Prevention of unintentional injuries in early childhood

Using an E-health4Uth home safety intervention to promote parents' child safety behaviours

Mirjam E.J. Scholing-van Beelen

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Chapter 1

General introduction

BACKGROUND

Unintentional injuries

Every day around the world the lives of more than two thousand families are torn apart by the loss of a child due to an unintentional injury [1]. Such tragedy can change lives irrevocably. It is a major public health problem that requires urgent attention. "Unintentional injury" is used to refer to injuries that were unplanned. Unintentional injuries can be defined as events in which the injury occurs in a short period of time (seconds or minutes); the harmful outcome was not sought; or the outcome was the result of one of the forms of physical energy in the environment or normal body functions being blocked by external means, e.g. drowning. The most common unintentional injuries result from motor vehicle crashes, falls, fires and burns, drowning, poisonings and aspirations [2].

Injury is a major cause of death of children (aged 0-18 years old) throughout the world, responsible for about 950.000 deaths each year [1, 3]. Unintentional injuries account for almost 90% of these deaths [1]. Unintentional injuries are also a major cause of disabilities and loss of quality of live, which can have a long-lasting impact on all facets of children's lives, i.e. relationships, learning and play, and their parents' lives [1, 4-6]. In the Netherlands unintentional injuries are also the greatest health problem among children [7, 8]. Each year 18 children aged 0-4 years die caused by unintentional injuries in and around the home. Additionally 41.000 children aged 0-4 years are medically treated, of which 23.000 children at the emergency room of a hospital because of unintentional injuries [9-11]. Among preschool children, toddlers have the highest risk of getting injured [1, 11]. The direct medical costs of an injury among children aged 0 to 4 years old, treated at the emergency room or hospitalized, is on average €820 per victim [11].

Promoting healthy behaviour of parents is important in order to reduce the number of unintentional injuries in young children. This thesis presents studies on the prevention of unintentional injuries in and around the home with regard to falls, poisoning, drowning, and burns.

Planned health promotion

The importance of careful theory-based intervention planning has been recognised since the publication of the Precede-Proceed model [12] and similar planning models [13]. According to these models, the first step in health-promotion planning is the identification of health problems that are serious and/or prevalent enough to justify spending time, money and other resources. In the second step, the behavioural risk factors for the health problems need to be identified. Step 3 is to investigate the mediators or determinants of these risk behaviours after which these determinants should

be translated into intervention goals, change strategies and methods, that need to be integrated in a comprehensive intervention package (step 4) that can be implemented and disseminated (step 5). Each step should preferably be evidence-based (Figure 1.1) [13].

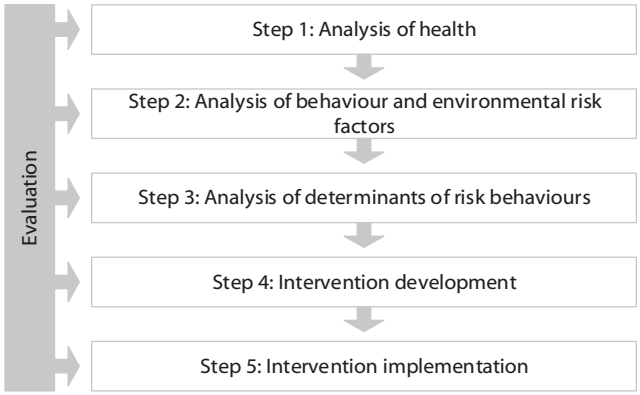

Figure 1.1 A model for planned health education and health promotion [13]

PART 1: DETERMINANTS OF PARENTS' CHILD SAFETY BEHAVIOUR

In part 1 of this thesis we explored parents' child safety behaviour and the socio-demographic and psychosocial determinants of unsafe behaviour of parents by conducting a preventive youth health care-based survey.

Parents' child safety behaviour and determinants of behaviour

In order to develop effective intervention strategies to improve parents' child safety behaviour, and prevent unintentional injuries, insight into underlying determinants of unsafe behaviour is necessary [12-15]. Behaviours are influenced by a complex, interrelated set of determinants, which include various socio-demographic (e.g. gender, educational level, ethnicity) and psychosocial factors [16, 17]. In this thesis we used the Protection Motivation Theory (PMT) to assess the influence of underlying psychosocial mechanisms on parents' child safety behaviours (Figure 1.2) [18, 19]. The Protection Motivation Theory is a framework particularly suited to interventions of health protective, precautionary behaviours [18]. According to this theory, safe behaviour is directly influenced by protection motivation, which is the result of an evaluation of environmental and personal factors. It posits that the probability of health protective behaviour, in this case parents' child safety behaviour, is increased by four beliefs; first, the personal abilities and self-confidence to engage in the health protective behaviour (self-efficacy);

second, the perception of the health protective behaviour as effective for warding off the threat (response efficacy); third, the perception of personal relevance of the threat (vulnerability); and fourth, the perception of severity of the threat (severity).

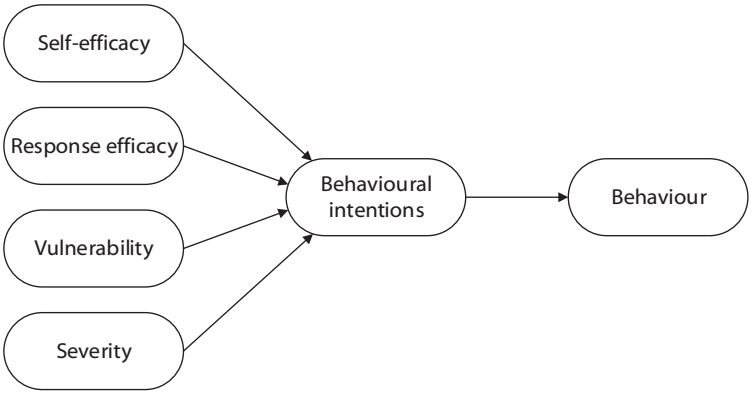

Figure 1.2 Conceptual framework for the Protection Motivation Theory (adapted model [18])

Current safety education at preventive youth health care

In the Netherlands, the preventive youth health care (Jeugdgezondheidszorg) system was developed in the early 20th century. It refers to various activities to improve and protect health, growth, and development of young people, and also to prevent illness and disability in early life. These activities include a system of maternal and child health care, which serves children from birth to 18 years of age. All parents are invited to attend, free of charge, regularly scheduled well-child visits at the well-baby clinics. During these well-child visits growth and development of the children is monitored and relevant health information and vaccinations are provided [20, 21]. Around 93% of parents attend one or more well-child visits with their child under four years of age; the attendance rates may vary from circa 50% to 93% for each of the specific child-age related scheduled visits [22]. Because one of their main activities is preventing illness and disability in early life, preventive youth health care can play an important role in informing and stimulating parents to prevent unintentional injuries. Youth health care professionals can provide safety education to parents of young children in order to make a safe environment for their growing child.

In order to reduce the number of unintentional injuries, the Consumer Safety Institute introduced the use of Safety Information Leaflets at well-baby clinics in the Netherlands to provide safety education to parents of children aged 0-4 years [23]. These Safety Information Leaflets contain relevant information about the prevention of injuries of toddlers in and around the home, i.e. general information on safety and safety advices about

the prevention of falls (i.e. window protection, stair gates, practice walking down the stairs), poisoning (i.e. safe storage of cleaning products and medicines), drowning (i.e. ponds) and burns (i.e. hot fluids, child in the kitchen during cooking, reachable hot pans) [24]. These leaflets are well used in well-baby clinics and indications for a small effect on parental behaviours were gained through observational research [25, 26]. However, despite current safety education, necessary safety behaviours are still not taken by a large number of parents, causing unnecessary risk of injury of young children [14, 27-31].

PART 2: EVALUATION OF AN INTERVENTION TO PROMOTE PARENTS' CHILD SAFETY BEHAVIOUR

In part 2 of this thesis we described, pilot-tested and evaluated an intervention to promote psychosocial correlates of safety behaviour and parents' child safety behaviour by conducting two preventive youth health care-based surveys (randomized controlled trials).

