opinions of the partner and nurses/midwifes on new

mothers' choices for breastfeeding and bottle-feeding [20]. Given that US screening is an innovation in preventive CHC in the Netherlands, the finding that subjective norms influence participation was consistent with our expectations. Parents might want to discuss the new screening method with others and subsequently base their decision to participate on their advices and opinions.

Parents' self-efficacy positively influenced participation in the screening. In a study by Kauffman-de Boer et al. [21], focusing on neonatal hearing screening, the authors found that some of the parents, who did not visit their regular CHC center for the screening, experienced practical problems. They reported longer traveling times, not possessing a car and problems with the planning of feeding. In our study, some of the parents also visited another CHC center for the screening than for regular well-child visits, which might have led to comparable constraints.

It is surprising that a low perceived susceptibility leads to a higher chance to participate in the screening. An explanation for this finding might lie in the organization of the screening. Infants with risk factors for DDH (family history of DDH and breech position in the last trimester of pregnancy and/or at birth) may have been identified after birth by the pediatrician and referred for diagnostic imaging in the hospital. Subsequently, it is likely that this group of parents did not visit the US screening at three months at the CHC center and were therefore considered as non-participants. Another reason for the negative association between participation and perceived susceptibility might be the retrospective design of the study. Parents who had already participated in the screening were being asked how likely it was that their infant would suffer from DDH. Since the outcome of the screening was already known and most parents received a satisfactory result, this might have decreased the perceived susceptibility.

This study did not reveal any influence of perceived severity on participation in the screening. A meta-analysis by Janz and Becker [22] showed that this determinant was the smallest predictor of preventive health behaviors. One explanation for perceived severity being a poor predictor might be that parents perceive the screening more as a way of confirmation of their infants' health and less as a way of detection of DDH. Severity of the disease might then be expected to play only a minor role in prediction of screening uptake. In a study focusing on parents' views on newborn hearing screening, it was found that parents were positive about the screening independent of their ideas about the magnitude of the handicap [23]. Parents stated that there were diseases of greater magnitude and therefore had not given much attention to hearing problems. Subsequently, they perceived the screening more as a measure of security and less as a means for detection of serious health problems.

Perceived effectiveness of the screening was a good predictor for screening uptake. When parents compared physical screening with US screening for DDH and the outcome of this

comparison was positive for US screening, they participated in the screening more often. Other literature found that perceived effectiveness was an important predictor for decisions on human papillomavirus vaccination policies [24] and breast cancer screening [25].

The organization, age of the mother and parental knowledge were found to be significantly related to parental participation. Infants of younger mothers were more likely to participate in the screening, which is in line with other literature on the influence of parents' age on participation in preventive child health examinations [26]. Parents' educational level differed significantly between participants and non-participants. However, when including this variable into the regression model, this effect diminished and was not found to be significant.

Parents who visited the organization in the urban area less often visited the screening compared to residents of the rural area. This might be explained by the different invitation strategies of the organizations. In the organization situated in the rural area, parents received a letter at home in which a date and location of the screening were described. If they did not want to participate, they had to consult the secretary of the CHC organization (opting out). In the organization located in the urban area, an appointment for the screening was made at the CHC center. The CHC assistant asked the parents whether they wanted to participate and if they agreed an appointment was planned (opting in). The nature of this invitation strategy might have looked more non-committal to parents. In general, opting out is more effective for the recruitment of people than an opting in approach [27-28].

Reading of the information brochure and content knowledge about DDH and the screening positively influenced participation. This is supported by other studies on the positive role of knowledge on vaccination for the human papillomavirus [17, 29].

The results of this study have some important practical implications for health care policy decision-makers and CHC professionals. Interventions focusing on maximization of screening uptake in US screening for DDH should include parents' beliefs about the screening. For example, information provision to parents can highlight the effectiveness of the screening for detection of DDH and emphasize the positive aspects of the screening. Barriers that might hinder participation, such as time constraints, should also be considered so parents' perception of control over participation in the screening can be enhanced. The influence of normative beliefs on participation indicates the important role of CHC physicians, CHC nurses and assistants in informing parents about the positive aspects of participation in the screening. Discussing the benefits associated with the screening and answering questions can be useful in stimulating screening uptake.

This study benefited from measuring the actual behavior of the parents instead of the intention to perform the behavior or the self-reported behavior. However, we should also take into account the limitations of this study when interpreting the results. First, the response rate of the non-participants was relatively low (37%) compared to the response rate of the

participants (62%). In more studies on (non)participation, a low response rate of non-participants was found [30-31]. This might diminish the generalizability of the results, since it is not known whether the responders of the non-participating group are a good representation of all non-participants. A second limitation concerns the cross-sectional nature of this study, so causal claims cannot be made. The psychosocial determinants may influence decisions about participation, but could also follow from the behavior of the parents. Third, high-risk infants who did not visit the US screening at the CHC center but who instead visited the hospital were represented in the non-participant group. The outcomes of this group may not reflect the outcomes of the rest of the non-participants, since these parents decided to have the hips of their infant examined in a hospital setting.

In conclusion, this study provides empirical support for the predictive ability of the psychosocial model concerning participation in US screening for DDH. Health care policy decision-makers and CHC professionals should consider these determinants when organizing the screening in order to stimulate optimal parental screening participation.

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CHAPTER 5

PREDICTING PARTICIPATION IN ULTRASOUND HIP SCREENING FROM MESSAGE FRAMING

MARJON WITTING
MAGDA M BOERE-BOONEKAMP
MARGOT AH FLEUREN
RALPH JB SAKKERS
MAARTEN J IJZERMAN

HEALTH COMMUNICATION – IN PRESS

ABSTRACT

Objective

The use of ultrasound (US) screening for developmental dysplasia of the hip (DDH) is an innovation in preventive child health care in the Netherlands. What is not known is whether parents will accept this screening method and will actually participate in it. It is widely known that health behaviors can be influenced by the framing of information. The objective of this study was to examine the influence of a gain- versus loss-framed brochure on parental participation in US screening for DDH.

Methods

In total, 4150 parents of infants born between August 2007 and December 2008 received either a gain-framed or a loss-framed brochure. Parents could participate in the screening when their infant was three months old.

Results

The participation rate in the US screening was 74.3%. In contrast to the predictions of prospect theory, the results indicated that parents who had received the gain-framed message were more likely to participate in the screening compared to parents who had received the loss-framed message.

Conclusions

The positive effect of the gain-framed message may be explained by the low risk perception of parents and by the possibility that the screening was perceived as a health-affirming behavior rather than an illness-detecting behavior. To increase participation rates, it is recommended that parents be informed about the positive aspects of partaking in screening for DDH.

INTRODUCTION

Developmental dysplasia of the hip (DDH) is a common disorder in early childhood that can cause disability if left untreated. Different screening strategies are used to detect and start treatment for DDH at an early phase, allowing for optimal development of the hip. Worldwide, physical examination and identification of risk factors for DDH are standard practice. However, ultrasound (US) screening has been adopted as the regular form of screening in several German-speaking countries [1]. In the Netherlands, screening for DDH in the first six months of life is part of the child health care (CHC) disease prevention program and is based on a physical examination and identification of risk factors.

US screening was introduced in the early 1980s by Graf [2]. Since then, many studies have been performed to investigate its effectiveness. Several positive effects of US screening have been reported, including decreased overall treatment rates [3], a shorter duration of treatment [4] and a reduction in surgeries [3, 5-6]. To investigate whether US screening for DDH is preferable to the routine screening program, a large prospective cohort study was performed [7]. Universal US screening at the age of three months, compared to the current screening method (physical examination and identification of risk factors), turned out to be more effective because of a lower rate of missed cases and a low referral rate.

Based on these positive results, a follow-up study was designed to examine the feasibility in daily practice and cost-effectiveness associated with the introduction of US screening for DDH in CHC centers in the Netherlands. In this follow-up study, more than 4000 parents of three-month-old babies were invited to participate in the US screening during an extra visit to the CHC center. We were particularly interested in the actual participation rate and the measures that could be used to increase parental participation rates. One such approach is the use of message framing.

The influence of message framing has been extensively studied in social research. By varying the content of a message in a positive or negative way, people's preferences can be influenced. Prospect theory assumes that when faced with a choice that implies a gain, people tend to be risk-averse. On the other hand, people prefer risk-taking behavior when faced with a loss-framed choice [8-9]. The concept of message framing can also play a role in predicting health behaviors. A distinction is often made between detection (e.g. breast self-examination) and prevention (e.g. using sunscreen to prevent skin cancer) health behaviors [10]. Detection behavior implies a risk-taking behavior because a health problem can be revealed by performing the behavior. Although the long term outcomes are often very beneficial, the fear of finding a health problem in the short term can be high [11]. Prevention behavior is far less risky, as people maintain their current health situation without directly facing negative consequences. In line with prospect theory, the performance of detection behaviors should be

more effective when using loss-framed messages (i.e. disadvantages or costs) and performance of prevention behaviors could be stimulated by the use of gain-framed messages (i.e. advantages or benefits) [10, 12].

Several studies, mainly focusing on (self)detection of breast cancer, have shown the positive effect of loss-framed messages on the performance of detection behaviors. Banks et al. [13] found that women who attended a video presentation about the importance of mammography screening for the early detection of breast cancer were more likely to have a mammogram if the video presentation was loss-framed compared to women who watched a gain-framed video presentation. In addition, women who read a loss-framed pamphlet revealed more positive attitudes, intentions and behavior regarding breast self-examination than women who read a gain-framed pamphlet [14]. Similar results were found in a study by Williams et al. [15], in which a loss-framed message led to an increase in perceived susceptibility for breast cancer and a positive change in performance of self-examination. Women who had never performed breast self-examination were more likely to perform the screening after reading a loss-framed message compared to women who read a gain-framed message. Finally, Rothman et al. [16] found that a loss-framed pamphlet, promoting the use of disclosing rinse to detect plaque, was more effective than the use of a gain-framed message.

Gain-framed messages are believed to positively influence preventive health behaviors. For example, in a study by Rothman et al. [16] which focused on dental health, a gain-framed message proved to be more effective when the use of mouth rinse was promoted to prevent plaque. Rivers et al. [17] found that in screening for cervical cancer, women were more likely to obtain a Pap test if the detection characteristics of a Pap test were paired with a loss-framed message and if the prevention aspects were paired with a gain-framed message. In relation to skin cancer, a positive effect of gain-framed messages was found on intentions to use a sufficient level of sun protection factor (SPF), sunscreen requests and applying sunscreen repeatedly [18]. This effect was particularly noticeable among people who had not intended to use sunscreen. Other research found that repeated exposure to messages emphasizing the benefits of engaging in physical activity resulted in greater physical activity compared to exposure to loss-framed messages [19].

Despite the widely held belief that loss-framed messages are more persuasive in encouraging detection behaviors and gain-framed messages are more effective in stimulating prevention behaviors, O'Keefe and Jensen [20-21] were not able to confirm this contention in two meta-analyses. In their most recent review [21], only a negligible significant effect (r = -.04) of loss-framed messages on detection behaviors was found and this effect was largely attributable to breast cancer detection behaviors. In the other meta-analysis [20] of the effects of message framing on disease prevention behaviors, they found similar results. The positive effect of gain-framed messages on prevention behaviors was statistically significant, but was

very small (r = .03) and resulted mainly from the effects of preventive dental hygiene behaviors.

The results of these meta-analyses seem disappointing in the light of the effectiveness of different message frames on people's health behaviors. However, for a population based screening method, like US screening for DDH, to be (cost)effective, it is desirable that participation rates are optimal. Even though the effect of message frames seems to be small, this effect can, in a population-based screening, make a substantial contribution to the participation of the target population. In addition, the framing of information brochures is a relatively easy way to increase participation rates in screening programs.

The aim of the present study was to analyze the influence of gain- and loss-framed messages on parental participation in US screening for DDH in preventive CHC. Partaking in the screening for DDH may be considered a risky behavior since an abnormality can be detected. Therefore, based on prospect theory, we expected a positive relation between a loss-framed message and participation in the screening for DDH. With the results of this study, realistic expectations of the effects of message framing on participation in the screening can be developed. In addition, the results may contribute to the decision-making process concerning information provision to parents of newborns in preventive CHC.

METHODS

Design

Two information brochures, one gain-framed and one loss-framed, were developed for this field experiment, inviting parents of newborns to the US screening. Participation in the screening was the main outcome variable of this study. As a manipulation check on the framing conditions, parents received a questionnaire in which they could evaluate the brochure on positivity and negativity.

Procedure

Recruitment of parents and performance of the screening was carried out by two CHC organizations, one of which was situated in a rural area (organization A) and the other in an urbanized area (organization B). The screening in organization A took place in different villages. The screening locations in organization B were two inner-city areas and three new suburban areas.

Parents received the information brochure at their first well-child visit to the CHC center when their infant was one month old. They could read the brochure at home and decide

whether they wanted to participate. At the age of two months, an appointment was made for the screening. The screening was performed at the age of three months. The invitation strategy was based on the regular way of inviting parents in the CHC organizations. In organization A, parents received an invitation letter for the US screening at home, including a date, time and location. Parents had to contact the CHC organization in case they wanted to change the date or if they did not want to participate (opting out). In organization B, the assistant asked parents, visiting the CHC center for a regular well-child visit, whether they wanted to participate in the screening. If the parents agreed to participate, an appointment was made (opting in). Participation in the screening was voluntary and all parents signed an informed consent form.

To control for other organizational factors that possibly influenced participation rate (e.g. the service area of the organizations and the method of making appointments), the organizations distributed the gain-framed and the loss-framed brochures separately at different periods of time. It was randomly decided that organization A would distribute the gain-framed brochure from September 2007 up to May 2008, followed by the loss-framed brochure from July 2008 up to January 2009. Organization B handed out the loss-framed brochure from September 2007 up to May 2008 and subsequently the gain-framed brochure from July 2008 up to January 2009. In both organizations, the brochures were replaced by the other version in June 2008.