An intervention to promote parents' child safety behaviour

Unintentional injuries characterize the event as predictable and preventable if proper safety measures are in place [32]. Interventions to prevent unintentional injuries have traditionally been considered in terms of the "three E's": education, enforcement and engineering [1].

Prevention of unintentional injuries should include promoting parents' child safety behaviour. It may be induced through promotion of the application of safety devices, like stair gates, window guards or locks on cabinets with poisonous products, or through showing safe behaviour, like always closing a stair gate, never leaving a child unsupervised in the bathtub or never drinking hot fluids with a child on your lap. Education and counselling provided by youth health care professionals may positively impact parents' child safety behaviours [33]. Therefore professional societies [34], government agencies, and national task forces [35] have recommended the provision of such guidance in the setting of (preventive) medical practice on the prevention of unintentional injuries. In spite of these recommendations providing educational materials in order to prevent unintentional injuries are not used as routine daily practice.

Current educational materials delivered at well-baby clinics are traditionally standard, population-based print media, such as leaflets or fact sheets [26, 34, 36]. When the population and its informational needs are fairly homogeneous, such generic materials may be adequate to promote parents' child safety behaviour. However, parents vary considerably in terms of their behaviour, motivation, learning needs, and other characteristics. Tailored safety information messages are individually customized and can address a parent's personal characteristics.

Tailoring is defined as '*any combination of information or change strategies intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and have been derived from an individual assessment*' [37]. They target a parent's particular need and home situation. Tailored safety information may offer greater relevance to the parent, less redundant information, more attention to the safety message, more involvement with the message, greater message recall, and message adaptation [38, 39]. Tailored information is thought to promote behaviour change by providing personally-relevant feedback [40]. Although (online) computer-tailored interventions seem to have a positive effect on adult behaviours compared to generic information or no information [28, 41], there is no evidence for the efficacy of a tailored intervention on specific parents' child safety behaviour in the prevention of unintentional injuries.

Therefore, in the BeSAFE study, an E-health4Uth home safety intervention with Web-based, tailored safety information was developed and applied. This concerns Web-based, tailored safety information in combination with personal counselling at well-baby clinics on safety behaviours required for their child at home. The intervention aims at 4 major topics on safety in and around the home of children aged 12 to 24 months; prevention of falls, poisoning, drowning and burns [25, 27, 28, 42-44].

In this thesis we explored the socio-demographic, family, and psychosocial correlates of parents' child safety behaviour and evaluated the effect of an E-health4Uth home safety intervention by conducting a preventive youth health care-based survey (randomized controlled trial).

RESEARCH QUESTIONS

This thesis reports on safety behaviours of parents of young children and the correlates of these safety behaviours. Furthermore we assessed the effectiveness of injury prevention by applying Web-based, tailored safety advice, combined with personal counselling.

The following research questions are addressed:

1. What preventive measures do parents take to avoid unintentional injuries? *(Chapter 2 and 3)*
2. Which socio-demographic, family and psychosocial correlates are associated with unsafe parents' child safety behaviour? *(Chapters 2, 3, and 4)*
3. How do parents and child health care professionals evaluate the use of Web-based, tailored safety advice to support counselling in routine well-child care? *(Chapter 5)*

4. What is the effect of Web-based, tailored safety advice combined with personal counselling on psychosocial correlates of parents' child safety behaviour? *(Chapter 7)*
5. What is the effect of Web-based, tailored safety advice combined with personal counselling on parents' child safety behaviour? *(Chapter 8)*

OVERVIEW OF THIS THESIS

Table 1.1 gives an overview of the studies presented in this thesis.

Table 1.1 Overview of the studies presented in this thesis

Chapter	Sample	n[1]	Behaviour	Focus of the study
	Part 1 Determinants of parents' child safety behaviour			
2[3]	Parents of infants of 30 well-baby clinics	1410[1]	Prevention of drowning	Evaluating the level of parental supervision of infants during bathing and investigate correlates of unsupervised bathing
3[3]	Parents of infants of 30 well-baby clinics	1439[1]	Prevention of falls and poisoning	Comparing safety behaviours of first-time parents with safety behaviours of non-first-time parents and determining correlates of unsafe behaviour of parents of infants
4	Articles that include correlates of parents' child safety behaviour	34[2]	Prevention of unintentional injuries in and around the home	Identifying socio-demographic, family, and psychosocial correlates of parents' child safety behaviors with regard to the prevention of unintentional injuries in and around the home
	Part 2 Evaluation of an intervention to promote parents' child safety behaviour			
5	Parents of toddlers of 4 well-baby clinics	312[1]	Prevention of falls, poisoning, drowning and burns	Evaluating a web-based, tailored safety advice module and evaluating the use of web-based, tailored safety advice to support counselling in routine well-child care
6	Parents of toddlers of well-baby clinics	NA	Prevention of falls, poisoning, drowning and burns	Describing the design of a study which evaluates the effect of web-based, tailored safety advice combined with personal counselling on parents' child safety behaviours
7[3]	Parents of toddlers	1292[1]	Prevention of falls, poisoning, drowning and burns	Evaluating the effect of web-based, tailored safety advice combined with personal counselling on psychosocial correlates of parents' child safety behaviour
8[3]	Parents of toddlers	1292[1]	Prevention of falls, poisoning, drowning and burns	Evaluating the effect of web-based, tailored safety advice combined with personal counselling on parents' child safety behaviours

[1] Population for analysis (parents)
[2] Included articles
[3] Chapters 2, 3, 7, and 8 report data from the same study sample
NA Not Applicable

The first part of this thesis, determinants of parents' child safety behaviour, describes the safety behaviours of parents, regarding the prevention of falls, poisoning, drowning and burns. Furthermore, it describes which socio-demographic, family and psychosocial factors are associated with unsafe behaviour. **Chapter 2** describes the level of supervision of parents of infants during bathing and studies whether socio-demographics and psychosocial factors are associated with supervision of infants. **Chapter 3** describes

which behaviours parents show with regard to the presence and use of a stair gate on the main staircase in the house; the presence of a window guard on windows below 1.20 metre; and the storage of cleaning products and medicines. A comparison is made between first-time and non-first-time parents. In **Chapter 4** a systematic review of the literature is described on correlates of parents' child safety behaviours.

The second part of this thesis describes the evaluation of an intervention to promote parents' child safety behaviour. **Chapter 5** presents a pilot study of Web-based, tailored safety advice to support counselling in routine well-child care (E-health4Uth home safety intervention). Evaluations of the E-health4Uth home safety intervention and the use of this intervention in routine well-child care are assessed in parents and child health care professionals. The use of E-health4Uth home safety is compared to the use of generic safety information in routine well-child care. The design of a study which evaluates the effect of the E-health4Uth home safety intervention on parents' child safety behaviours is described in **chapter 6**. **Chapter 7** describes the effect of the E-health4Uth home safety intervention on psychosocial correlates of parents' child safety behaviour. Finally, **chapter 8** describes the results of the randomized controlled trial to evaluate the effect of the E-health4Uth home safety intervention on parents' child safety behaviours.

In the general discussion, **chapter 9**, results of the studies are summarized and integrated, and implications for practice and further research are provided.

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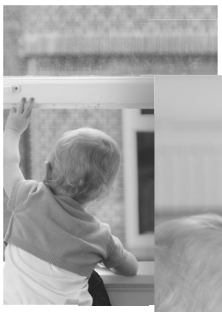
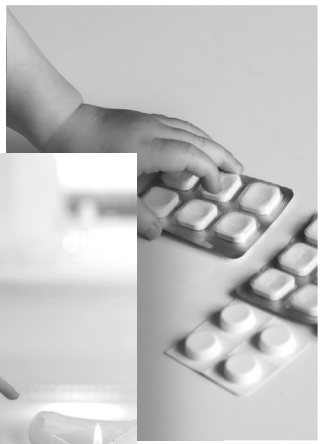
Part I

Determinants of parents' child safety behaviour








Chapter 2

Correlates of unsupervised bathing of infants: a cross-sectional study

Mirjam E.J. van Beelen, Eduard F. van Beeck, Paul den Hertog, Tinneke M.J. Beirens, Hein Raat

Int J Environ Res Public Health. 2013 Mar 4;10(3):856-66

ABSTRACT

Introduction

Drowning represents the third leading cause of fatal unintentional injury in infants (0–1 years). The aim of this study is to investigate correlates of unsupervised bathing.