Population

Parents of 4150 newborns born in the period August 2007 to December 2008 participated in the message framing study. These parents were invited to bring their infant for an US screening for DDH. Registration of (non)participation of the parents was performed by the CHC organizations.

A total of 4150 brochures were distributed, of which 2043 were gain-framed and 2107 were loss-framed. In organization A, 1924 parents received an information brochure, of which 1062 (55.2%) were gain-framed and 862 (44.8%) were loss-framed. In organization B, the brochure was handed out to 2226 parents, of which 981 (44.1%) were gain-framed and 1245 (55.9%) were loss-framed.

Information brochures

Brochures were developed to inform parents about DDH and the US screening. Results from a focus group of parents of newborns with whom the requirements concerning the content and the layout of the brochures had been discussed, were used in developing the brochures. The characteristics emphasized by the parents were the conciseness of the brochure, the

readability of the language and the presence of some pictures. Based on these results, information in the brochure was provided on DDH in general (e.g. pathogenesis, prevalence, medical consequences and treatment), screening methods, the procedure during the US screening and the project itself. The form of the brochures was finalized after the concept brochures had been assessed several times by different individuals from different disciplines and populations, including parents.

The managers of the CHC organizations were consulted about the desirability of translating the brochures into other languages, such as Turkish and Moroccan. All managers stated that, in their organization, general information provision to parents was given in Dutch. To conform with the current policy on information provision by the CHC organizations, the brochures in this study were therefore only available in Dutch.

There were, in total, seven gain and loss variations in the brochure. The gain-framed and loss-framed arguments included in the brochures are presented in Table 1. The brochure was one double-sided A4 in size and printed in color.

Table 1. Message framing arguments

Gain-framed message	**Loss-framed message**
A possible hip abnormality is often easier to treat if it is discovered in time.	A possible hip abnormality is often more difficult to treat if it is not discovered in time.
The chances of complete recovery are higher if the hip abnormality is discovered in time.	The chances of permanent injury are higher if the hip abnormality is not discovered in time.
The hip joint develops normally in about 97% of the infants.	The hip joint does not develop normally in about 3% of the infants.
If an infant with a hip abnormality is treated in an early phase, this decreases the chance that he/she will have difficulty with walking and standing.	If an infant with a hip abnormality is treated in a late phase, this increases the chance that he/she will have difficulty with walking and standing.
There is a lower chance that, as a young adult, he/she will limp and have degenerative joint disease.	There is a higher chance that, as a young adult, he/she will limp and have degenerative joint disease.
If you perform an ultrasound screening of the hip of your infant, there is a higher chance of discovering a possible hip abnormality in time.	If you do not perform an ultrasound screening of the hip of your infant, there is a lower chance of discovering a possible hip abnormality in time.
The younger the baby is when diagnosed and the start of the treatment, the less complicated/intrusive and shorter the treatment can be.	The older the baby is when diagnosed and the start of the treatment, the more complicated/intrusive and longer the treatment can be.

Manipulation check

To check whether the intended message (either gain-framed or loss-framed) was well received, parents answered two questions. The manipulation check was part of a larger questionnaire survey concerning the feasibility of implementation of US screening for DDH. Parents were first asked if they were aware of the information brochure. They were presented with four options: (1) "No, I do not know the brochure", (2) "Yes, I know the brochure but I never read it", (3) "Yes, I read the brochure superficially" and (4) "Yes, I read the brochure in depth." Subsequently, parents were asked to evaluate the positivity and negativity of the brochures on a five-point scale varying from 1 "very negative" to 5 "very positive". Both participating and non-participating parents received the questionnaire and were asked to return it within two weeks. A reminder letter was sent after this period.

The questionnaire was given to a sample of 1140 parents participating in the screening. The sample size of the participating parents was based on a power calculation made for the larger questionnaire survey. The screener handed out the questionnaire after the screening in May and June 2008 and in November and December 2008 in the two organizations, which made it possible to correct for variations during the year. In addition, all 1057 non-participants received the questionnaire. Since the group of non-participants was expected to be much smaller than the group of participating parents, it was decided not to take a sample of this group. Non-participating parents received the questionnaire at home, when their infant was aged six months.

In total, 703 questionnaires of the participating parents were returned (response 61.7%). The response rates in organization A and B were 68.6% (427/622) and 53.3% (276/518), respectively. The overall response rate for the non-participating parents was 37.2% (n = 393). In organization A the response rate was 46.8% (123/263) and in organization B 34.0% (270/794).

Measures and analyses

The main outcome of this study was the participation rate of the parents in the US screening program. To measure the influence of the message frame on participation, an odds ratio was calculated and tested using logistic regression. Logistic regression analysis was also used to control for the organization in which the screening took place and to test for interaction effects. A chi-square test was performed to analyze differences in participation between the two organizations. A chi-square test was also performed to determine if the message provided in the brochures was received as intended.

RESULTS

Manipulation check

Of the parents who filled in the questionnaire (n = 1096), 408 parents stated that they had not received or read the brochure: 292 (71.6%) parents did not know the brochure, and 116 (28.4%) parents knew the brochure but never read the information. The brochure was read by 681 parents: 468 (68.7%) of them read the information superficially, and 213 (31.3%) thoroughly. No data were available from seven parents.

Parents who had read the brochure evaluated the positivity/negativity of the brochures with a mean score of 3.93 (SD = 0.74). After reducing the five-point scale into a three-point scale, a chi-square test showed that the message frame did not significantly influence ($p > .05$) the evaluation of positivity and negativity of both brochures. Of the parents who received the gain-framed brochure, 75.8% evaluated the brochure as positive and 23.2% as neutral. The outcomes of the parents who had received the loss-framed brochure were almost the same as that of the gain-framed brochure, with 74.9% of them perceiving the brochure as positive and 22.7% as neutral.

Participation in the screening

The participation rates in each organization are presented in Table 2. In total, 3085 of the invited 4150 parents participated with their infant in the US screening, leading to a participation rate of 74.3%. Participation rates differed significantly between the two organizations $\chi^2(1, N = 4150) = 617.78$, $p < .001$. In organization A (situated in a rural area), 1779 of the 1924 parents participated, leading to a participation rate of 92.5%. In organization B (situated in an urban area), the participation rate was 58.7%, with 1306 out of 2226 parents partaking in the screening.

Table 2. Participants and non-participants in the US screening for DDH based on message type and organization

	Organization A (N = 1924)		**Organization B (N = 2226)**		**Total (N = 4150)**	
	Participants	Non-participants	Participants	Non-participants	Participants	Non-participants
Gain-framed message	990 (93.2%)	72 (6.8%)	598 (61.0%)	383 (39.0%)	1588 (77.7%)	455 (22.3%)
Loss-framed message	789 (91.5%)	73 (8.5%)	708 (56.9%)	537 (43.1%)	1497 (71.0%)	610 (29.0%)

Note: percentages are based on participants and non-participants within each message frame.

The results of the logistic regression are presented in Table 3. There was a significant impact of message type on actual participation in the US screening. Parents who received the gain-framed brochure were 1.42 times (unadjusted OR) more likely to participate in the screening than parents who received the loss-framed brochure (model 1). In total, 77.7% of the parents who had received the gain-framed message, did participate in the screening. Of the parents who had received the loss-framed message, 71.0% participated. When calculating the odds ratio per organization, differences emerged. In organization A, no significant association was found between message type and participation (model 2). In organization B, a small significant effect of message frame on participation was found (OR = 1.18) (model 3). When adjusting the influence of the message on participation for "organization" (model 4), the chances of participation after receiving a gain-framed brochure still remained significant but decreased to 1.20. The organization proved to be a strong predictor, in that parents visiting organization A were significantly more likely to participate in the screening compared to parents visiting organization B (OR = 8.49). We did not find an interaction between organization and message type (model 5).

Table 3. Logistic regression predicting parental participation in the US screening for DDH (N = 4150)

Predictor variable	B	SE	OR	95% CI
Model 1				
Message	0.35**	.07	1.42	1.24-1.64
Model 2				
Message (organization A)	0.24	.17	1.27	0.91-1.79
Model 3				
Message (organization B)	0.17*	.09	1.18	1.00-1.40
Model 4				
Message	0.18*	.08	1.20	1.03-1.40
Organization	2.14**	.10	8.49	7.03-10.27
Model 5				
Message	0.17*	.09	1.18	1.00-1.40
Organization	2.10**	.14	8.20	6.29-10.68
Message x Organization	0.07	.19	1.07	0.74-1.57

* $p \leq .05$; ** $p \leq .001$.

DISCUSSION

This study demonstrates the effect of message type on parental participation rate in the US screening for DDH. The gain-framed brochure had a more positive effect on parental participation than the loss-framed brochure. This effect was the reverse of what was expected, since effectiveness of detection behaviors is often associated with the positive influence of loss-framed messages.

The first reason for the positive influence of the gain-framed brochure on parental participation might be the low risk perception of parents regarding DDH. Detection behaviors are often associated with a risk, in that a serious disease can be revealed by engaging in the behavior. Since treatment can be very effective if DDH is diagnosed at an early stage, parents might not perceive the screening as very risky. Given that (perceived) risk is considered an important reason for the effectiveness of message frames [12, 22-25], the low risk perception might have diminished the effect of the loss-framed message and might have strengthened the influence of the gain-framed message on parental participation.

Another reason for the positive effect of the gain-framed message might be the perceived function of the behavior. Rothman and Salovey [10] state that health behaviors can serve multiple functions; for example, self-screening on breast cancer can be considered an illness-detecting behavior, but also a health-detecting or health-affirming behavior. Women who perceive breast cancer screening as a health-detecting behavior instead of an illness-detecting behavior could benefit more from a gain-framed message instead of a loss-framed message. The same holds true for the parents in this study; if they perceive US screening for DDH as a way of affirmation of the health of their infant, a gain-framed message could influence participation positively.

The multiple ways parents can perceive US screening might explain the results found in this study. However, since we do not have insight into parents' risk perception regarding the screening and since we did not ask them to assess US screening as an illness- or health-affirming behavior, we should also consider the possibility that prospect theory might not be very satisfactory in predicting screening participation. No support was offered for the general belief that detection behaviors, through which a health outcome can be confirmed or disconfirmed, might profit more from a loss-framed message than from a gain-framed message. This is in keeping with the meta-analyses by O'Keefe and Jensen [20-21], in which they found statistically significant but very weak correlations for the overall advantage of message framing on health behaviors. Future research would benefit from identifying which characteristics of the detection behavior, such as perceived risk, and the message can strengthen each other, so that participation in screening activities may be optimized.

The effect of the gain-framed message on participation rate differed between the two organizations. It is reasonable to expect that the effect of the gain-framed message decreases with a higher participation rate. In organization B, in which the participation rate was already low, the benefits of using a gain-framed message are probably higher than in organization A, in which the participation rate almost reached its ceiling. However, even in organization A, the usage of a gain-framed message still resulted in an increase of 1.7% on the participation rate. In light of implementing the screening on a population based level, this effect should be taken seriously.

To confirm whether the gain-framed and loss-framed messages came across as intended, a manipulation check was carried out. The results of this evaluation demonstrated that parents did not perceive the brochures as two extremes. This lack of perceived contrast adds ambiguity to the interpretation of the results. However, it is reasonable to expect that the long period between the handing out of the brochure and the evaluation of the brochure might account for this difference. Since memory for information provided by health care practitioners is often poor [26], it is not very surprising that parents could not remember the brochure very well and so could not provide an accurate evaluation of the brochure. Therefore, while it seems that the manipulation check did not provide the expected outcome, it is plausible that this did not influence the results in such a way that they become questionable.

Participation rates differed significantly between the two organizations. The participation rate of 92.5% in organization A, situated in the rural area, is comparable to the national average of 95% for regular CHC well-child visits [27-28]. In organization B, situated in the urban area, there was a relatively low participation rate of 58.7%, which is far below the national average. The location of the CHC organizations and the procedures within the organizations can probably explain part of the variance in the participation rate. Ethnicity, for example, might be a reason for the lower participation rate in the urban area. It is well known that there are inequalities in the use of health care services between immigrant groups and the indigenous population [29]. Poor language skills and ineffective communication can account for these differences in health care usage [30]. Fassaert et al. [31] also conclude that mastery of the language is essential to the usage of health care services and place emphasis on assisting and educating immigrants. Since the brochures used in this study were formulated in Dutch, this could have been a reason for the lower participation rate in the urbanized area. However, ethnicity might not only account for differences in participation. For example, Frenken [32] found that there were almost no differences between immigrants and the indigenous population in regular well-child visits to the CHC center. Nevertheless, since this screening method and the corresponding information provision are new in preventive CHC, language problems might have had a higher impact on participation.

A further reason for the differences in participation rate might be the way parents were approached. In organization A (rural area), parents received a detailed invitation with an appointment at home. They did not have to do anything, unless they did not want to participate (opting out) or if they wanted to change the date of the screening. In organization B (urban area), the assistant asked parents if they wanted to participate in the screening and if they agreed, an appointment was made (opting in). This might have looked more noncommittal than receiving a clear invitation. In general, opting out is more effective for the recruitment of people, as has been demonstrated for organ donations [33] or for getting informed consent [34]. The opting out approach used in organization A might partly explain the higher participation rate.

This study benefited from measuring the actual behavior of parents as an outcome variable, instead of the intention to perform the behavior. However, it also suffered from some limitations that should be mentioned. First, we only looked at the effect of message frame on participation rate. Previous research has identified several factors that might mediate or moderate framing effects, such as perceived outcome efficacy [25], perceived certainty of the outcome [22], involvement [11-12], avoidance motivation [24] and personal outcome effectiveness [35]. On the contrary, there are also studies in which little support is found for (cognitive) factors that might mediate or moderate framing effects [14-15, 23]. Although the effects of mediating and moderating factors are ambiguous, the influence of message frame on participation in this study might possibly have been stronger if (a selection of) these factors had been taken into account.