Methods

This cross-sectional study included 1410 parents with an infant. Parents completed a questionnaire regarding supervision during bathing, socio-demographic factors, and Protection Motivation Theory-constructs. To determine correlates of parents who leave their infant unsupervised, logistic regression analyses were performed.

Results

Of the parents, 6.2% left their child unsupervised in the bathtub. Parents with older children (OR 1.24; 95% CI 1.00–1.54) were more likely to leave their child unsupervised in the bathtub. First-time parents (OR 0.59; 95% CI 0.36–0.97) and non-Western migrant fathers (OR 0.18; 95% CI 0.05–0.63) were less likely to leave their child unsupervised in the bathtub. Furthermore, parents who perceived higher self-efficacy (OR 0.57; 95% CI 0.47–0.69), higher response efficacy (OR 0.34; 95% CI 0.24–0.48), and higher severity (OR 0.74; 95% CI 0.58–0.93) were less likely to leave their child unsupervised.

Discussion

Since young children are at great risk of drowning if supervision is absent, effective strategies for drowning prevention should be developed and evaluated. In the meantime, health care professionals should inform parents with regard to the importance of supervision during bathing.

INTRODUCTION

Drowning is a major health problem among children around the globe [1]. Drowning refers to an event in which a child's airway is immersed in a liquid medium, leading to difficulty in breathing [2]. This event may result in death or (permanent) disability. In the United States, drowning represents the third leading cause of fatal unintentional injury in infants less than one year of age, and over half of these fatal drownings occur in bathtubs [3,4]. Up to the age of twelve months infants may be able to sit up unsupported, although some are still unable to right themselves if they fall over in the bathtub [5,6]. At young age, infants fully rely on their parents to prevent potential harm.

Adequate child supervision is likely to be the most effective defence against many childhood unintentional injuries [7]. However, still many injuries to young children, for example drowning, poisoning, or falls, occur in their homes when caregivers are responsible for a safe environment and adequate supervision [8]. It has been shown that parents' opinions about the necessity of adult supervision are associated with parent behaviour and family and household characteristics [7]. In acute poisoning, an increased number of children in the home is associated with less parental supervision related to the presence of older children [9]. So far, little is known about the correlates of unsupervised bathing, although in over three quarters of bathtub drownings, lack of adequate adult supervision is involved [10,11]. Two previous studies found that some parents believe they can leave their infant unsupervised in the bathtub for a short moment [3,12]. One single study showed that many parents fail to realize the severity of drowning [13].

To develop strategies for infant drowning prevention, more insight is needed into the correlates of unsafe behaviour. In addition to the role of socio-demographic characteristics, insight with regard to psychosocial constructs of unsupervised bathing is needed, using a theoretical model. Protection Motivation Theory (PMT) is a framework particularly suited for interventions of protective, precautionary behaviours [14]. PMT is suggested to be applied to assess the influence of psychosocial factors on parental safety behaviour. According to PMT, the probability of health protective behaviour or an "adaptive response"—in this case supervision during bathing—is increased by four factors: (1) the threat is perceived as severe (severity); (2) the threat is perceived as high of personal relevance (vulnerability); (3) the adaptive response is perceived as affective for warding off the threat (response efficacy); and (4) the personal abilities and self-confidence to engage in the adaptive response is perceived as high (self-efficacy). The aim of this study is thus to investigate correlates of unsupervised bathing.

METHODS

Participants and setting

The present cross-sectional study used data obtained at enrolment in the "BeSAFE" study, a randomized controlled trial which aims to assess the effects of internet-based, tailored safety information combined with personal counselling on parents' child safety behaviours, as described in detail elsewhere [15]. The "BeSAFE" study addressed several topics with regard to the safety in and around the home, such as the prevention of falls, poisoning, drowning and burns. The Medical Ethics Committee of the Erasmus Medical Center gave a "declaration of no objection" for this study (MEC-2008-370).

Parents of infants (4–12 months), attending a regular well-child visit were invited by their child health care professional to participate in a home safety survey on multiple home safety topics. An opportunity sample of five child health care organizations, located in both urban and rural areas of the Netherlands, invited a total of 3147 parents between 2009 and 2010. A total of 1440 parents (45.8%) provided informed consent for the baseline questionnaire and completed the baseline questionnaire (in Dutch). Parents who did not wish to participate in the follow-up of the "BeSAFE" study were invited to anonymously complete the baseline questionnaire. Sixty parents completed the baseline questionnaire anonymously and 1380 parents provided informed consent for participation in the complete "BeSAFE" study. A total of 30 records were removed, because parents did not bathe their child. A study population of 1410 parents and children was complete for data analysis.

Design

Parents received written information about the study, were asked to provide informed consent and complete the baseline questionnaire on home safety. The baseline questionnaire included questions on socio-demographic factors, safety behaviour and PMT constructs.

Parental supervision

Parental supervision of their infant during bathing was assessed by the item asking parents "How often do you leave your child alone when he/she is in the bathtub, even just for a short time?"; answering very often/often/sometimes/rarely/never.

Potential correlates

We used socio-demographic variables and PMT constructs to investigate potential correlates of supervision during bathing. The socio-demographic variables, age, gender, number of parents and siblings, and parental employment, education and ethnicity, included in this study were chosen based on earlier studies reporting the influence of these variables on safety behaviours [16–18].

Ethnicity of the parents (Dutch or Western migrant; non-Western migrant) was determined on the basis of grandmothers' and grandfathers' country of birth according to the definitions of Statistics Netherlands [19]. The parent was of non-Western ethnic origin if at least one of their parents was born in a non-Western country. If both their parents were born in a non-Western country, ethnicity was determined according to the mother's country of birth. Crawling was defined as the child being able to: "crawl on hands and knees and/or crawl on their tummy and/or shuffle on their bottom" (yes/no).

Additionally, psychosocial constructs were measured within the domain of PMT. All items related to PMT were measured on bipolar five-point scales. Self-efficacy was measured by the item asking parents how difficult or easy they perceived taking the safety measures to be (from −2 = very difficult to +2 = very easy). Response efficacy was measured by the item assessing how helpful parents perceived the specific behaviour to be for preventing an injury (from −2 = not very helpful to +2 = very helpful). Vulnerability was measured by the item asking parents their perception of their child's risk of an unintentional injury on each specific subject (from −2 = low risk to +2 = high risk). Severity was measured by the item assessing how seriously parents perceived the consequences of an injury occurring in the bathtub (from −2 = not serious at all to +2 = very serious).

Statistical analyses

Statistical analyses were performed using SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Level of supervision was dichotomized into leaving the child unsupervised (very often/often/sometimes/rarely) and never leaving the child unsupervised. Frequency tables were used to explore the socio-demographic characteristics of the total study population, and those categorized as left unsupervised and never left unsupervised. Mean and frequency differences between children who were left unsupervised and children who were never left unsupervised were evaluated through independent sample *t*-tests and Chi-square statistics, respectively. Correlations were calculated to assess multicollinearity. All correlations were under 0.60, indicating that multicollinearity would not be an issue for multiple logistic regression analyses.

To determine significant correlates of parents who leave their infant unsupervised, three steps of logistic regression analyses were performed with supervision during bathing (left unsupervised/never left unsupervised) as the dependent variable and potential correlates (socio-demographic and PMT constructs) as independent variables. In Model 1 the potential correlates were entered univariate. Secondly, a multiple model was constructed using a manual-enter selection method in which all independent socio-demographic variables were included. Subsequently all variables with the highest *P*-value were deleted from the model, until all variables had a *P*-value of 0.05 or less. In Model 3 a multiple model with socio-demographic variables and PMT constructs were included, using the same stepwise backward analyses as performed in Model 2.