Second, we do not know if and what extra information was provided at the CHC center by the CHC physician, CHC nurse or assistant. Complementary face to face information can probably influence parental participation. Segura et al. [36] found that direct contact with professionals can increase participation rates by 15-20% compared to mailed letters in mammography screening. The authors state that direct contact makes it possible to tailor the information to the needs of the people concerned. To increase participation at mammography screening, McCaul and Wold [37] also suggest the use of tailored messages. Differences in the direct communication with parents between the organizations could have influenced participation.

Third, the design of this field study makes it inevitable that not all 4150 parents remembered receiving or reading the brochure. This can be explained by the long period between receiving the brochure and filling in the questionnaire, but it can also be expected that it reflects practice as usual in (child) health care. Although the study design did not allow for exclusion of all parents who did not read the brochure, it might be expected that this study is a realistic reflection of the way parents deal with information they receive and that they do not always read the information provided. With regard to CHC, this shows the importance of

careful consideration of the distribution of information to parents of newborns to increase the participation rate. CHC professionals should think about when and how to distribute the information and how to stimulate parents to actually read the information.

Finally, if parents did not participate in the US screening, care as usual was provided, meaning parents did not 'lose' anything if they did not visit the screening with their infant, except for an extra checkup. If US screening for DDH is implemented in the future, this method will replace the current screening method and will become an integral part of preventive CHC. This means that if parents want the hips of their infant to be examined, they have to visit the screening since this has become the care as usual. This will presumably influence participation positively.

The findings presented in this article have practical implications for communication with parents in preventive CHC. Our findings suggest that the use of a gain-framed information brochure might lead to a higher participation rate in US screening for DDH. Therefore, when creating information brochures for US screening, the focus should be on the advantages of participating in the screening for the infants (and parents), while loss-framed arguments should be avoided whenever possible. The current research also emphasizes the importance of effective information distribution to parents. The team of CHC professionals should monitor the process to ensure that all parents receive the available information and should stimulate parents to read the information. Finally, to optimize techniques for approaching and inviting parents for the screening, CHC organizations should take into account the characteristics of the service area and of the parents.

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CHAPTER 6

DETERMINANTS OF PARENTAL SATISFACTION WITH ULTRASOUND HIP SCREENING IN CHILD HEALTH CARE

MARJON WITTING
MAGDA M BOERE-BOONEKAMP
MARGOT AH FLEUREN
RALPH JB SAKKERS
MAARTEN J IJZERMAN

JOURNAL OF CHILD HEALTH CARE – ACCEPTED FOR PUBLICATION

ABSTRACT

Objective

Prior research has shown ultrasound (US) screening for developmental dysplasia of the hip (DDH) in preventive child health care to be more effective than the current screening method. In the present study, three-month-old infants were screened for DDH with US. The objective of this study was to examine parental satisfaction with the screening and determinants that affect satisfaction.

Methods

Parental satisfaction was measured using a questionnaire. Independent variables included socio-demographic determinants, structure, process and outcome related determinants and the meeting of expectations.

Results

Satisfaction with the screening was high. Parents who perceived the screener as competent, had enough time to ask questions, perceived the proceeding as fluent, perceived a low burden on their infant and whose expectations were met, were more likely to be satisfied.

Conclusions

Satisfaction was influenced by process related factors and not by factors related to the structure and the outcome of the screening. Good information provision before the screening and communication during the screening are means by which parental satisfaction can be influenced positively.

INTRODUCTION

Routine examination of all infants is standard practice in preventive child health care (CHC). In the Netherlands, every infant is scheduled, for preventive reasons, to visit the CHC center eight times during their first year of life. The acceptance of this surveillance is proven by the high participation rate of 95% in the first year of life [1-2]. One of the standard examinations performed in the newborns first few months is the screening for developmental dysplasia of the hip (DDH), which entails a physical examination and identification of risk factors (e.g. breech position in the last period of pregnancy and/or at birth and a positive DDH family history). An alternative for the physical examination for DDH is ultrasound (US) screening. This is a widely accepted screening method in German-speaking countries [3]. Previous research in the Netherlands showed that US screening detects more infants with DDH and detects them at an earlier age compared to the current practice [4]. As well as the effects of DDH screening on clinical outcomes, it is also important to assess less tangible outcomes, such as parental satisfaction with the screening [5].

Patient satisfaction is an important validator for the quality of health care delivery [6-7]. In preventive CHC, the focus on the assessment of the quality of the provided care is essential to improve the functioning of the health care system and it is needed to maintain optimal care as well as to avoid adverse outcomes [8]. Patient satisfaction is, in turn, considered to be an important predictor of health-related behavior by, for example, influencing patients' commitment to, and effectiveness of recommended treatment [7, 9].

Butt et al. [10] provided a conceptual model to measure parental satisfaction with quality of care. The essence of this model is based on Donabedian's [11] categorization of measures of health care quality: structure, process and outcome. Structure encompasses the attributes of the setting, such as accessibility and waiting time. The process denotes what is being done during the provision and receipt of health care, and includes measures like interpersonal communication between the health care provider and the patient, and the continuity of the health care provider. The last factor is the outcome, which can be defined as the impact of the provided care on the parents' emotions and knowledge. It also includes the effects of the provided care on the health status of the patient.

Another determinant often associated with a person's satisfaction with health care is the expectations prior to the health care encounter [7, 12-14]. Discrepancy between the patients' expectations and the occurrences during the health care encounter correlates negatively with patient satisfaction [12]. This has two practical outcomes. First, it implies that, with regard to health services research, knowledge about patients' expectations can predict their evaluation of the health care encounter. Second, health care providers can ensure patient satisfaction by

provoking positive expectations and subsequently provide a favorable health care encounter [12].

Based on the positive outcomes of US screening compared to the current screening method, a follow-up study was set up to examine the feasibility in daily practice and the cost-effectiveness associated with the introduction of US screening for DDH in CHC centers in the Netherlands. In this follow-up study, 5521 parents were invited when their newborns were three months old, to participate in the US screening during an extra visit to the CHC center.

Since US screening for DDH is an innovation in CHC in the Netherlands, it was unclear whether the invited parents would accept the screening and be satisfied with the delivered care. The aim of the current study was therefore to assess parental satisfaction with the new type of hip screening (with US) and to gain an insight into the factors that influence satisfaction. Insight into key factors that determine parental satisfaction with the screening makes it possible to optimize the provision of the screening to parents, which in turn might lead to higher participation rates, increased compliance with the instructions of the US screener and a higher adherence to the advice on additional diagnostics once DDH is suspected.

METHODS

Between November 2007 and April 2009, 4099 infants aged three months were screened for DDH during a special visit to the CHC center. The US screening for DDH was organized by two CHC organizations, one of which was situated in a rural area (organization A) and the other in an urbanized area (organization B) in the Netherlands. The examinations were performed by CHC physicians, CHC nurses and radiographic technicians, who were all trained in hip sonography. All infants with suspected DDH, based on the screening, were referred to the medical specialist for additional diagnostic procedures and, if necessary, treatment.

Participants and procedure

Participants in the current study were parents of infants who visited the US screening in organization A or B. The questionnaire was given to the parents in two different time frames (in May and June 2008 and in November and December 2008) by both organizations. Handing out the questionnaires in different months allowed for a correction of variations during the year. A total of 1140 parents in both time frames together participated in the screening and received the questionnaire, of which 622 parents (54.6%) visited organization A and 518 parents (45.4%) organization B.

The screener handed out the questionnaire to the parents after the US screening and briefly explained the objective of the questionnaire. A letter was included with information about the questionnaire together with a reply-paid envelope. A reminder was sent after two weeks to help increase the response.

Satisfaction measures

A questionnaire developed by the researchers was used to measure parental satisfaction with the screening. Measures taken to predict satisfaction were based on the three determinants in the conceptual models by Donabedian [11] and Butt et al. [10] and on the assumption that expectations are related to satisfaction.

Background variables

The following socio-demographic variables were collected from the parents: age, educational level (low, middle and high), country of birth of the father and the mother and the language spoken at home. In addition, the organization in which the screening was performed was used as a predictor of satisfaction, since procedures may have differed between the organizations (0 = organization A/rural area, 1 = organization B/urban area).

Parental satisfaction

Overall parental satisfaction was measured on a ten-point scale ranging from 1 “bad” to 10 “excellent” using the following item: “Can you indicate your evaluation of the screening?” Providing an evaluation score on a ten-point scale is a commonly used and accepted method in the Netherlands.

Structure

The concept of structure was measured by asking parents to evaluate their traveling and waiting time on a five-point scale ranging from 1 “very long” to 5 “very short”.

Process

The screening process was measured with seven items. First, parents evaluated the screener on competence (1 “very incompetent” to 5 “very competent”), friendliness (1 “very unfriendly” to 5 “very friendly”) and carefulness (1 “not careful” to 5 “very careful”). Second, the interpersonal communication with the screener was assessed with the following item: “There was enough time to ask questions during the consultation” (1 “totally disagree” to 5 “totally agree”). Third, parents could respond to the following items: “The screening proceeded very

fluently" and "The burden of the screening on my infant was very high" on a five-point scale ranging from 1 "totally disagree" to 5 "totally agree". The scores of the last item were reversed, with a high score implying a low screening burden and a low score indicating a high burden. The last item measured the crying of the infant and the extent to which parents perceived this as unpleasant. Parents recorded whether their infant cried during the screening and if so, they scored on a five-point scale their perception of the unpleasantness of the crying (1 "not unpleasant" to 5 "very unpleasant"). A dichotomous score was then created based on a positive and negative experience of the (not) crying of the infant. A positive experience by the parents was described as the infant not crying or they perceived the crying as not unpleasant. If the infant's crying was perceived to be unpleasant, it was considered to be a negative experience. This item was scored 0 "not crying or crying but not unpleasant" and 1 "crying and unpleasant".

Outcome

We asked parents to provide a description of their feelings of fright, concern and insecurity after the screening. All these items were measured on a five-point scale (1 "very frightened" to 5 "not frightened", 1 "very concerned" to 5 "not concerned" and 1 "very insecure" to 5 "very secure"). Another outcome measured in this study was a possible referral of the infant to the medical specialist if DDH was suspected. This variable was scored 0 "no referral" and 1 "referral".

Meeting of expectations

The agreement between expectations and the occurrence of these expectations was retrospectively assessed with the following question: "The ultrasound screening met my expectations completely." This item was measured on a five-point scale ranging from 1 "totally disagree" to 5 "totally agree".

Data analyses

Means, standard deviations and frequencies were determined for all variables. After this, Spearman's rank correlation coefficients between the predictor variables and the score on overall parental satisfaction were calculated. Finally, a univariate analysis of variance (ANCOVA) was performed to examine the relationship between the independent variables and parental satisfaction.

RESULTS

Participants

A total of 703 questionnaires were returned (response 61.7%). In organization A, 427 questionnaires were sent back (response 68.6%) and 276 in organization B (response 53.3%). Mothers filled out most of the questionnaires (84.3%), followed by the fathers (7.7%) and lastly, both parents together (7.4%).

The average age of the fathers was 34.30 (*SD* = 5.13) and of the mothers 31.53 (*SD* = 4.38). Of the fathers, 25.9% had received a lower education, 33.4% a middle education and 40.7% were highly educated. Of the mothers, this was 20.1%, 34.6% and 45.2% respectively. The parents mainly originated from the Netherlands (93.2% of the fathers and 93.3% of the mothers) and spoke Dutch at home (96.2%). Since these measures of ethnicity were very homogenous, they were not included in the analyses.

Descriptive statistics and correlations for predictor variables and parental satisfaction

The descriptive statistics of the determinants of satisfaction are presented in Table 1. Overall, parents reported positive scores on all factors. The average score on overall satisfaction was 8.08 (*SD* = 1.05), with 5.2% (*n* = 36) of the parents evaluating the screening with a six or lower, 17.7% (*n* = 122) with a seven, 48.2% (*n* = 333) with an eight, 19.1% (*n* = 132) with a nine and 9.8% (*n* = 68) with a ten. Of the infants, 33.9% (*n* = 234) cried during the screening. Of this group, 31.6% (*n* = 74) of the parents found the infant's crying (very) unpleasant. A total of 142 infants (20.2%) were referred to the hospital because of suspected DDH.

Table 1. Descriptive statistics for the predictor variables of overall parental satisfaction with the US screening for DDH

Measure	N	M	SD	25% [a]	50% [a]	75% [a]
Structure						
Evaluation of the traveling time	689	4.08	0.96	5.5	23.7	70.8
Evaluation of the waiting time	689	4.21	1.03	7.4	16.3	76.3
Process						
Screener competence	678	4.16	0.76	1.8	15.8	82.4
Screener friendliness	690	4.31	0.77	1.9	12.0	86.1
Screener carefulness	672	4.20	0.75	1.9	13.7	84.4
Enough time to ask questions	693	3.90	0.77	5.2	17.3	77.5
Proceeding of the screening	692	4.02	0.82	6.8	10.4	82.8
Burden of the screening	692	4.00	0.89	7.1	13.0	79.9
Outcome						
Feeling frightened after the screening	679	4.50	0.83	3.5	8.2	88.2
Feeling concerned after the screening	682	4.39	0.94	6.6	7.8	85.6
Feeling insecure after the screening	680	4.38	0.84	4.0	9.9	86.2
Meeting of expectations	690	3.62	0.74	6.7	31.7	61.6

[a] Measured on a five-point scale (25% represents 1/2 on the scale, 50% represents 3 on the scale, 75% represents 4/5 on the scale).

In Table 2, Spearman's correlations between the factors are presented. Parental satisfaction was marginally related to the socio-demographic variables. Only the mothers' educational level correlated significantly with satisfaction, but it still showed a small effect. Medium to large positive relations were found between parental satisfaction and the competence, friendliness, and carefulness of the screener, the proceeding of the screening and the burden of the screening on the infant.