RESULTS

Participants

The mean age of the children was 7.2 months (SD 1.1; range 4–12 months); 48.3% were girls; 34.4% could crawl. Of the participating families 93.3% of the mothers completed the questionnaire and 48.4% had one child (Table 2.1).

Table 2.1 Child and family characteristics and PMT constructs of supervision of infants in bathtubs (n= 1410)

		Total group	Children left unsupervised	Children never left unsupervised	*P*-value
Infant is bathed in bathtub		n= 1410	n= 87	n= 1319	
Child characteristics		**n (%)**	**n (%)**	**n (%)**	
Mean age in months (SD) Range in months		7.2 (1.1) 4–12	7.5 (1.2) 4–12	7.2 (1.1) 4–12	0.01 **
Gender	Girl	681 (48.3)	47 (54.0)	633 (48.0)	0.28 *
Child can crawl	Yes	484 (34.4)	34 (39.1)	450 (34.2)	0.35 *
Family characteristics		**n (%)**	**n (%)**	**n (%)**	
Mother is respondent		1315 (93.3)	83 (95.4)	1229 (93.2)	0.71 *
Family situation	One-parent family	39 (2.8)	3 (3.5)	36 (2.7)	0.67 *
Number of children	One child	682 (48.4)	34 (39.1)	645 (48.9)	0.08 *
in family	Two or more children	728 (51.6)	53 (60.9)	674 (51.1)	
Mother's employment	Paid job fulltime	90 (6.6)	7 (8.5)	83 (6.5)	0.63 *
	Paid job part time	1024 (75.1)	63 (76.8)	959 (75.1)	
	No paid job	249 (18.3)	12 (14.6)	235 (18.4)	
Mother's	Low	234 (16.6)	11 (12.6)	222 (16.9)	0.51 *
educational level	Intermediate	623 (44.2)	38 (43.7)	583 (44.3)	
	High	551 (39.1)	38 (43.7)	512 (38.9)	
Mother's ethnicity	Western	1292 (91.6)	79 (90.8)	1211 (91.8)	0.55 *
	Non-Western	118 (8.4)	8 (9.2)	108 (8.2)	
Father's employment	Paid job fulltime	1149 (85.7)	70 (87.5)	1076 (85.6)	0.81*
	Paid job part time	138 (10.3)	6 (7.5)	131 (10.4)	
	No paid job	54 (4.0)	4 (5.0)	50 (4.0)	
Father's educational	Low	319 (22.9)	23 (27.1)	295 (22.6)	0.62 *
level	Intermediate	569 (40.8)	32 (37.6)	536 (41.1)	
	High	506 (36.3)	30 (35.3)	474 (36.3)	
Father's ethnicity	Western	1284 (91.8)	81 (95.3)	1200 (91.6)	0.30 *
	Non-Western	115 (8.2)	4 (4.7)	110 (8.4)	
PMT constructs		**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	
Self-efficacy (−2, +2)		1.49 (1.0)	0.57 (1.0)	1.56 (0.9)	<0.0001 **
Response efficacy (−2, +2)		1.74 (0.5)	1.16 (0.7)	1.77 (0.5)	<0.0001 **
Vulnerability (−2, +2)		−1.42 (0.9)	−1.21 (0.8)	−1.43 (0.9)	0.02 **
Severity (−2, +2)		1.39 (0.9)	0.92 (1.0)	1.42 (0.9)	<0.0001 **

* Chi-square-test. ** Independent sample *t*-test.

Missing values were 4 for infant is bathed; 1 for child's gender; 3 for respondent's gender, 4 for number of children; 47 for mother's employment; 4 for mother's educational level; 4 for mother's ethnicity; 69 for father's employment; 16 for father's educational level; and 11 for father's ethnicity.

Of the parents, 6.2% left their child unsupervised in the bathtub (4.8% rarely, 1.2% sometimes, and 0.2% (very) often). The percentage of children who were left unsupervised in the bathtub rose with increasing age; 5.1% of children aged 4–6 months were left unsupervised; 5.7% of children aged 6–8 months were left unsupervised; 8.1% of children aged 8–1 0 months were left unsupervised and 13.3% of children aged 10–12 months were left unsupervised (Figure 2.1). Parents with only one child left their infant less often alone in the bathtub compared to parents with two or more children (*P*= 0.08). Compared to parents who never left their child unsupervised in the bathtub, parents who left their child unsupervised had lower self-efficacy; mean 0.57 (SD 1.0) *vs.* 1.56 (SD 0.9), reported higher vulnerability; mean −1.21 (SD 0.8) *vs.* −1.43 (SD 0.9), perceived lower severity; mean 0.92 (SD 1.0) *vs.* 1.42 (SD 0.9), and reported lower response-efficacy; mean 1.16 (SD 0.7) *vs.* 1.77 (SD 0.5) (all *P*<0.05; Table 2.1).

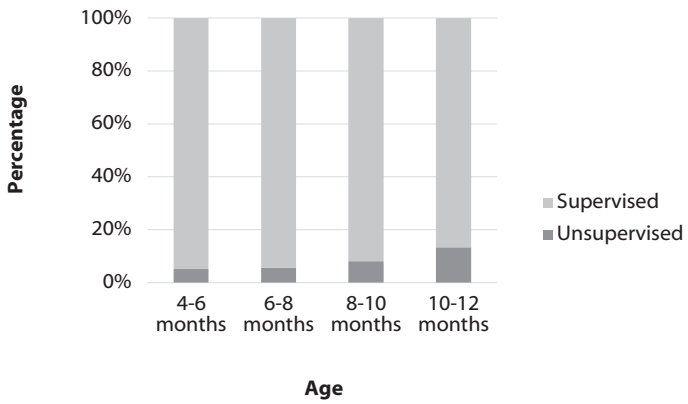


Figure 2.1. Percentage of children left unsupervised by age group.

Correlates of leaving the infant unsupervised in the bathtub

Table 2.2 presents results of the univariate and multiple logistic regression analyses. In the first model, age, self-efficacy, response efficacy, vulnerability, and severity were significant correlates of supervision of their infant (*P*<0.05). In the second model only age was significantly associated with leaving the infant unsupervised in the bathtub (OR 1.29; 95% CI 1.06–1.57). In the subsequent step, when PMT constructs were added to Model 2 (Model 3), a model with six correlates was significant (*P*<0.05). With rising age of the child, the more likely parents were to leave their child unsupervised in the bathtub (OR 1.24; 95% CI 1.00–1.54). Parents with one child were less likely to leave their child unsupervised in the bathtub (OR 0.59; 95% CI 0.36–0.97). Fathers of non-Western ethnicity were less likely to leave their infant unsupervised than fathers of Western ethnicity (OR 0.18; 95% CI 0.05–0.63). Parents who leave their infant unsupervised in the bathtub reported significantly less self-efficacy (OR 0.57; 95% CI 0.47–0.69), response efficacy (OR 0.34; 95% CI 0.24–0.48) and perceived severity (OR 0.74; 95% CI 0.58–0.93).