Table 2. Spearman's rank bivariate correlations for relations between independent variables and overall parental satisfaction with the US screening for DDH

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Background variables																			
1. Organization																			
2. Age mother	.17**																		
3. Age father	.11**	.67**																	
4. Educational level mother	.42**	.20**	.14**																
5. Educational level father	.41**	.14**	.06	.58**															
Structure																			
6. Evaluation of the traveling time	-.04	-.06	-.06	-.12**	-.13**														
7. Evaluation of the waiting time	-.16**	.01	.00	-.09*	-.13**	.26**													
Process																			
8. Screener competence	.07	-.01	-.04	-.09*	-.07	.17**	.19**												
9. Screener friendliness	.14**	.01	.00	.01	-.02	.16**	.21**	.70**											
10. Screener carefulness	.03	-.01	-.01	-.05	-.05	.18**	.28**	.73**	.70**										
11. Enough time to ask questions	.07	.05	-.06	.03	-.01	.10**	.16**	.42**	.38**	.37**									
12. Proceeding of the screening	.09*	.10*	-.01	.02	.03	.10*	.21**	.44**	.39**	.43**	.39**								
13. Burden of the screening	.05	.07	-.04	.04	.02	.07	.23**	.33**	.27**	.34**	.33**	.56**							
14. Crying	-.02	-.01	.06	.10*	.06	-.10*	-.10*	-.21**	-.18**	-.21**	-.12**	-.38**	-.38**						
Outcome																			
15. Feeling frightened after the screening	.11**	.00	.01	-.02	-.01	.18**	.17**	.28**	.26**	.28**	.18**	.29**	.20**	-.12**					
16. Feeling concerned after the screening	.15**	.04	.00	.00	-.01	.16**	.19**	.33**	.27**	.29**	.16**	.32**	.23**	-.19**	.85**				
17. Feeling insecure after the screening	.12**	.03	.03	-.03	-.03	.20**	.20**	.33**	.30**	.30**	.19**	.31**	.22**	-.15**	.83**	.84**			
18. Referral	-.08*	.00	-.01	-.02	.04	-.07	-.06	-.12**	-.09*	-.10**	-.01	-.08*	-.08*	.06	-.36**	-.42**	-.35**		
19. Meeting of expectations	.04	.03	.03	-.05	-.03	.02	.12**	.29**	.20**	.28**	.26**	.37**	.27**	-.23**	.20**	.19**	.20**	.02	
20. Satisfaction	.02	-.02	-.06	-.09*	-.06	.17**	.22**	.48**	.42**	.44**	.37**	.47**	.42**	-.28**	.31**	.34**	.30**	-.16**	.36**

* $p < .05$; ** $p < .01$.

Codes: organization 0 = organization A (rural area), 1 = organization B (urban area); crying 0 = not crying or crying but not unpleasant, 1 = crying and unpleasant; referral 0 = no referral, 1 = referral.

Note: associations between two dichotomous variables (organization, crying and referral) were calculated with Phi tests.

Univariate results

Table 3 presents the univariate findings for parental satisfaction. The three redefined categories (25% - 50% - 75%, see Table 1) were used for this analysis, since the distribution was skewed to the right for all predictor variables.

The competence of the screener influenced satisfaction significantly. Parents who perceived the screener as competent were more satisfied than parents who were neutral $t(586) = -3.28$, $p = .001$ or who found the screener incompetent $t(586) = -1.98$, $p = .05$.

Satisfaction was also significantly influenced by the time offered to parents to ask questions. Parents who felt they had been given enough time to ask questions were more satisfied compared to parents who were neutral $t(586) = -3.63$, $p < .001$, but not compared to parents who found that they did not have sufficient time $t(586) = -1.81$, $p = .07$.

Parental satisfaction was also associated with the proceeding of the screening. A perceived fluent proceeding resulted in more satisfaction than a non-fluent proceeding $t(586) = -2.27$, $p < .05$ or a screening which was evaluated as neutral $t(586) = -1.97$, $p = .05$.

In addition, satisfaction was influenced by the burden of the screening on the infant. Parents who found that the screening placed a low burden on their infant were more satisfied than parents who evaluated the burden on their infant as high $t(586) = -2.75$, $p < .05$, but not compared to parents who were neutral $t(586) = -0.36$, $p = .72$.

The unpleasantness of the crying of the infant proved to be a significant predictor of satisfaction. Parents whose infant did not cry or who did not perceive the crying as unpleasant were more satisfied than parents who perceived the crying as unpleasant $t(586) = 2.00$, $p = .05$.

Finally, meeting the parents' expectations also influenced satisfaction. If the screening met the parents' expectations, they were more satisfied than if the screening did not meet their expectations $t(586) = -3.52$, $p < .001$ or if they were neutral $t(586) = -3.39$, $p = .001$.

The organization, the socio-demographic variables, the evaluation of traveling and waiting time, the friendliness and carefulness of the screener, feeling frightened, concerned and insecure after the screening and referral to the medical specialist, were not predictors of parental satisfaction.

Table 3. Results of the ANCOVA for overall parental satisfaction with the US screening for DDH

Measure	Type III Sum of squares	df	Mean square	F	Sig.
Background variables					
Organization	0.76	1	0.76	1.11	.29
Age mother	0.00	1	0.00	0.00	.96
Age father	0.75	1	0.75	1.09	.30
Educational level mother	3.73	2	1.87	2.71	.07
Educational level father	0.25	2	0.12	0.18	.84
Structure					
Evaluation of the traveling time	0.98	2	0.49	0.71	.49
Evaluation of the waiting time	1.48	2	0.74	1.08	.34
Process					
Screener competence	8.42	2	4.21	6.12	.00
Screener friendliness	1.94	2	0.97	1.41	.25
Screener carefulness	0.33	2	0.16	0.24	.79
Enough time to ask questions	10.04	2	5.02	7.30	.00
Proceeding of the screening	4.91	2	2.46	3.57	.03
Burden of the screening	5.23	2	2.62	3.80	.02
Crying	2.75	1	2.75	3.99	.05
Outcome					
Feeling frightened after the screening	0.38	2	0.19	0.27	.76
Feeling concerned after the screening	2.08	2	1.04	1.51	.22
Feeling insecure after the screening	0.18	2	0.09	0.13	.88
Referral	2.26	1	2.26	3.29	.07
Meeting of expectations	13.34	2	6.67	9.70	.00

R Squared = .37.

DISCUSSION

Screening for DDH with US is an innovation in CHC in the Netherlands. Insight into parents' perceptions about the screening is very important because it gives CHC professionals the opportunity to improve the care provided to infants. This study identified several determinants related to parental satisfaction and showed that parents were positive about different aspects of the screening. Parents also reported high levels of overall satisfaction with the screening. High parental satisfaction levels in CHC have also been found in other studies [15-19].

Socio-demographic variables did not predict satisfaction of the parents in this study. This is in line with a meta-analysis by Hall and Dornan [20], in which only minor correlations between socio-demographic variables and patient satisfaction were found. The participants in

this study were mostly women who originated from the Netherlands and were all part of the same age group. Because of this homogenous structure of the study population, it is not surprising that satisfaction was not found to be influenced by the socio-demographic characteristics.

Structure, which is the first determinant related to parental satisfaction, did not predict satisfaction. This concept was measured by the parents' perception of the length of the traveling and waiting time. Parents who perceived the traveling and/or waiting time as short, were not more satisfied than parents who evaluated them as long. This is in contrast to the results of a study by Waseem et al. [21], in which strong relations between actual and perceived waiting time in a pediatric emergency department and parental satisfaction was found. A sound explanation for this difference is that parents visiting the CHC center for the US screening for DDH do not face immediate consequences if they are not seen in time. Waseem et al. [21] also found that parents of infants (< 24 months) were less likely to overperceive their waiting time compared to parents of children between two and eleven years of age. The authors argue that this can be explained by the amount of time parents spend taking care of their infant, such as feeding and holding their baby. Since parents had to undress their infant before the US screening, they might have perceived the waiting time at the CHC center as short. This can explain the non-relationship found in this study between satisfaction and waiting time.

The competence of the screener was found to be an important factor in the process domain of satisfaction. Parents who perceived the screener as competent reported a higher satisfaction rate with the screening. In practice, this finding implies that during the screening parents should be convinced that the screener is competent to make the images. Since all screeners have been fully trained to perform the screening, they have to communicate with the parents about their expertise in performing the screening and explain to them what exactly is being done. Other measures related to the screener were the perceived friendliness and carefulness. In this study, no association was found between these characteristics and parental satisfaction.

The current study provided evidence for the important role of communication during the consultation. Parents who were able to ask all their questions, were significantly more satisfied with the screening. Other research also shows that if the communication between parents and the health care provider is good, this positively influences satisfaction levels. For example, Hart et al. [17] found that parents who perceived the communication with their provider as good, more often reported to be very satisfied and evaluated the quality of the received care as very high. Likewise, Halfon et al. [15] reported that parents who asked all the questions they wished to ask, and therefore had all the information they needed, were more satisfied with the length of the visit and also reported a higher global satisfaction. In another study it was found that

communication with patients was the most important predictor of patient satisfaction [22]. This result of our study suggests that during the screening consultation, enough time should be made available for the answering of all the parents' questions. The screener can play an active role in this, by asking the parents if they are well informed and if they have any more questions before they leave the consultation room.

A screening that proceeded fluently and was a low burden to the infant, positively influenced parental satisfaction with the screening. In addition, the perceived unpleasantness of a crying infant was a negative predictor of levels of parental satisfaction. These results show the importance of creating a comfortable environment for the infant. For example, in this study a soft pillow was used to position the infant, which made it easier for the screener to create the image. The results also emphasize the need to inform parents about the screening procedure, to ensure that they know what to expect. Information provision might for example describe the way the infants are positioned with the help of the pillow and the fact that some infants cry during the screening.

The outcome of health consultations is considered to be an important determinant of patient satisfaction. For example, parents of infants who were referred for further tests after a negative newborn hearing test were more emotionally distressed, more worried and less satisfied with the test than parents who had a satisfactory result [23]. In this study, no relationship was found between the outcome of the screening and parental satisfaction. Parents' emotions after the screening and a referral to the medical specialist were not related to their reported satisfaction level.

Finally, the results of this study showed that there is a significant positive relationship between the meeting of expectations and parental satisfaction. Other research has also shown that there is a positive association between fulfillment of expectations and satisfaction [19, 24-27]. In practice, this shows the importance of good information provision to parents about all the aspects of the screening. Informing parents adequately about the screening might result in realistic expectations and subsequently in higher satisfaction levels.

The results of this study should be interpreted in light of some limitations. First, a 'self-developed' questionnaire survey was used to assess parental satisfaction. Although the concepts measured in the questionnaire were based on determinants that are known to be related to satisfaction, the questionnaire was not standardized and validated. However, the use of a self-developed questionnaire made it possible to adapt the questions to this specific (new) screening method and this specific population.

Non-response bias might have led to an artificially high satisfaction score. The mean response rate in this study was more than 60%, which is comparable to other satisfaction studies [28]. However, it is suggested that if a response bias is present and more satisfied patients are more likely to respond than less satisfied patients, patient satisfaction will be

overestimated [29]. A study by Lasek et al. [30] found only relatively small and negligible differences in satisfaction between respondents and non-respondents. When interpreting these results, we should be aware of a possible presence of a response bias, which might have led to a high satisfaction level. When generalizing these results to a wider population, caution should be taken, as data are not available concerning non-respondents.

Finally, parents were asked retrospectively if the screening met their expectations. It is likely that parents' evaluation of this item was influenced by the screening itself. We have no insight into the parents' exact expectations and to which degree these expectations were met. Since the concept proved to be significantly related to satisfaction, future research should focus on exploring the different parental expectations before the actual screening and subsequently assess the degree to which the meeting of these expectations influences satisfaction.

US screening for DDH is an innovation in CHC in the Netherlands. This study was performed to gain more insight into parental satisfaction with the consultation at the CHC center and into the factors that influence satisfaction. The results showed that parental satisfaction with the new screening method is high. Satisfaction was influenced by process related factors, and not by factors related to the structure and the outcome of the screening. Parents who perceived the screener as competent, had enough time to ask questions, perceived the screening procedure as fluent, had the feeling that the screening placed a low burden on their infant and whose expectations were met, were more likely to be satisfied. The perceived unpleasantness of a crying infant had a negative influence on parental satisfaction. When implementing the screening, CHC professionals can adapt these determinants to stimulate high parental satisfaction levels. Information provision before the screening and communication with parents during the screening are means by which parental satisfaction can be influenced positively.

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CHAPTER 7

DIRECT REFERRAL BY THE CHILD HEALTH CARE PHYSICIAN IN CASE OF SUSPICION OF DEVELOPMENTAL DYSPLASIA OF THE HIP: THE PARENTS' PERSPECTIVE

MARJON WITTING
MAGDA M BOERE-BOONEKAMP
MARGOT AH FLEUREN
RALPH JB SAKKERS
MAARTEN J IJZERMAN

TIJDSCHRIFT VOOR GEZONDHEIDSWETENSCHAPPEN 2011;89(8):414-419

ABSTRACT

Objective

Direct referral by the child health care (CHC) physician to secondary care appears to be useful if developmental dysplasia of the hip (DDH) is suspected. Screening for DDH is based on a physical examination and identification of risk factors. Ultrasound (US) screening seems to lead to better medical and economic outcomes. As part of a study into the feasibility of implementation of US screening in the Netherlands, we studied how parents evaluated the referral process, i.e. the way they were referred to the orthopedic surgeon - directly or via the general practitioner (GP) - in case of suspected DDH.

Methods

A questionnaire was developed to evaluate the experience of parents of infants who had been referred. The questionnaire was sent to a total of 355 parents of infants between January 2008 and November 2008.

Results

The response rate was 46.5%. Parents were more satisfied if they were referred directly by the CHC physician as opposed to indirectly via the GP. The time between referral and the first appointment with the orthopedic surgeon was shorter if infants were referred directly. Finally, parents were more satisfied if they evaluated the referral process as being not stressful and if it proceeded fluently.

Conclusions

Based on the perception of parents, this study provides a first indication that, when taking into consideration some important preconditions, direct referral to secondary care in the case of DDH is desirable.