Table 2.2. Odds ratios (OR) and 95% confidence intervals from univariate (Model 1) and multiple logistic regression analyses with leaving the infant unsupervised in the bathtub as dependent variable and demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors (n= 1410)

	Infant left unsupervised in the bathtub					
	Model 1 OR (95% CI)	P-value	Model 2 OR (95% CI)	P- value	Model 3 OR (95% CI)	P- value
Demographic variables						
Infants						
Age in months	**1.29 (1.06–1.57)**	**0.01**	**1.29 (1.06–1.57)**	**0.01**	**1.24 (1.00–1.54)**	**0.05**
Girl	1.27 (0.82–1.97)	0.28				
Infant can crawl	0.81 (0.52–1.26)	0.35				
Family						
One-parent family	1.30 (0.39–4.30)	0.67				
First-time parent	0.67 (0.43–1.05)	0.08			**0.59 (0.36–0.97)**	**0.04**
Mother						
Employment						
Paid job fulltime	1.00					
Paid job part time	0.78 (0.35–1.76)	0.55				
No paid job	0.61 (0.23–1.59)	0.31				
Educational level						
Low	1.00					
Intermediate	1.32 (0.66–2.62)	0.44				
High	1.50 (0.75–2.98)	0.25				
Non-Western migrant	1.14 (0.54–2.41)	0.74				
Father						
Employment						
Paid job fulltime						
Paid job part time		0.42				
No paid job		0.70				
Educational level						
Low	1.00	-				
Intermediate	0.77 (0.44–1.33)	0.35				
High	0.81 (0.46–1.42)	0.47				
Non-Western migrant	0.54 (0.19–1.50)	0.24			**0.18 (0.05–0.63)**	**0.01**
PMT constructs [a]						
Self-efficacy (−2, +2)	**0.53 (0.45–0.62)**	**<0.001**			**0.57 (0.47–0.69)**	**<0.001**
Response efficacy (−2, +2)	**0.26 (0.19–0.35)**	**<0.001**			**0.34 (0.24–0.48)**	**<0.001**
Vulnerability (−2, +2)	**1.30 (1.05–1.61)**	**0.02**				
Severity (−2, +2)	**0.63 (0.52–0.76)**	**<0.001**			**0.74 (0.58–0.93)**	**0.01**

[a] The OR represents a one-unit change in the scale score.

DISCUSSION

Parents reported leaving their infants unsupervised in the bathtub. These parents expose their infant to the avoidable risk of becoming immersed in water, which could lead to fatal drowning. Since some young children are unable to right themselves if they fall over in the bathtub, they are at great risk of drowning if supervision is absent during bathing. Therefore, effective strategies for drowning prevention, aimed at improved parental supervision during bathing, should be developed. Our analyses indicate the need for tailoring these strategies to parents with older infants (8–12 months) and parents with low Protection Motivation Theory constructs.

When infants grow older, parents in our study reported they were more likely to leave their infant unsupervised in the bathtub. However, such young children below the age of 12 months may still not be able to prevent themselves from drowning and therefore should never—not even for a moment—be left alone [20].

When parents have two or more children, they are even more likely to leave their infant alone in the bathtub. Reasons for this could be that they are busy with their other child or children, having to leave their infant alone, maybe just for a few moments, not realizing the risk for the infant. It is also possible that parents do not think of the risk of drowning, because nothing has happened before with their infant or older children, so these parents may have considerations like "why would there be a risk now?". Parents' may also belief that their child does not need to be supervised all time.

Parents who leave their infant unsupervised in the bathtub reported less self-efficacy, response efficacy and severity. It could be possible that parents do not believe they are able to always supervise their child, do not think supervision could help prevent their child from drowning, and are not aware of the consequences of an injury occurring in the bathtub. Enhancing parents' knowledge and abilities for never leaving their child unsupervised and explaining why supervision helps to prevent infants from drowning, could increase parental understanding of the importance to supervise their infants in the bathtub. Furthermore, parents need to be better informed about the potential severity of getting injured in the bathtub. Improving these insights could lead to more safe behaviour. Therefore, interventions should aim at enlarging the knowledge about these items.

Various studies have reported inadequate supervision as an important risk factor for drowning in children [3,12,13,21]. A study by Lee et al. reported unsupervised bathing by 5% of parents [3]. Our study reports unsupervised bathing of very young children

(4–12 months). Furthermore, correlates of unsupervised bathing were determined with this study, which can be used to identify specific target groups of parents in campaigns which promote safe behaviour.

Some limitations of this study need to be addressed. Because our study relied on self-report of supervision during bathing, misclassification could have occurred: for example, parents might have given socially desirable answers. This might result in underestimating the percentage of parents leaving their infant unsupervised in the bathtub.

Participation rate in this study, 46%, was low. There is no data available on the characteristics of parents who did not wish to participate in this study. It is difficult to ascertain whether the associations found would be different in non-responders. Also, it is not clear whether parents, who did not wish to participate, showed less or more unsafe behaviour with regard to supervision of their infant.

In 93% of participants, it was the mother who responded to the invitation to participate in the survey and completed the questionnaire. In the written information we provided to parents we asked if the parent spending most time with the child could complete the questionnaire. This could explain why most participants were mothers.

We dichotomized the level of supervision, instead of using five different categories, in order to get large enough subgroups for analysis. Although there is a difference in leaving a child unsupervised in the bathtub very often and rarely, the recommendation of the American Academy of Pediatrics is to never leave the child unsupervised [20]. To change the undesirable parental beliefs and, more importantly, parental behaviours, physicians and nurses are crucial in educating parents about the risks and consequences of infants drowning in bathtubs when left unsupervised [20]. Parents need to be informed about the risks and we recommend discussing possible solutions for this issue during the well-child visits.

We used one single question to address the level of supervision during bathing. Further research could be extended with the length of time parents estimated that they left their child alone in the bathtub. This could also be important in order to gain insight in what parents think about the time they can leave a child alone in the bathtub and the reasons for parents to leave their child unsupervised in the bathtub.

Furthermore, the depth of water the child was left unsupervised in could be addressed. A small child can drown in a few centimetres of water at the bottom of the bathtub [1]. Data can be collected on use of devices in the bathtub, like infant bath seats. Such

devices could give a false sense of security and a parent or caregiver might be more likely to leave the child alone in the bathtub [6,13,22]. Therefore, they should not be recommended by health care professionals to use as safety devices. In addition, shared bathing can be addressed, where infants are not supervised by adults, but are bathed in the company of an older sibling. This may also be a risk factor with regard to drowning in the bathtub [21]. Furthermore, we recommend theory and evidence-based development of strategies to promote drowning prevention, effect-evaluation of such strategies and wide scale implementation. Future studies could also be extended with home safety observations in order to eliminate possible misclassification. Furthermore, analyses of fatal or nonfatal drowning could give more insight in the validity of parent responses regarding their supervision skills and behaviour.

Conclusions

Young children are in need of supervision to prevent them from drowning. Strategies for infant drowning prevention in bathtubs should target the following parents: those of older infants, who have more than one child, Western fathers, parents who have low self-efficacy, response efficacy and perceived severity in relation to infant bath drowning, since these are important correlates of leaving a child unsupervised in the bathtub.

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Chapter 3

First-time parents are not well enough prepared for the safety of their infant

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ABSTRACT

Introduction

Unintentional falls and poisonings are major causes of death and disability among infants. Although guidelines are available to prevent these injuries, safety behaviours are not performed by parents, causing unnecessary risks. Little is known about safety behaviours of first-time parents and whether they behave according to these guidelines. The objective of this study was to compare safety behaviours of first-time parents with those of non-first-time parents and to determine correlates of unsafe behaviour of parents of infants.

Methods

We used self-report questionnaires to assess safety behaviours in a cross-sectional study sample. A total of 1439 parents visiting a preventive youth healthcare centre in the Netherlands were invited to complete a questionnaire with regard to the prevention of falls and poisonings. Parents were categorized into first-time parents and non-first-time parents. Correlates of parents' child safety behaviours were determined using multiple logistic regression analyses.

Results

Most respondents were mothers (93.2%); 48.2% of families were first-time parents. The mean age of the infants was 7.2 months (SD 1.1; range 4-12), 51.8% were boys, and 34.5% of infants could crawl. First-time parents were more likely not to have a stair gate installed (OR 16.46; 95% CI 12.36-21.93); were more likely to store cleaning products unsafely (OR 4.55; 95% CI 3.59-5.76); and were more likely to store medicines unsafely (OR 2.90; 95% CI 2.31-3.63) than non-first-time parents. First-time parents were more likely to not have a window guard installed (OR 1.52; 95% CI 1.08-2.15) (all $P<0.05$).

Discussion

First-time parents are not well prepared for the safety of their infant, causing unnecessary risk. The various parents' safety behaviours were influenced by different variables, e.g. age of the infant, crawling of the infant, mother's educational level, mother's ethnicity, self-efficacy, vulnerability, and severity.

INTRODUCTION

Unintentional injuries, such as falls and poisonings, are the fifth leading cause of death among infants [1]. They are also a major source of morbidity and loss of quality of life [2-4]. Each year worldwide 1.9 in 100,000 children under 20 years of age die due to falls, and 1.8 in 100,000 children die due to poisonings [2].