INTRODUCTION

In preventive child health care (CHC) almost 20% of all infants are referred for additional diagnostics because of suspected or to exclude developmental dysplasia of the hip (DDH) [1]. It is the most common reason for referral by CHC centers [2]. Initially, these infants are referred to general practitioners (GPs) who in their turn usually refer the parents to the medical specialist. This referral process corresponds with the role of the GP as gatekeeper, treating doctor and family doctor [3]. However, there is a discussion about the added value of a consultation with the GP if healthy infants are being referred by the CHC physician based on a screening result, such as the screening for DDH. Direct referral to the orthopedic surgeon in cases of DDH seems useful because several important advantages can be obtained, such as time-saving for parents and improved information exchange between medical specialists and the CHC physician [3].

The preconditions for direct referral to secondary care by a CHC physician, which were formulated after a pilot study in Noord-Brabant (the Netherlands), are: an experienced CHC physician (employed in preventive CHC for more than one year), a guideline or protocol based referral and the existence of agreements about mutual information exchange within the referral chain [3]. Recently, a National First-Line Health Care Cooperation Agreement (LESA) for DDH was developed to optimize health care for the infant [4]. This LESA, formulated by a study group of the scientific organization for CHC physicians (AJN) and the Dutch General Practitioners Association (NHG), provides guidelines for the cooperation and suggestions for work agreements between the CHC physician and the GP in cases of suspected DDH and direct referral to the medical specialist.

The screening for DDH consists of repeated physical examination and identification of risk factors. In many German-speaking countries, ultrasound (US) is used to screen for DDH [5]. In 1998 and 1999, a study was performed in the Netherlands assessing the effectiveness of US screening compared with the current screening method. This study showed that US screening of three-month-old infants leads to fewer missed cases and a low referral rate [6]. As well as the clinical outcomes related to the screening for DDH, less objective measures, such as parental satisfaction, are also of importance [7]. Patient satisfaction is an important determinant of the quality of the provided health care [8-9] and influences patient behavior, such as adherence to a recommended treatment plan [9-10].

The objective of this study was to gain insight into the experience and satisfaction of parents with the referral process in the case of an abnormal US. Special attention was given to the differences between parents who were referred to the orthopedic surgeon via the GP and parents who were referred directly. This study was part of a larger follow-up study in which the feasibility and cost-effectiveness of implementation of US screening for DDH in the Netherlands

was examined. In this pilot implementation, all parents of newborns in the regions Salland and Utrecht (the Netherlands) had the opportunity to, besides the regular physical screening, have a hip US image created during an extra well-child visit. From November 2007 up to April 2009, 4099 infants were screened using US. This took place at the age of three months and was performed by specially trained CHC physicians, CHC nurses and radiographic technicians at the CHC centers. All infants with an abnormal US image were referred to the GP or orthopedic surgeon for additional diagnostics and potential treatment. In consultation with the largest health care insurer, all infants in Salland were referred directly. The GPs received a copy of the referral letter. In Utrecht, infants were first referred to the GP and subsequently to the orthopedic surgeon.

METHODS

Participants and procedure

All parents (*N* = 355) of infants screened between January 2008 up to November 2008, who were referred directly or indirectly to the orthopedic surgeon received a questionnaire by mail. This took place three to four months after the referral. It concerned 259 parents in Salland and 96 parents in Utrecht. This period was determined to ascertain that all parents had visited the orthopedic surgeon and knew if their infant needed treatment. A follow-up reminder was sent after two weeks.

Questionnaire

The questionnaire was developed together with CHC professionals and an implementation expert. In addition, the questionnaire was based on former research into the experience of parents with direct referral [3]. Parents could indicate by means of seven items how they experienced the referral process (five-point scale ranging from 1 “totally disagree” to 5 “totally agree”) (Table 1). Parents were asked to evaluate the practicality of the referral process through a five-point scale. Parents who were referred via the GP were asked if they would have preferred to have been referred directly to the hospital and parents who were referred directly to the hospital were asked if they would have preferred to have been referred via the GP. Finally, parents could give an overall evaluation of the referral process on a ten-point scale ranging from 1 to 10.

Data analyses

T-tests (two-sided) for independent samples were performed to test for differences between direct and indirect referral regarding parental satisfaction and the time between referral and the first consultation with the orthopedic surgeon. Chi-square tests and Fisher's Freeman Halton exact tests (two-sided) for categorical variables were used to test for differences between direct and indirect referral regarding the experience of parents. A univariate analysis of variance (ANCOVA) was performed to gain insight into the factors that determine parental satisfaction with the referral process.

RESULTS

Participants

The questionnaire was sent back by 165 parents (response 46.5%). Eight questionnaires were not filled in or were not completed fully and one parent did not comply with the advised referral. The results of a further fifteen parents were not taken into account because they were not referred to the orthopedic surgeon according to the protocol of the CHC organizations (six infants were referred via the GP in Salland; nine infants were referred directly in Utrecht). Thus 141 questionnaires could be used for the analyses (response 39.7%). A total 120 questionnaires from the 259 parents in Salland could be used (response 46.3%) and 21 questionnaires from the 96 parents in Utrecht (response 21.9%).

It was unclear if eleven of the parents were referred directly or indirectly. Of the remaining 130 parents, 109 parents (83.8%) were referred directly and 21 parents (16.2%) were referred via the GP. Almost half (48.2%) of all referred infants were treated, of which 49.6% in Salland and 45.0% in Utrecht $\chi^2(1, N = 139) = 0.14$, $p = .71$. Two parents (1.4%) did not know (yet) if their infant needed treatment.

Evaluation of the referral process

The average of the parents evaluation of the referral process was 7.24 (*SD* = 1.89). The average of the parents assessment of a direct referral was 7.51 (*SD* = 1.78) and of parents who had been referred via the GP, the evaluation average was 6.31 *(SD* = 2.25). This difference was significant $t(126) = 2.71$, $p < 0.01$ and demonstrates a correlation of $r = .23$.

The time between the referral and the first visit to the hospital was on average two and a half weeks (*M* = 2.52, *SD* = 1.48). Parents who were referred directly visited the hospital after almost two and a half weeks (*M* = 2.33, *SD* = 1.30) and parents who were referred via the GP after three weeks (*M* = 3.00, *SD* = 1.84). This difference was significant $t(127) = -2.00$, $p = 0.05$.

All parents who were referred via the GP would have preferred to have been referred directly and 90% of the parents who were referred directly preferred this way of referral. Of the parents who were referred directly, 87.7% evaluated this referral route as practical compared to 5.0% of the indirectly referred parents. The results of the statements related to the experience of the parents are presented in Table 1. As a result of the low numbers, the results were redefined into three categories. The statement “I was fully aware of what I could expect in the hospital”, differed significantly between parents who were referred directly and indirectly $\chi^2(2, N = 130) = 6.93, p = .03$. Additional analyses showed that parents who were referred directly agreed more often with this statement and answered less with “neutral” compared to parents who were referred to the orthopedic surgeon indirectly.

Table 1. Experience of parents with the referral process

	Total [a]	Direct referral	Indirect referral
	N = 141 (%)	N = 109 (%)	N = 21 (%)
I was fully aware of what I had to do after an abnormal US image was found at the CHC center [b]			
(totally) Disagree	18 (12.9)	11 (10.2)	4 (19.0)
Neutral	18 (12.9)	14 (13.0)	1 (4.8)
(totally) Agree	103 (74.1)	83 (76.9)	16 (76.2)
I experienced the referral process as very stressful [b]			
(totally) Disagree	91 (64.5)	68 (62.4)	14 (66.7)
Neutral	26 (18.4)	22 (20.2)	2 (9.5)
(totally) Agree	24 (17.0)	19 (17.4)	5 (23.8)
I was fully aware of what I could expect in the hospital [c] *			
(totally) Disagree	49 (34.8)	37 (33.9)	6 (28.6)
Neutral	35 (24.8)	23 (21.1)	10 (47.6)
(totally) Agree	57 (40.4)	49 (45.0)	5 (23.8)
I found the time between referral and my first visit to the hospital too long [b]			
(totally) Disagree	92 (66.2)	76 (70.4)	11 (52.4)
Neutral	25 (18.0)	19 (17.6)	4 (19.0)
(totally) Agree	22 (15.8)	13 (12.0)	6 (28.6)
I was very worried in the period between the screening and my visit to the hospital [c]			
(totally) Disagree	82 (58.6)	65 (60.2)	8 (38.1)
Neutral	32 (22.9)	25 (23.1)	6 (28.6)
(totally) Agree	26 (18.6)	18 (16.7)	7 (33.3)
The referral process proceeded fluently [b]			
(totally) Disagree	14 (10.0)	8 (7.4)	4 (19.0)
Neutral	19 (13.6)	13 (12.0)	4 (19.0)
(totally) Agree	107 (76.4)	87 (80.6)	13 (61.9)
I felt very badly prepared for my first visit to the hospital [c]			
(totally) Disagree	91 (65.0)	74 (68.5)	11 (52.4)
Neutral	33 (23.6)	26 (24.1)	6 (28.6)
(totally) Agree	16 (11.4)	8 (7.4)	4 (19.0)

* $p \leq .05$.

[a] The totals do not match up with the sum of the results of the direct and indirect referrals, because information about the referral process was not available for eleven parents.

[b] Performed with a Fisher's Freeman Halton test for categorical variables.

[c] Performed with a Chi-square test for categorical variables.

The results of the ANCOVA are presented in Table 2. The degree to which parents perceived the referral process as stressful, influenced satisfaction. If parents perceived the referral process as less stressful, they were more satisfied $t(117) = 1.95$, $p = .05$. Moreover, the perceived fluency of the referral process had a positive influence on parental satisfaction. Parents who perceived the referral process as fluent, were more satisfied compared to parents who disagreed with this proposition $t(117) = -5.87$, $p < .01$. The time between referral and the first visit to the orthopedic surgeon and possible treatment of the infant, did not influence satisfaction.

Table 2. Results of the ANCOVA with satisfaction with the referral process as dependent variable

Measure	Type III Sum of squares	df	Mean square	F	Sig.
Treatment	3.02	1	3.02	1.38	.24
Time between referral and first visit to the hospital	0.44	1	0.44	0.20	.65
I was fully aware of what I had to do after an abnormal US image was found at the CHC center	3.60	2	1.80	0.82	.44
I experienced the referral process as very stressful	13.52	2	6.76	3.09	.05
I was fully aware of what I could expect in the hospital	6.55	2	3.28	1.50	.23
I found the time between referral and my first visit to the hospital too long	3.49	2	1.74	0.80	.45
I was very worried in the period between the screening and my visit to the hospital	2.87	2	1.44	0.66	.52
The referral process proceeded fluently	79.19	2	39.59	18.11	.00
I felt very badly prepared for my first visit to the hospital	4.21	2	2.11	0.96	.39

R Squared = .45.

DISCUSSION

This study demonstrates that parents are more satisfied if they are referred directly by the CHC center to the orthopedic surgeon and less so if they have to visit the GP first after an abnormal US image. All parents who were referred via the GP preferred to have been referred directly whereas the majority of the parents who had been referred directly preferred this route.

Moreover, parents who were referred directly evaluated this process as more practical than parents who were referred via the GP. This corresponds with the results of previous research which showed that 93% of all parents evaluated a referral route via the GP as unpractical [3].

The direct referral process resulted in a reduction in days between the referral by the CHC center and the visit to the hospital. The discrepancy with the indirect referral may be due to the extra visit to the GP. It is of importance to minimize the time between referral and the first visit to the hospital, so that on the one hand a treatment can be initiated without delay and on the other hand to reduce the parents' negative feelings, such as fright and concern. The period between referral and the first visit to the medical specialist did not influence parental satisfaction.

Parents were more satisfied if they perceived the referral process as not stressful and if they evaluated the proceeding of the process as being fluent. From a practical point of view, this implies that the screener should facilitate the start of the referral process in such a way that parents enter the process in a convenient way, for example by providing good information about the outcome of the screening. Romeijn [11] also emphasizes the importance of good communication and agreement with parents about the problem in case of a referral.

One of the limitations of this study is that, due to practical reasons, it was not possible to randomly assign parents to a direct or indirect referral. This implies that other factors, such as the location and socio-demographic differences between parents, might also influence some of the results. However, a meta-analysis showed that socio-demographic characteristics only have a minor influence on satisfaction with health care [12]. Moreover, it is not likely that the organization in which the screening was performed can account for the differences, since the screening was conducted according to a strict protocol and parents therefore received the same care. We expect that the chance is minimal that the differences in satisfaction can be explained by other factors and that they can be attributed to the process of referral.

Another limitation of this study is that the group of infants who were referred directly (Salland) is much larger compared to the group of infants who were referred via the GP (Utrecht). Although the reproducibility of the screening was proven to be adequate [13-14], possible differences in creating and interpreting the images between screeners in this study might have led to a higher percentage of referrals in one region compared to the other region. Additionally, during the research period, more infants in Salland were screened (N = 2370) than in Utrecht (N = 1729), which implies that the chance is higher that more infants were referred in this region. Finally, it is possible that the prevalence of DDH is actually higher in Salland than in Utrecht, for example because of a family history of DDH.

The response to the questionnaire survey in Utrecht, where there was an indirect referral policy, was lower compared to the response in Salland. In previous research it was suggested that people are less inclined to participate in (questionnaire) surveys if they are less satisfied

with the received care [15-16]. This might implicate that the difference found in satisfaction between directly and indirectly referred infants might possibly be larger than found in this study. Socio-demographic characteristics of the parents might also explain the variance in response. Non-response in surveys is for example associated with being of another ethnicity or living in an urban area [17]. Language problems in Utrecht might have led to difficulties for parents of another ethnicity in filling out the questionnaire. Since we do not have an insight into the experiences of the non-participants, we should be careful with extrapolating the results to the general population.

Finally, the time between referral and the receipt of the questionnaire was three to four months. This could have led to recall bias; parents might possibly have had difficulties with remembering how the referral process proceeded. Furthermore, it might have resulted in a selective response; parents of infants who were not treated, possibly did not react so readily because their referral process was already concluded. Parents of infants who are being treated might respond more often, because for them it is still an ongoing process.

This study showed that when looking at the parents' perception, direct referral is preferable over a referral via the GP if DDH is suspected. Parents perceived this process as more practical and they were more satisfied. Moreover, a direct referral resulted in a reduction in the number of days between referral by the CHC center and the visit to the hospital for additional diagnostics. The results provide a first indication that direct referral is desirable if DDH is suspected. This is in line with formerly formulated recommendations [3]. Future research among medical specialists, GPs and CHC physicians should provide more insight into the desirability of and the preconditions for direct referral in the case of suspected DDH. It is essential that during future implementation of the direct referral process, this process is closely monitored. As a starting point for the implementation, the LESA DDH [4] can be used. Here, the preconditions for (direct) referral are formulated, such as agreements about the referral process for additional diagnostics, the (backtrack) reports and quality assurance of the care process.

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CHAPTER 8

GENERAL DISCUSSION

INTRODUCTION

Early diagnosis and treatment of developmental dysplasia of the hip (DDH) is essential to allow for the normal development of the hip. In the Netherlands, the current screening method for DDH consists of physical examination in combination with identification of risk factors performed in preventive child health care (CHC) by CHC physicians. In previous studies, ultrasound (US) screening for DDH was demonstrated to be more (cost)effective compared to the current screening method [1]. However, these clinical and economic outcomes can be relatively uncertain since they may not reflect the real value of the innovation when implemented in a 'real-world' health care setting [2-3]. The next step was therefore to investigate US screening for DDH as part of the preventive CHC program by means of a pilot implementation. The aim of this thesis was to study determinants related to the implementation of the screening and, particularly, determinants associated with parental participation in and satisfaction with the screening. The results of these studies can support decision-making in health care policy regarding national implementation of the screening. First, this chapter describes the importance of a determinant analysis before implementation of an innovation. Subsequently, the significance of parental participation in the implementation of infant screening is described, followed by several implementation strategies that can be used in health care policy decision-making. The value of a pilot implementation is described and the framework that was used in this thesis is discussed. Finally, this chapter addresses methodological issues related to the studies.

DETERMINANTS FOR SUCCESSFUL IMPLEMENTATION

The use of a determinant analysis is considered essential for successful implementation of innovations in health care [4-10]. It provides health care professionals, health care policy decision-makers and managers of health care organizations guidance to making well-informed decisions concerning implementation. Focus groups are often used in health care policy research, since they elicit different perspectives and interactions between multiple stakeholders and can describe complex settings and interactions [11]. Focus groups are also very useful for identifying implementation barriers [10]. In the first phase of the pilot implementation, a focus group study was conducted to identify enhancing and impeding factors, within a framework of innovation determinants, related to US screening for DDH (chapter 3). Based on the determinants formulated in the framework of Fleuren et al. [4], a multidisciplinary approach was adopted. A multidisciplinary approach generally increases the chances of successful implementation of evidence-based results [12]. The most important

stakeholders participated in the focus groups: managers and staff doctors of CHC organizations, potential screeners, representatives of policy, professional and patient organizations, parents, general practitioners (GPs) and medical specialists. Conducting the focus group study before the pilot implementation proved to be very useful to enable a detailed picture of important determinants, to elicit new ideas and viewpoints related to the implementation and subsequently to adapt these insights into the implementation strategy. For example, preferences regarding the parental information provision, quality assurance and the training program for screeners were included in the strategy. Involving those people who actually are to use the innovation, manage its implementation as well as those who are indirectly involved in the process, is a first step in closing the gap between scientific evidence and practice and in creating support for the implementation.

THE IMPORTANCE OF PARENTAL PARTICIPATION IN IMPLEMENTATION OF INFANT SCREENING

In the Netherlands, CHC organizations aim at reaching 100% of the infants in their catchment area, but the accepted minimum is 95% [13]. A high reach in preventive CHC is desirable since this allows not only for effective primary prevention programs, aiming at optimal growth and development of infants, but also for early detection and subsequently timely intervention and/or treatment of a disorder. Preventive care will enhance population health and well-being and will prevent high costs associated with future health problems. So, while a participation rate of 92.0% for the pilot implementation in Salland is acceptable considering that the overall participation rate in the Netherlands in preventive CHC is 95% [14-15], a participation rate of 58.7% in Utrecht is well below the accepted minimum and is presumably too low for a population based screening to be (cost)effective (see chapter 1 for participation rate calculations). Furthermore, such a low participation rate might prevent health care policy decision-makers from considering implementation of US screening for DDH in the future. Therefore, it seems necessary to differentiate between rural and urban settings regarding the requirement for implementation strategies to achieve higher participation rates. While implementation strategies might be beneficial for areas in which the participation rate is already acceptable, it is expected that the highest profit can be gained by application of effective implementation strategies in (urbanized) areas where participation rates are expected to be low.

IMPLEMENTATION STRATEGIES

When considering the 'principles' of screening proposed by Wilson and Jungner [16], it can be seen that the acceptability of the screening to the population is regarded as an important factor. Parental participation in and satisfaction with the screening are most likely the best indicators for acceptability. To understand the determinants of participation and satisfaction, several studies were carried out, focusing on psychosocial determinants related to participation in US screening (chapter 4), the most effective information strategy (chapter 5), satisfaction with US screening (chapter 6) and satisfaction with the referral process (chapter 7). Based on the findings of these studies, strategies can be formulated for nationwide implementation of US screening for DDH in preventive CHC. These strategies can support health care policy-makers and managers in preventive CHC in their decision-making concerning the implementation of the screening. The implementation strategies described below are categorized into three main clusters: the organization of the screening, the communication with parents and the screening process.

Strategies related to the organization of the screening

Removing practical barriers

Self-efficacy of parents was found to be an important predictor of participation (chapter 4). Parents who expected that they had to arrange a lot or who felt that it would cost them a lot of time, less often participated in the screening. CHC organizations should therefore facilitate parental screening uptake by removing these practical barriers. For example, the accessibility of preventive CHC can be increased by offering evening and weekend well-child visits, resulting in more options to visit the screening. Moreover, the possibility of digital planning and/or changing of screening appointments by parents, for example through a web-based parent-portal [13, 17], and the availability of more screening locations might increase the accessibility of the screening.

Stimulating a positive subjective norm

It was found that parents are sensitive to the opinion of their partner and health care professionals at the CHC center in their decision-making process (chapter 4). Communication strategies on several levels (e.g. national, regional, neighborhood and/or individual level) can be implemented to stimulate a positive subjective norm and subsequently improve screening uptake. At the start of the implementation of the neonatal hearing screening, several information channels were used by CHC organizations to inform parents and other stakeholders, such as local radio and television-channels and the local newspaper [18]. These

channels provide the opportunity for health care policy decision-makers to influence the subjective norm regarding US screening. On the individual level, CHC professionals, who are considered as 'experts' by parents, can also influence the subjective norm by emphasizing the positive aspects of partaking in US screening.

Establishing an adequate training program

One of the arguments frequently proposed by opponents of US screening for DDH is the operator dependency of the screening [19-22]. However, US screening is an accurate method in the hands of experienced examiners [22-24]. Well-trained screeners will have a lower false-positive rate and have a lower probability to miss a positive case compared to relatively untrained screeners. Training and expertise are therefore necessary to achieve reliable screening results. In the focus group study, intensive training, including training on the job, feedback and training in communicating bad news, were mentioned as important preconditions for the implementation of the screening (chapter 3). Along with the positive influence of screener training on clinical outcomes, screener competence also affects less tangible outcomes, such as parental satisfaction with the screening, as was demonstrated in chapter 6. Health care policy decision-makers should consider training of screeners as an important part of the implementation of US screening. Cooperation can be sought with medical specialists, such as radiologists and orthopedic surgeons, to realize a high quality educational program.

Establishing a direct referral route

In cooperation with the health care insurers, it is advised to establish a direct referral route to the orthopedic surgeon in case DDH is suspected. This advise is in line with other recommendations regarding referral in case of suspected DDH [25]. Parents are more satisfied if they are referred directly to the orthopedic surgeon than if they have to visit the GP first (chapter 7). Furthermore, the direct referral process reduced the time between the referral by the CHC center and the first visit to the hospital. Collaboration of all stakeholders, including the GP, the CHC physician, the orthopedic surgeon and the radiologist, is essential for successful realization of the direct referral route. The GPs' and the medical specialists' views on the referral process should be further explored to ensure their support and explicit agreements should be made about responsibilities. The National First-Line Health Care Cooperation Agreement (LESA), in which recommendations for cooperation and suggestions for work agreements between the CHC physician and the GP are described, can serve as a guideline for implementation of a direct referral policy [26].

Strategies related to communication with parents

Providing effective information before the screening

Providing effective parental information is an essential strategy for successful implementation of US screening. A large group of parents reported never having received or read the information brochure (chapter 5). This certainly needs attention, as sufficient knowledge is necessary to enable informed parental decision-making [27-28]. Even more important might be the influential role of knowledge in parental screening participation. This was found in the study on psychosocial determinants of participation (chapter 4) and was also demonstrated in other studies focusing on factors influencing the intention to get the human papillomavirus vaccination [29-30]. Interventions that facilitate dissemination of US screening, such as monitoring of the distribution process, stimulation of parents to actually read the information and asking if parents have any questions about the provided information, should be considered by health care professionals and health care policy decision-makers.

In the focus group study (chapter 3), the importance of effective information provision to parents was highlighted by managers and parents. One of the factors discussed was the content of the information brochure, which should contain information about DDH, the screening procedure, the results of the screening and treatment for DDH. Preferably, this information should be provided in person at the CHC center as well as in a brochure. Davis et al. [31] also conducted focus groups and individual interviews with parents and health care providers to gather opinions about effective newborn screening communication. They found that parents like to hear about newborn screening from a trusted health care provider, who provides the information brochure accompanied by a face to face explanation. Medical explanations of the disease were of minor importance to parents. Additionally, parents preferred short and concise information brochures in an easy-to-read format that includes only essential information about the screening, such as information about the benefits, possible retesting and the way they would be notified about this.

Translation of the information in other languages, such as Moroccan or Turkish should also be a point of consideration for health care policy decision-makers and managers in preventive CHC, as lack of local language skills has been found to be a barrier for health care usage [32-33]. In the focus group study (chapter 3) it was also mentioned that the information should be available in other languages as well. However, to conform to the current policy on information provision by the CHC organizations, the brochures in the pilot implementation were only available in Dutch. This might have hindered informed-decision making and thus the decision on participation for non-native speakers. Especially in urbanized areas, where most migrants live, translation of information might positively influence participation.

It is beneficial to use gain-framed brochures when informing parents about US screening. Emphasizing the advantages of screening participation might positively influence attendance rates, as was concluded in the study on message framing (chapter 5). Moreover, informing parents about the positive aspects of the screening can create a positive attitude towards the screening, which in turn can increase parental participation (chapter 4). Both in the face to face communication with parents at the CHC center as in the information brochures, gain-framed information can have positive effects on parental decision-making about partaking in the screening. This effect might especially be visible in organizations in which the participation rate is expected to be relatively low, such as organizations located in urbanized areas.

Using an active invitation and reminder approach

The different invitation strategies between the organizations might be one of the main reasons for the large variance in participation rates (chapter 5). In both organizations, parents received the information brochure at their first well-child visit to the CHC center, when their infant was one month old. At the age of two months, parents in the rural area received a screening invitation as it was an integral part of the routine examinations. They received the invitation at home, including a place, date and time for the screening. If parents did not want to participate, they had to contact the CHC assistant to cancel the appointment (opting out). These parents might have perceived the screening to be valuable simply because it was routinely offered by the CHC center. In the urban area, parents had to make an appointment at the CHC center in case they wanted to participate (opting in). This implicates that they had to undertake action themselves, which might have prevented some parents from making an appointment. Moreover, parents could have questioned the value of the screening assuming that when it would be truly valuable to their infant's health, the CHC organization would probably have encouraged their participation by means of a more active approach. For national implementation, it is advised to make use of the opting out approach to invite parents for the screening, as this is generally considered a better method for the recruitment of people [34-35]. Acceptance of US screening might be higher if the actions that parents themselves need to undertake for participation, are minimized.

The use of reminders can also be an effective strategy for optimizing screening uptake. In preventive CHC, the use of reminders such as e-mail and text messages (SMS) becomes more popular to increase participation [13, 36]. Additionally, a free phone number might stimulate parents to reschedule appointments instead of not visiting a prearranged appointment and therefore missing the screening altogether. In case parents do not participate in the screening, CHC centers should actively try to reach these parents by telephone or by sending a second

invitation letter. An active approach is considered as one of the main measures to increase participation [13].

Strategies related to the screening process

Creating a comfortable environment for the infant

In the study on parental satisfaction (chapter 6) it was found that the process domain contained the most important predictors of parental satisfaction. The process domain denotes what is being done during provision and receipt of health care [37-38]. Parental satisfaction was positively related to a fluent proceeding, a low burden to the infant and the not crying of the infant (or not perceiving the crying as unpleasant). This indicates that the screening should be organized in such a way that parents perceive it as convenient for their infant. Using a soft pillow to position the infant and making use of a dummy or toy to distract the infant are practical strategies to create a comfortable environment.

Communicating effectively with parents during the screening

Parents should be given enough time to let them ask all questions they may have. Although time for the screening is expected to be limited (in the Soundchec 2 study, we calculated ten minutes for the screening), the screener should be able to address possible questions of parents. Effective communication during a health care visit is considered to be an important determinant for (parental) satisfaction as was found in the study described in chapter 6 and confirmed in other studies [39-41]. Screeners should explicitly ask parents whether they have any more questions before they leave the screening. Moreover, extra attention could be given to parents whose infant has to be referred to the orthopedic surgeon because of suspected DDH. It was shown that parents who perceived the referral process as not stressful and who evaluated the proceeding of the process as being fluent, were more satisfied with the overall referral process (chapter 7). The screener can facilitate the referral process by informing parents about the procedure and comfort parents when they are anxious or worried about the outcome.