The American Academy of Pediatrics (AAP) provides specific informative tools for parents about the safety measures they can take for infants from birth to twelve months of age [5]. To prevent falls, parents are advised to install and always use stair gates on stairs and to install window guards. To prevent poisonings, they are advised to keep household products such as cleaners and chemicals, and medicines out of sight and reach [5]. Parents with several children have often taken various safety measures [6-8]. However, when they have their first child many safety measures still need to be taken. It is important for first-time parents to be prepared to raise their infant in a safe environment. Little is known about the safety behaviours of first-time parents and whether they behave according to the recommendations of the AAP. For the purpose of developing strategies to reduce the number of injuries from falls and poisonings, it is important to know which preventive actions first-time parents actually take. It is also useful to know which parent and child characteristics and other determinants are associated with these preventive actions, in order to develop effective intervention strategies. More information is needed on these determinants related to protecting infants against unintentional injuries in the home.

Behaviours are influenced by a complex, interrelated set of determinants, which include various demographic and psychosocial factors. To assess the influence of underlying psychosocial factors on behaviours, the Protection Motivation Theory (PMT) has been proven reliable in predicting behaviours [9-11]. Protection Motivation Theory is a framework particularly suited to interventions of protective, precautionary behaviours. According to this theory, safe behaviour is directly influenced by protection motivation, which is the result of an evaluation of environmental and personal factors. It posits that the probability of safe behaviour, in this case preventing falls and poisoning, is increased by four beliefs: 1) the personal abilities and self-confidence to always use a stair gate and store cleaning products and medicines safe, self-efficacy; 2) the perception of the adaptive response to use a stair gate and store cleaning products and medicines safe, response efficacy; 3) the perception of personal relevance regarding falls from the staircase or of ingestion of cleaning products and medicines, vulnerability; and 4) the perception of severity in the event of a fall on the stairs or of ingesting cleaning products or medicines. In this study we used demographic variables as well as PMT constructs to assess the influence of underlying psychosocial factors on parents' child safety behaviours.

The objective of this study was to compare safety behaviours of first-time parents with safety behaviours of non-first-time parents and to determine correlates of unsafe behaviour parents of infants. We used self-report questionnaires on safety behaviour to assess these safety behaviours in a cross-sectional study sample.

MATERIALS AND METHODS

Participants and recruitment

The present study used data obtained at enrolment in the 'BeSAFE' study, a randomized controlled trial which aims to assess the effects of internet-based, tailored safety information combined with personal counselling on parents' child safety behaviours, as described in detail elsewhere [12]. An opportunity sample of five preventive youth health care centres in the Netherlands invited a total of 3147 parents of infants aged 5 to 12 months old (one parent per family) to participate in the study between 2009 and 2010. These five youth health care centres were located in urban and rural areas. Written informed consent was provided by 45.7% (n= 1439), who also completed the questionnaire.

The Medical Ethics Committee of the Erasmus Medical Center gave a "declaration of no objection" for this study (MEC-2008-370). The 'BeSAFE' study was registered in the Dutch Trial Registration (Current Controlled Trials NTR1836).

Measurements

Parents received written information about the study, were asked to provide informed consent and were asked to complete the questionnaire on home safety. Up to two reminders were sent. Parents were assured of confidentiality and the results were processed anonymously. The questionnaire assessed family, infant and housing characteristics, parents' child safety behaviour, and 'Protection Motivation Theory'-constructs.

Family, infant, and housing characteristics

Number of children was assessed and dichotomized as first-time parents (first child in family) and non-first-time parents (second child or more children in family). Parents' educational level was assessed and categorized as 'high', 'intermediate', and 'low'; high level being defined as higher professional education or academic higher education; intermediate level as senior secondary vocational education, senior general secondary education or university preparatory education; low educational level being defined as preparatory secondary vocational education or lower [13]. Parents' employment status was assesses and defined as "unemployed" if they had neither a part-time or full-time

job. Parents' ethnicity was determined on the basis of their own parents' country of birth (grandparents of the infant). A parent was of Dutch ethnicity if both grandparents had been born in The Netherlands; if one of the grandparents had been born in another Western country, a parent was of other Western ethnicity. If both grandparents had been born in another Western or non-Western country, ethnicity was determined by the grandmother's country of birth [13]. Crawling was assessed and defined as an infant's ability to: "crawl on hands and knees and/or crawl on their tummy and/or shuffle on their bottom". Infant's medically attended injury was assessed and categorized as 'none' and 'one or more'; one or more was defined as one or more injuries for which the child was taken to a general practitioner, the emergency department of a hospital, or both.

Protection Motivation Theory constructs

The psychosocial correlates of safety behaviour were measured with regard to Protection Motivation Theory constructs [9, 10]. Self-efficacy was measured from -2=very difficult to +2=very easy, response efficacy was measured from -2=not very helpful to +2=very helpful, vulnerability was measured from -2=low risk; +2=high risk, and severity was measured from -2=not serious; +2=very serious. All items related to the Protection Motivation Theory constructs were measured on bipolar five-point scales.

Parents' child safety behaviour with regard to falls

Parents were asked whether there was a staircase between the floor with the living room and a separate floor with the bedrooms; if so, this was designated as the main staircase. The presence of a stair gate at the top or bottom of the main staircase was assessed. The self-reported frequency of closing the stair gate of the main staircase was measured on a five-point scale ('never' to 'always'); adequate use was defined as 'always closing the stair gate'. The presence of windows which could be opened, below the height of 1.20m, was assessed, and parents were asked whether they had window guards on at least one of such windows.

Parents' child safety behaviour with regard to poisoning

Parents were asked where they stored their cleaning products and medicines. 'Unsafe' storage of cleaning products was defined as stored in the bathroom, kitchen or shed/garage on the floor or in a cupboard without a lock, at a height below 1.50 m. 'Unsafe' storage of medicines was defined as stored in the bathroom, kitchen or bedroom on the floor or in a cupboard without a lock, at a height below 1.50 m.

Statistical analyses

Categorical data were described using percentages and continuous data using mean (SD). Differences in the proportions and means of all potential correlates were tested

by chi-square test and Mann-Whitney *U* test. First-time parents' safety behaviours and non-first-time parents' safety behaviours were compared between infants who could not crawl and those who could crawl. To determine significant correlates of parents' safety behaviour, multiple logistic regression analyses were performed, with unsafe behaviour as the dependent variable and various factors (demographic and Protection Motivation Theory constructs) as independent variables. Five different sets of multiple logistic regression analyses were conducted, first for respondents who indicated the absence of a stair gate on their main stairs, and second for the sub-group of respondents who had a stair gate but did not use it adequately. A third set described the correlates of the absence of a window guard on windows below the height of 1.20m. A fourth set was conducted with regard to the unsafe storage of cleaning products and a fifth on the unsafe storage of medicines. In model 1 of every set the number of children (e.g. first-time parents vs. non-first-time parents, with regard to unsafe behaviour was entered. In model 2 other demographic variables that were considered to be more distal, these were non-modifiable potential correlates, were entered. Subsequently, in model 3, Protection Motivation Theory constructs were entered into the models. Statistical analyses were performed using SPSS 17.0 (SPSS Inc., Chicago, IL.).

RESULTS

Family, infant, and housing characteristics

Most respondents were mothers (93.2%); 48.2% were first-time parents; 97.2% of the families included two parents. Fewer first-time mothers were unemployed than non-first-time mothers (13.4% vs. 23.2% respectively; $P<0.001$) (Table 3.1). The mean age of the infants was 7.2 months (SD 1.1; range 4-12 months); 51.8% were boys; 34.5% could crawl, and 0.5% could walk independently. A main staircase was present in 86.6% of houses; 36.6% of houses had a window below a height of 1.20m, which could be opened. Fewer first-time parents (82.7%) had a main staircase present than non-first-time parents (90.2%; $P<0.001$).