THE VALUE OF A PILOT IMPLEMENTATION

Assessment of clinical benefits and cost-effectiveness of innovations can be informative for health care policy decision-making. These outcomes can influence the diffusion, adoption and use of new technologies, for instance through regulation of coverage [42]. However, these assessments are often performed under idealized conditions and therefore do not reflect the

clinical and economic value of the new technology once implemented in the 'real-world' [2-3]. Moreover, it is shown that results of cost-effectiveness studies are of limited importance in supporting health care policy decision-making [43]. Health care policy decision-makers are increasingly interested in information on 'real-world' data on which to base their decisions [44]. Additional data gathering might therefore be necessary to get a full understanding of the factors that may influence the innovation process. Three types of 'real-world' data can be identified, including clinical, economic and patient-reported outcomes [44]. All these factors are considered relevant for health care policy decision-making. A pilot implementation, such as the Soundchec 2 study, can be used as a method to gather these 'real-world' data. While the clinical and economic outcomes have been reported in the Soundchec 1 study [1] and in another thesis on the Soundchec 2 study [45], the studies described in this thesis focused mainly on the client-reported outcomes. By conducting these studies, several aspects could be identified that can influence nationwide implementation of US screening. Moreover, this study revealed factors that could not have been identified in the Soundchec 1 study, but yet can affect the (cost)effectiveness of the screening, such as parental participation and satisfaction. Based on these outcomes, refinement of the economic value of the innovation is possible.

Clinical and economic outcomes related to the screening can be interpreted from another angle, i.e. from a parent-perspective. For instance, apart from perceiving screener competence as a way of guaranteeing a valid and reliable screening that in turn can influence clinical and economic outcomes, this study showed that screener competence also influenced a relatively 'soft', yet important, outcome, namely parental satisfaction. Parental satisfaction can lead to commitment and adherence to a recommended treatment [46-47], which in its turn can positively influence costs related to treatment and prevent negative future health effects, such as premature degenerative joint disease. Moreover, a positive experience might induce positive 'word of mouth' [48]. In light of the screening, satisfied parents might talk to other parents about their positive experience and stimulate their participation in the screening. Screener competence can thus directly influence economic outcomes via the quality of the screening and indirectly via parental satisfaction. Another example of the linkage between clinical outcomes and the perspective of parents is the screening effectiveness. In chapter 4 it was found that parents who perceive US screening as an effective way of detecting DDH were more prone to participate in the screening. So, effectiveness measures might not only be valuable to health care policy decision-makers but might also increase informed-decision making for parents.

A 'NEW' DETERMINANT: THE PATIENT

The framework by Fleuren et al. [4] proved to be very useful in identifying determinants that influence successful implementation. Apart from being a helpful tool in the execution and the analyses of the focus groups, the structuring of innovation determinants can also be useful for health care policy decision-makers to decide which determinant(s) to focus on when implementing an innovation.

In the framework, the patient characteristics, such as awareness and discomfort, are placed under the determinant socio-political context. However, the socio-political context also includes factors outside the patient and on a macro level, such as rules and legislation. Since the socio-political context might not be the most appropriate place for the patient, and because the framework did not provide a separate determinant for the patient/client, they were, together with the health care professionals, in this thesis considered as users of the innovation. An extension of the framework with a 'stand alone' patient/client determinant can be very valuable (Figure 1). It is important to assess patient characteristics, so the implementation of evidence-based innovations has more chance to succeed. Examples of patient characteristics that can be included within this determinant are patient satisfaction with the received care, psychosocial determinants related to participation and knowledge about the innovation. So while the framework does not fail to acknowledge patient/client characteristics, the appropriate place might be reconsidered. This is substantiated by other researchers in the implementation field, who also differentiate between characteristics of the health care professional and characteristics of the patient in the innovation process [5, 7, 49]. Chaudoir et al. [50] performed a systematic review on factors related to implementation of evidence-based innovations and concluded that there is a shortage of patient-level factors in implementation research. For future research, they recommend using more measures at a patient-level, in addition to measures on the structural, organizational, provider and innovation level.

Involvement of end-users is essential to optimize the innovation process. Their constant feedback might lead to adjustments to the existing innovation so it can be optimally tailored to the end-users' wants and needs. If US screening for DDH will be implemented in the future, it is important that the end-users of the innovation are involved in reappraisal of the implementation of the innovation. Not only should participation rates be evaluated on a regular basis; satisfaction studies might also be conducted frequently.

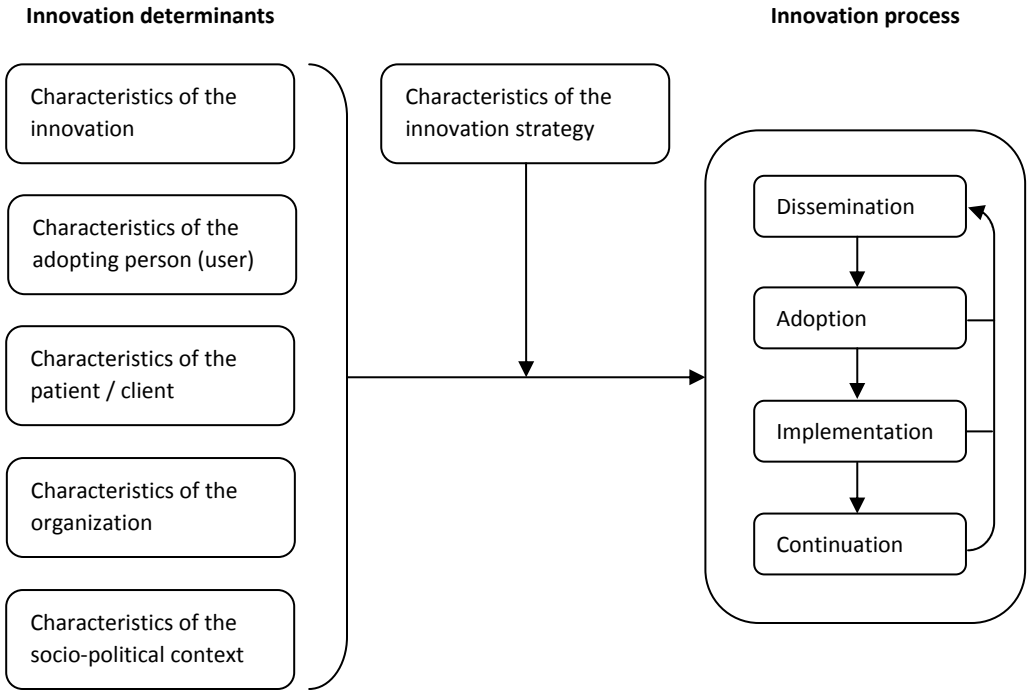

Figure 1. Extended framework representing the innovation process and related categories of determinants [4]

METHODOLOGICAL CONSIDERATIONS

Although the results of the studies described in this thesis are relevant and useful for theory and practice, we should also consider some methodological limitations. The main limitation of the empirical studies is the type of data gathering. Convenience sampling was used both in the enrollment of participants in the focus groups and for the recruitment of participants for the questionnaires studies. The main advantages of this method of sampling are the accessibility of the participants and the ease of data gathering, such as time saving. However, the biggest disadvantage of using a convenience sample is the sampling bias. In the focus group study, it was not possible to overcome this bias by randomization of the participants. It is possible that people who already had an opinion about the screening or were supportive of the screening were more willing to participate. Therefore, the participants might not be a true reflection of the target population. The same bias might have been present in the questionnaire surveys: parents who participated in the screening and/or parents who were satisfied with the screening might have been more prone to fill out the questionnaires. The response rate of the non-participants (37.2%) was much lower compared to the response rate of the participants

(61.7%), leading to an overrepresentation of parents who visited the screening. Moreover, within the group of participants there might have been an overrepresentation of satisfied parents, since people who are more satisfied with the received care are generally more inclined to participate in (questionnaire) surveys than people who are less satisfied [51-52]. Other research found only relatively small and negligible differences in satisfaction between respondents and non-respondents [53]. Acknowledgement of the possibility that the results of the studies do not represent the whole population being studied is necessary. Despite this limitation, the results provide a good indication for the relations between the several determinants and parental participation and satisfaction found in the studies.

It is recognized that even a pilot implementation does not fully reflect 'real-world' practice. In the Soundchec 2 study, US screening was offered to parents as an extra examination of the hips of their infant. Care as usual was not removed from the preventive program, but was performed standard in the well-child visits. In case US screening will be implemented in the future, physical examination and identification of risk factors will probably be replaced partly by the US screening. This might influence the decision-making of parents regarding their participation in the screening. Without understatement of this limitation, it is reasonable to expect that the results found in the studies reflect the way parents evaluate the screening and the underlying reasons for their participation.

The data about the non-participants were gathered three months after the possibility to participate in the screening (chapter 4) and the data on parental satisfaction with the referral process were collected six months after the referral (chapter 7). Since recall accuracy declines with a longer time period [54], parents might not have remembered all the details related to their choice not to participate in the screening or the details concerning the referral process. However, significance of an event to the respondent is also considered an important factor for recall [54]. Since the screening for DDH concerns their infants' health and can therefore be expected to be of value for parents, it is likely that the recall bias is relatively low. Recall bias is also unlikely to be a problem for parents of referred infants, since a referral to the orthopedic surgeon can have a relatively high emotional impact. Although uncertainty about the interpretation of the results might be increased by recall bias, this effect will probably only be minor because of the significance of the events.

The large variance in participation rate found in the pilot implementation is mainly attributed to the invitation strategies of the organizations (opting in versus opting out) and specific regional characteristics, such as the degree of urbanization. However, this is only a tentative conclusion, since the studies did not take into account these possible predictors of participation. To get a clearer picture, future studies in more CHC organizations are needed to address the influence of the invitation strategy and the influence of regional characteristics on parental participation in the screening.

The final important issue that needs to be addressed is the national character of the pilot implementation. Although the findings of the separate studies are to a large extent comparable to other studies, screening for DDH in the way that it was organized in this study is unique to the Netherlands. This is mainly because preventive CHC in the Netherlands is organized in such a way that it allows for screening outside of the hospital by CHC professionals. Most European countries provide preventive CHC based on another structure, such as by the GP or by the pediatrician [55]. So, although the provided screening might be the same, the context specific characteristics can differ. This implies that the findings of this pilot implementation are only partly generalizable to other countries and settings.

CONCLUSION

One of the most important factors that influences successful implementation of US screening for DDH in preventive CHC in the Netherlands is the screening acceptance by parents. Indicators for acceptance are parental participation in the screening and satisfaction with the received care. By means of a pilot implementation the determinants that influence parental participation and satisfaction could be identified. Based on these outcomes, effective implementation strategies were formulated related to the organization of the screening, the communication with parents and the screening process. These strategies can support health care policy decision-makers with national implementation of US screening, so as to facilitate optimal likelihood of implementation. Particularly in regions in which the participation rate is expected to be low, these strategies might be of extra value.

From a more general point of view, this study shows the value of a pilot implementation in gathering additional 'real-world' data. In this case, the findings are a valuable addition to the existing clinical and economic evidence related to US screening for DDH. Furthermore, the findings presented in this thesis show the important role of the patient/client in implementation research. By integrating this determinant into studies focusing on the implementation of evidence-based innovations in health care, insight can be gained into individual factors that can promote or hinder successful implementation.

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SUMMARY

Developmental dysplasia of the hip (DDH) is a common disorder in early childhood with serious consequences if left untreated or treated late. Screening of the newborn is therefore essential for early diagnosis of DDH. Various screening strategies have been developed, with physical examination and ultrasound screening being the most commonly used. In the Netherlands, the current screening protocol in preventive child health care is based on physical examination and identification of risk factors (breech position in the last trimester of pregnancy and/or at birth and family history of DDH). A large study in the Netherlands showed that ultrasound screening detects more infants with DDH and leads to a lower referral rate compared to the current screening method. Based on these results, a pilot implementation was set up to gain insight into the 'real-world' factors that can influence national implementation of ultrasound screening for DDH. In this pilot implementation, a total of 4099 infants participated (overall participation rate 74.2%, in the rural area (Salland) 92.0%, in the urban area (Utrecht) 58.7%). The aim of this thesis was to investigate determinants related to the implementation of ultrasound screening for DDH and, particularly, determinants associated with parental participation in and satisfaction with the screening. These results provide health care policy decision-makers with effective strategies regarding national implementation of the screening.

Chapter 2 presented a theoretical overview of implementation of innovations in (child) health care. Implementation is often considered a challenging process for health care policy decision-makers. Theoretical evidence on effectiveness might be convincing, but translating this evidence into practice is a difficult process. A framework was introduced that describes the innovation process (dissemination, adoption, implementation and continuation) together with the most important innovation determinants that can influence the process. These determinants are: the innovation, the adopting person (user), the organization and the socio-political context. This framework was applied to the studies described in this thesis.

Prior to the pilot implementation, a focus group study was conducted to identify enhancing factors, impeding factors and preconditions within the framework of innovation determinants (**chapter 3**). The focus groups comprised of the most important stakeholders, including (1) managers and staff doctors of child health care organizations, (2) child health care physicians, child health care nurses and radiographic technicians, (3) representatives of policy, professional and patient organizations, (4) parents of newborns and (5) orthopedic surgeons, radiologists and general practitioners (this group received a questionnaire). Conducting these focus groups proved to be very useful in formulating the strategy for the pilot implementation. Several

aspects could be included, such as preferences regarding parental information provision, the training program for screeners and the quality assurance.

After the exploratory focus group study, the focus of the other studies was on the parents of infants. **Chapter 4** describes a study into the psychosocial determinants related to parental participation in the screening. The results of questionnaires of more than seven hundred participants and almost four hundred non-participants could be used. A positive attitude, a high subjective norm, a high self-efficacy, a low perceived susceptibility and a high perceived effectiveness were positively associated with parental participation in the screening. Perceived severity was not found to be a predictor. Some of the background variables were also predictors, such as the organization and parental knowledge. Parents who visited the organization in the rural area, more often participated in the screening compared to parents living in the urban area. Moreover, it was found that the more knowledge parents had, the higher the chance was that they participated. Health care policy decision-makers can include these psychosocial determinants into interventions focused on maximizing screening uptake. They can, for example, highlight the positive aspects and the effectiveness of the screening in the information provision to parents, remove practical barriers and stimulate a positive subjective norm.