Safety behaviour of first-time parents

If their infant could not crawl, more first-time parents had not installed a stair gate (89.4%) than first-time parents with an infant that could crawl (75.0%; $P<0.05$) (Table 3.2). If their infant could not crawl, more first-time parents stored medicines unsafely (54.3%) than first-time parents with an infant that could crawl (43.6%; $P<0.05$). There were no differences in the safety behaviours between non-first-time parents whose infant could crawl and those whose infants could not crawl ($P>0.05$).

Table 3.1 Family, infant and housing characteristics, divided by number of children (n=1439)

		Total (%) (Unless otherwise specified)	First-time parents (%) (Unless otherwise specified)	Non-first-time parents[4] (%) (Unless otherwise specified)
		n=1439	n=693	n=746
Family characteristics				
Mother was respondent		93.2	92.4	94.0
Mother's educational level	High[1]	39.0	39.3	38.7
	Intermediate[2]	44.2	45.2	43.2
	Low[3]	16.8	15.5	18.1
Father's educational level	High[1]	36.1	39.3	37.3
	Intermediate[2]	40.9	45.2	38.7
	Low[3]	23.0	15.5	24.0
Mother's employment status	Unemployed	18.5	13.4	23.2***
Father's employment status	Unemployed	4.4	3.5	5.3
Mother's ethnicity	Dutch	86.7	87.0	86.5
	Other Western	4.6	5.5	3.8
	Non-Western	8.7	7.5	9.8
Father's ethnicity	Dutch	86.8	87.0	86.6
	Other Western	4.7	5.7	3.8
	Non-Western	8.5	7.3	9.6
Single parent	Yes	2.8	2.5	3.1
Infant characteristics				
Infant's age in months	Mean (SD); range	7.2 (1.1); 4-12	7.2 (1.0); 4-12	7.2 (1.1); 4-12
Gender	Boy	51.8	55.3	48.5*
Infant could crawl	Yes	34.5	34.8	34.2
Infant could walk independently	Yes	0.5	0.4	0.5
Lifetime prevalence of medically attended unintentional injury	One or more	2.8	2.2	3.4
Housing characteristics				
Presence of main staircase in the house	Yes	86.6	82.7	90.2***
Presence of windows below the height of 1.20m (which can be opened)	Yes	36.6	36.4	36.8

[1] High educational level: at least higher professional education

[2] Intermediate educational level: senior secondary vocational education, senior general secondary education and university preparatory education

[3] Low educational level: preparatory secondary vocational education or less

[4] Differences in characteristics of first-time parents and non-first-time parents evaluated by chi-square test or Mann-Whitney U-test: * Significant at the 0.05 level, *** significant at the 0.001 level

First-time parents were more likely not to have a stair gate installed (OR 16.46; 95% CI 12.36-21.93); were more likely to store cleaning products unsafely (OR 4.55; 95% CI 3.59-5.76); and were more likely to store medicines unsafely (OR 2.90; 95% CI 2.31-3.63) than non-first-time parents (all $P<0.05$) (Table 3.3). Furthermore first-time parents were more likely to not have a window guard installed (OR 1.52; 95% CI 1.08-2.15) than non-first-time parents ($P<0.05$) (Table 3.3-3.7).

Table 3.2 First-time and non-first-time parents' safety behaviour relevant to the prevention of falls and poisonings, compared between infants who cannot crawl and infants who can crawl (n=1439)

		First-time parents			Non-first-time parents		
	Total group (%)	Infant cannot crawl (%)	Infant can crawl (%)	P-value±	Infant cannot crawl (%)	Infant can crawl (%)	P-value±
Falls							
Main staircase in the house[1]	n=1245	n=388	n=184		n=453	n=219	
Absence of stair gate	52.6	**89.4**	**75.0**	**< 0.001**	26.0	23.7	0.52
Presence of stair gate	47.4	**10.6**	**25.0**		74.0	76.3	
Stair gate use[1]	n=590	n=41	n=46		n=335	n=167	
No adequate use	41.1	42.5	34.8	0.46	42.0	40.4	0.72
Adequate use	58.9	57.5	65.2		58.0	59.6	
Windows below 1.20m[1]	n=526	n=170	n=82		n=183	n=91	
No window guard	55.3	58.2	65.9	0.25	51.9	47.3	0.47
Window guard	44.7	41.8	34.1		48.1	52.7	
Poisonings							
Storage of cleaning products	n= 1439	n= 451	n= 241		n= 490	n= 255	
Unsafe storage	60.3	78.7	75.5	0.16	44.6	43.7	0.96
Safe storage	37.0	18.4	23.2		53.0	52.4	
Unknown storage	2.6	2.9	1.2		2.5	3.9	
Storage of medicines	n= 1439	n= 451	n= 241		n= 490	n= 255	
Unsafe storage	38.2	**54.3**	**43.6**	**0.01**	27.8	24.1	0.33
Safe storage	54.1	**39.7**	**48.1**		64.2	66.4	
Unknown storage	7.7	**6.0**	**8.3**		8.0	9.5	

[1] Only when situation is applicable

± Differences between infants who cannot crawl and can crawl evaluated by Chi-square test

Note: Bold numbers indicate significant *P*-values

Multiple correlates of safety behaviour

Number of children, crawling of their infant, vulnerability, and severity were significantly associated with the absence of a stair gate ($P<0.05$) (Table 3.3). Educational level, mother's ethnicity, and self-efficacy were significantly associated with the inadequate use of a stair gate ($P<0.05$) (Table 3.4). In this model number of children was not associated with the behaviour. Only number of children was a significant variable ($P<0.05$) of the variance in the absence of a window guard (Table 3.5). Number of children, mother's educational level, mother's ethnicity, self-efficacy, and vulnerability were significant variables ($P<0.05$) of the variance in the unsafe storage of cleaning products (Table 3.6). Number of children, infant's age, mother's educational level, and self-efficacy were significant variables ($P<0.05$) of the variance in unsafe storage of medicines (Table 3.7).

Table 3.3 Odds ratios (OR) and 95% confidence intervals from multiple logistic regression analyses with reported absence of stair gate as dependent variable and number of children (Model 1), other demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors in a subgroup of parents with a main staircase present in their house (n= 1245)

		Absence of stair gate		
		Model 1	Model 2	Model 3
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Demographic variables				
Number of children	First-time parents	**16.46 (12.36-21.93)*** **	**17.53 (13.04-23.56)*** **	**19.60 (14.36-26.75)*** **
	Non-first-time parents	1.00	1.00	1.00
Infant's age	0-6 months		0.78 (0.53-1.15)	0.79 (0.53-1.18)
	6-12 months		1.00	1.00
Infant's gender	Girl		1.07 (0.80-1.41)	1.11 (0.83-1.48)
	Boy		1.00	1.00
Infant can crawl	No		**1.66 (1.22-2.27)****	**1.69 (1.23-2.32)****
	Yes		1.00	1.00
Mother's educational level	High		1.24 (0.81-1.91)	1.13 (0.72-1.76)
	Intermediate		1.17 (0.76-1.79)	1.14 (0.73-1.77)
	Low		1.00	1.00
Mother's ethnicity	Non-Western		**1.87 (1.02-3.43)***	1.56 (0.85-2.87)
	Other Western		1.65 (0.81-3.33)	1.58 (0.77-3.24)
	Dutch		1.00	1.00
PMT constructs				
Self-efficacy	-2, +2			n.a.
Response efficacy	-2, +2			n.a.
Vulnerability	-2, +2			**1.56 (1.35-1.80)*** **
Severity	-2, +2			**0.76 (0.61-0.94)***
Nagelkerke R^2		0.42	0.44	0.47

n.a. not assessed

* Significant at the 0.05 level, ** significant at the 0.01 level, *** significant at the 0.001 level

Note: Bold numbers indicate significant *P*-values

DISCUSSION

The results of this study show that there is a difference in safety behaviour between first-time parents and non-first-time parents. Regarding having a stair gate at the main staircase at the house and storage of medicines, more first-time parents with infants who cannot crawl behave unsafe than first-time parents with an infant that can crawl. Furthermore, the results show that different demographic variables are associated with unsafe behaviour of parents of infants. From our study it can be concluded that PMT constructs are applicable to predict the absence of a stair gate, inadequate use of a stair gate, and unsafe storage of cleaning products and medicines.