In **chapter 5**, the results of a study into the influence of message framing on participation in the screening are presented. A total of 4150 parents received either a gain-framed or a loss-framed brochure. In contrast to what was expected based on prospect theory, parents who received the gain-framed message were more likely to participate in the screening compared to parents who received the loss-framed message. This effect was stronger for the organization in the urban area compared to the organization in the rural area. The explanation for the unexpected result might be the low risk perception of parents. Since treatment can be very effective if DDH is diagnosed in time, parents might not perceive the screening as very risky. Parents might also perceive the screening more as manner of affirmation of their infants' health rather than a way of detecting an illness. A positively formulated brochure can stimulate parental participation in the screening.

In **chapter 6**, a study focusing on parental satisfaction with the screening and the determinants associated with satisfaction is described. Patient satisfaction is considered an important validator for the quality of health care delivery and it also predicts health-related behaviors. A taxonomy of measures of health care quality was used in this study, which included the structure, process and outcome of the health care encounter. The agreement between expectations and the occurrence of these expectations was also assessed. More than seven

hundred questionnaires could be used for the analyses. General satisfaction with the screening was high. Parents who perceived the screener as competent, had enough time to ask questions, perceived the proceeding as fluently, perceived a low burden on their infant and whose expectations were met, were more likely to be satisfied. The perceived unpleasantness of a crying infant had a negative influence on parental satisfaction. Based on these results, it was concluded that factors related to the process of the screening were the most important determinants of parental satisfaction. Parental satisfaction can be stimulated by effective information provision by the child health care center before the screening, by effective communication by the screener during the screening procedure and by creating a comfortable environment for the infant.

Direct referral by the child health care physician to secondary care seems useful if DDH is suspected. In **chapter 7**, a study is described that explores the evaluation of parents regarding the referral process to the orthopedic surgeon. A differentiation was made between parents who were referred directly (in the rural area) and parents who were referred indirectly via the general practitioner (in the urban area). Parents were more satisfied if they were referred directly by the child health care physician as opposed to indirectly via the general practitioner. The time between referral and the first appointment with the orthopedic surgeon was also shorter if infants were referred directly. Finally, parents were more satisfied if they perceived the referral process as not stressful and if they evaluated the proceeding of the process as being fluent. It was concluded that, based on the perception of parents, direct referral to secondary care is preferable over indirect referral in case DDH is suspected.

In **chapter 8**, the main conclusions of this thesis are discussed. Child health care organizations in the Netherlands aim at reaching 100% of the infants. The participation rate of 58.7% in the screening in the urban area, might be too low for a population based screening to be (cost)effective. Especially in (urban) areas in which the participation rate is expected to be low, effective implementation strategies can be very beneficial in increasing the participation rate. By means of the pilot implementation, insight was gained into the determinants that influence parental participation and satisfaction. These findings are a valuable addition to existing clinical and economic evidence regarding ultrasound screening for DDH. Based on these results, several implementation strategies were formulated related to the organization of the screening, the communication with parents and the screening process. The outcomes of this pilot implementation can support health care policy decision-makers with future national implementation of the screening.

SAMENVATTING

Dysplastische heupontwikkeling (DHO) is een vaak voorkomende aandoening bij zuigelingen die kan leiden tot ernstige gevolgen als deze niet (tijdig) behandeld wordt. Screening van zuigelingen is daarom essentieel voor vroegtijdige diagnose van DHO. Verschillende screeningsmethodes zijn ontwikkeld, waarbij lichamelijk onderzoek en screening met behulp van echografie het meest toegepast worden. In Nederland is het huidige screeningsprotocol in de jeugdgezondheidszorg gebaseerd op lichamelijk onderzoek en identificatie van risicofactoren (stuitligging in het laatste trimester van de zwangerschap en/of bij de bevalling en belaste familieanamnese voor DHO). Een grote studie uitgevoerd in Nederland toonde aan dat echografische screening meer kinderen met DHO opspoort en dat het verwijspercentage lager is dan dat van de huidige screeningsmethode. Gebaseerd op deze resultaten is een proefimplementatie opgezet om inzicht te krijgen in de factoren uit de praktijk die nationale implementatie van de echografische screening op DHO kunnen beïnvloeden. Aan deze proefimplementatie namen in totaal 4099 zuigelingen deel (totale deelnamepercentage 74.2%, in het landelijk gebied (Salland) 92.0%, in het stedelijk gebied (Utrecht) 58.7%). Het doel van dit proefschrift was het onderzoeken van determinanten gerelateerd aan de implementatie van de echografische screening op DHO en, specifiek, determinanten gerelateerd aan participatie van ouders en tevredenheid van ouders met de screening. Deze resultaten bieden beleidsmakers in de gezondheidszorg effectieve strategieën met betrekking tot nationale implementatie van de screening.

In **hoofdstuk 2** is een theoretisch overzicht gepresenteerd met betrekking tot implementatie van innovaties in de (jeugd)gezondheidszorg. Implementatie wordt vaak gezien als een uitdagend proces voor beleidsmakers in de gezondheidszorg. Theoretisch bewijs over effectiviteit kan overtuigend zijn, maar de vertaling van dit bewijs naar de praktijk is een moeilijk proces. Een model is geïntroduceerd dat inzicht geeft in het innovatieproces (disseminatie, adoptie, implementatie en continuatie) samen met de meest belangrijke innovatie determinanten die dit proces kunnen beïnvloeden. Deze determinanten zijn: de innovatie, de gebruiker, de organisatie en de sociaal-politieke omgeving. Dit model is toegepast in de studies die beschreven zijn in dit proefschrift.

Voorafgaand aan de proefimplementatie is een focusgroep studie uitgevoerd om bevorderende factoren, belemmerende factoren en voorwaarden binnen het model met innovatie determinanten in kaart te brengen (**hoofdstuk 3**). In de focusgroepen waren de belangrijkste doelgroepen vertegenwoordigd, waaronder (1) managers en stafartsen van

jeugdgezondheidszorg organisaties, (2) consultatiebureau-artsen, consultatiebureau-verpleegkundigen en radiologisch laboranten, (3) vertegenwoordigers van beleidsorganisaties, beroepsorganisaties en patiëntenorganisaties, (4) ouders van zuigelingen en (5) orthopedisch chirurgen, radiologen en huisartsen (deze groep ontving een vragenlijst). Het uitvoeren van deze focusgroepen bleek heel nuttig te zijn voor het formuleren van de strategie voor de proefimplementatie. Verscheidene aspecten konden opgenomen worden, zoals de voorkeuren met betrekking tot informatievoorziening voor ouders, het scholingsprogramma voor screeners en de kwaliteitsbewaking.

Na de explorerende focusgroep studie, lag de focus van de andere studies op de ouders van zuigelingen. **Hoofdstuk 4** beschrijft een studie naar de relatie tussen psychosociale determinanten en de deelname van ouders aan de screening. De resultaten van vragenlijsten van meer dan zevenhonderd deelnemers en bijna vierhonderd niet-deelnemers waren bruikbaar. Een positieve attitude, een hoge subjectieve norm, een hoge mate van zelf-effectiviteit, een lage perceptie van kwetsbaarheid en een hoge perceptie van effectiviteit waren positief gerelateerd aan participatie van ouders in de screening. Gepercipieerde ernst bleek geen voorspeller te zijn. Een aantal achtergrondvariabelen bleek ook van invloed te zijn, waaronder de organisatie waarin de screening plaatsvond en de kennis van de ouders. Ouders die de organisatie in het landelijk gebied bezochten, namen vaker deel aan de screening dan ouders woonachtig in het stedelijk gebied. Ook bleek dat hoe meer kennis ouders hadden, hoe groter de kans was dat zij deelnamen. Beleidsmakers in de gezondheidszorg kunnen deze psychosociale determinanten integreren in interventies gericht op het maximaliseren van de opkomst voor de screening. Zij kunnen, bijvoorbeeld, de positieve aspecten en de effectiviteit van de screening benadrukken in de informatievoorziening richting ouders, praktische barrières wegnemen en een positieve subjectieve norm stimuleren.

In **hoofstuk 5** worden de resultaten van een onderzoek naar de invloed van 'message framing' op participatie in de screening gepresenteerd. In totaal ontvingen 4150 ouders een positief of negatief geformuleerde brochure. In tegenstelling tot wat verwacht werd op basis van de 'prospect theory', waren ouders die een positief geformuleerde boodschap ontvingen eerder geneigd deel te nemen aan de screening dan ouders die een negatief geformuleerde boodschap ontvingen. Dit effect was sterker voor de organisatie in het stedelijk gebied dan voor de organisatie in het landelijk gebied. De verklaring voor het onverwachte resultaat kan liggen in de lage risicoperceptie van ouders. Omdat behandeling zeer effectief kan zijn als DHO op tijd wordt ontdekt, percipiëren ouders de screening mogelijk als niet heel risicovol. Ouders kunnen de screening ook meer ervaren als bevestiging van de gezondheid van hun kind dan als

een manier om een ziekte op te sporen. Een positief geformuleerde brochure kan de participatie van ouders in de screening bevorderen.

In **hoofdstuk 6** wordt een studie naar de tevredenheid van ouders met de screening en de hieraan gerelateerde determinanten beschreven. Patiënttevredenheid wordt beschouwd als een belangrijke bevestiging voor de kwaliteit van de geleverde gezondheidszorg en voorspelt ook gezondheidsgedrag. Een taxonomie van indicatoren voor de kwaliteit van gezondheidszorg is gebruikt in deze studie, welke bestond uit de structuur, het proces en de uitkomst van het contactmoment. De overeenstemming tussen verwachtingen en de uitkomst van deze verwachtingen werd ook gemeten. Meer dan zevenhonderd vragenlijsten konden worden gebruikt voor de analyses. De algemene tevredenheid met de screening was groot. Ouders die de screener competent vonden, voldoende tijd hadden om vragen te stellen, vonden dat de screening soepel verliep en weinig belastend was voor hun kind en aan wiens verwachtingen werd voldaan, waren vaker tevreden. Als ouders het vervelend vonden dat hun kind huilde, had dit een negatief effect op hun tevredenheid. Gebaseerd op deze resultaten werd geconcludeerd dat de factoren gerelateerd aan het proces van de screening de meest belangrijke determinanten waren voor de tevredenheid van ouders. Deze tevredenheid kan positief beïnvloed worden door effectieve informatievoorziening vanuit het consultatiebureau voorafgaand aan de screening, door effectieve communicatie door de screener tijdens de screening en door het creëren van een comfortabele omgeving voor het kind.

Rechtstreekse verwijzing door de consultatiebureau-arts naar de tweede lijn lijkt nuttig bij een verdenking op DHO. In **hoofdstuk 7** wordt een studie beschreven waarin is onderzocht hoe ouders het verwijstraject naar de orthopedisch chirurg beoordelen. Hierbij werd onderscheid gemaakt tussen ouders die rechtstreeks werden verwezen (in het landelijk gebied) en ouders die eerst de huisarts moesten bezoeken (in het stedelijk gebied). Ouders waren meer tevreden als ze rechtstreeks werden verwezen door de consultatiebureau-arts dan wanneer dit indirect gebeurde via de huisarts. De tijd tussen de verwijzing en de eerste afspraak bij de orthopedisch chirurg was ook korter als ouders rechtstreeks werden verwezen. Tot slot waren ouders meer tevreden als ze vonden dat het verwijstraject niet stressvol was en het proces soepel verliep. Geconcludeerd werd dat, gebaseerd op de perceptie van ouders, rechtstreekse verwijzing naar de tweede lijn de voorkeur heeft boven indirecte verwijzing in het geval van een verdenking op DHO.

In **hoofdstuk 8** worden de belangrijkste conclusies van dit proefschrift besproken. Organisaties in de jeugdgezondheidszorg in Nederland streven naar 100% bereik. Het deelnamepercentage van 58.7% in de screening, welke bereikt werd in het stedelijk gebied, kan te laag zijn voor een

bevolkingsscreening om (kosten)effectief te zijn. Met name in (stedelijke) gebieden waarin verwacht wordt dat het deelnamepercentage laag zal zijn, kunnen effectieve implementatiestrategieën zeer nuttig zijn om het deelnamepercentage te verhogen. Door middel van de proefimplementatie is inzicht verkregen in de determinanten die participatie en tevredenheid van ouders beïnvloeden. Deze resultaten zijn een waardevolle aanvulling op het bestaande klinisch en economisch bewijs met betrekking tot echografische screening op DHO. Gebaseerd op deze uitkomsten zijn verscheidene implementatiestrategieën geformuleerd, gerelateerd aan de organisatie van de screening, de communicatie met ouders en het screeningsproces. De uitkomsten van deze proefimplementatie kunnen beleidsmakers in de gezondheidszorg ondersteunen bij het nemen van beslissingen over toekomstige nationale implementatie van de screening.

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Marjon
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Curriculum Vitae

Marjon Witting was born on the 16th of October 1983 in Veendam, the Netherlands. She attended secondary school (Atheneum) at the Winkler Prins in Veendam and graduated in 2001. In the same year she started the study Communication Science at the University of Twente in Enschede. A year later she also started the study Psychology at the same university. In 2006 she graduated cum laude for both studies. Her master thesis for Communication Science focused on the relations between organizational identity, identification and organizational objectives. This study was carried out at Mercurius Marketing in Almelo. The master thesis for Psychology dealt with the differences between objective and subjective assessments of physical activity in patients with fibromyalgia, and the influence of pain, emotions and cognitions. This research was conducted at Roessingh Research and Development in Enschede and was awarded with the best Master Thesis Prize 2006-2007 of the Faculty of Behavioral Science. In 2007 she started to work as a PhD student at the department of Science, Technology, Health and Policy Studies and later the department of Health Technology and Services Research of the University of Twente under the supervision of dr. Magda M. Boere-Boonekamp and prof. dr. Maarten J. IJzerman. The main focus of her work was on the implementation of ultrasound screening for developmental dysplasia of the hip in the Netherlands.