This study shows that first-time parents don't behave as recommended in the prevention of falls and poisonings. When infants of first-time parents start crawling parents are probably more aware of the dangers in their home, and therefore start showing the

Table 3.4 Odds ratios (OR) and 95% confidence intervals from multiple logistic regression analyses with no adequate use of the stair gate as dependent variable and number of children (Model 1), other demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors in a subgroup of parents with a stair gate present at their staircase (n=590)

		No adequate use of stair gate		
		Model 1	**Model 2**	**Model 3**
		OR (95% CI)	**OR (95% CI)**	**OR (95% CI)**
Demographic variables				
Number of children	First-time parents	0.87 (0.55-1.40)	0.89 (0.55-1.46)	0.83 (0.47-1.47)
	Non-first-time parents	1.00	1.00	1.00
Infant's age	0-6 months		0.81 (0.49-1.33)	0.84 (0.48-1.48)
	6-12 months		1.00	1.00
Infant's gender	Girl		0.89 (0.63-1.25)	0.70 (0.48-1.03)
	Boy		1.00	1.00
Infant can crawl	No		1.05 (0.73-1.51)	0.97 (0.65-1.46)
	Yes		1.00	1.00
Mother's educational level	High		**2.77 (1.61-4.78)*** **	**2.99 (1.58-5.65)*** **
	Intermediate		**2.24 (1.31-3.84)****	**2.32 (1.24-4.35)****
	Low		1.00	1.00
Mother's ethnicity	Non-Western		0.94 (0.43-2.05)	0.69 (0.29-1.61)
	Other Western		**2.91 (1.12-7.51)***	2.98 (0.99-9.02)
	Dutch		1.00	1.00
PMT constructs				
Self-efficacy	-2, +2			**0.28 (0.20-0.38)*** **
Response efficacy	-2, +2			0.79 (0.53-1.17)
Vulnerability	-2, +2			1.13 (0.92-1.38)
Severity	-2, +2			0.98 (0.72-1.32)
Nagelkerke R^2		0.001	0.05	0.28

* Significant at the 0.05 level, ** significant at the 0.01 level, *** significant at the 0.001 level
Note: Bold numbers indicate significant *P*-values

required safety behaviour only then when their child is already at risk. Earlier studies show that these parents still do not take enough safety measures to prevent injuries [7, 8]. When infants are able to move around the house, they are able to explore their world. It is recommended to prepare for a safe home environment before infants can move themselves around [5]. Since one cannot predict exactly when each child develops these abilities it is important to start showing these safety behaviours at an early stage.

Especially first-time parents are not well prepared for their crawling infant compared to non-first-time parents. When older siblings are present in the home, safety behaviours with regard to the presence of stair gates are shown more often possibly based on their experience with their older child or children. However parents still do not use the stair gate adequately. Or maybe they stop using the stair gate adequately, because their older sibling can walk the stairs himself.

Table 3.5 Odds ratios (OR), 95% confidence intervals and explained variance (Nagelkerke R^2) from multiple logistic regression analyses with reported absence of window guard as dependent variable and number of children (Model 1), other demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors in a subgroup of parents with windows that could be opened in their house (n=526)

		Absence of window guard		
		Model 1	**Model 2**	**Model 3**
		OR (95% CI)	**OR (95% CI)**	**OR (95% CI)**
Demographic variables				
Number of children	First-time parents	**1.52 (1.08-2.15)***	**1.60 (1.13-2.27)****	**1.60 (1.13-2.28)****
	Non-first-time parents	1.00	1.00	1.00
Infant's age	0-6 months		0.83 (0.51-1.35)	0.83 (0.51-1.35)
	6-12 months		1.00	1.00
Infant's gender	Girl		1.21 (0.85-1.71)	1.21 (0.85-1.72)
	Boy		1.00	1.00
Infant can crawl	No		0.89 (0.60-1.31)	0.89 (0.60-1.31)
	Yes		1.00	1.00
Mother's educational level	High		1.69 (1.00-2.85)	1.69 (1.00-2.86)
	Intermediate		1.56 (0.93-2.62)	1.56 (0.93-2.62)
	Low		1.00	1.00
Mother's ethnicity	Non-Western		0.99 (0.54-1.83)	0.99 (0.54-1.83)
	Other Western		0.74 (0.29-1.88)	0.74 (0.29-1.88)
	Dutch		1.00	1.00
PMT constructs				
Self-efficacy	-2, +2			1.00 (1.00-1.00)
Response efficacy				n.a.
Vulnerability				n.a.
Severity				n.a.
Nagelkerke R^2		0.01	0.03	0.03

n.a. not assessed

* Significant at the 0.05 level, ** significant at the 0.01 level

Note: Bold numbers indicate significant *P*-values

Earlier study on parents' safety behaviours of Brice, et al showed no significant differences on infant-safe homes between first-time mothers and non-first-time mothers. This study, however, did not focus on prevention of falls or poisonings [14]. The associations included in our study were similar to the results in previous studies on safety behaviour [6, 15-17]. However, to our knowledge, this is the first study to look specifically at first-time parents. First-time parents, infants that could not crawl, parents who perceived lower vulnerability of their child and parents who perceived lower severity were more likely not to have a stair gate present. Besides, when a stair gate is present mothers with an intermediate or high educational level or mothers with lower self-efficacy are more likely to use the stair gate inadequately. It could be beneficial to aim specific interventions at these parents in order to reduce the number of injures due to falls from stairs.

Table 3.6 Odds ratios (OR), 95% confidence intervals and explained variance (Nagelkerke R^2) from multiple logistic regression analyses with reported unsafe storage of cleaning products as dependent variable and number of children (Model 1), other demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors (n=1439)

		Unsafe storage of cleaning products		
		Model 1	Model 2	Model 3
		OR 95% CI)	OR (95% CI)	OR 95% CI)
Demographic variables				
Number of children	First-time parents	**4.55 (3.59-5.76)*** **	**4.69 (3.68-5.98)*** **	**4.53 (3.53-5.82)*** **
	Non-first-time parents	1.00	1.00	1.00
Infant's age	0-6 months		1.05 (0.76-1.47	1.09 (0.78-1.53)
	6-12 months		1.00	1.00
Infant's gender	Girl		0.99 (0.79-1.26)	0.96 (0.76-1.23)
	Boy		1.00	1.00
Infant can crawl	No		1.15 (0.89-1.48)	1.09 (0.83-1.41)
	Yes		1.00	1.00
Mother's educational level	High		**2.22 (1.58-3.13)*** **	**2.05 (1.43-2.94)*** **
	Intermediate		**1.82 (1.31-2.54)*** **	**1.70 (1.20-2.39)** **
	Low		1.00	1.00
Mother's ethnicity	Non-Western		**1.97 (1.26-3.07)** **	**2.04 (1.29-3.25)** **
	Other Western		**1.89 (1.03-3.49)***	1.81 (0.97-3.37)
	Dutch		1.00	1.00
PMT constructs				
Self-efficacy	-2, +2			**0.74 (0.62-0.88)*** **
Response efficacy	-2, +2			1.03 (0.84-1.27)
Vulnerability	-2, +2			**1.14 (1.01-1.29)***
Severity	-2, +2			0.98 (0.82-1.17)
Nagelkerke R^2		0.16	0.19	0.21

* Significant at the 0.05 level, ** significant at the 0.01 level, *** significant at the 0.001 level
Note: Bold numbers indicate significant *P*-values

Injuries from falls from a window especially occur in children aged 0-4 years old, with a peak at one year [18]. In our study we saw that number of children was correlated with absence of a window guard and no other demographic characteristics or PMT constructs. It is therefore important to point prevention strategies at all parents, not families with specific characteristics. It is however recommended to specifically inform first-time parents about the prevention of falls from windows and the use of window guards in order to improve the use of these window guards.

First-time parents, mothers with intermediate or high educational level, non-Western ethnicity of the mother, lower self-efficacy and higher perceived vulnerability are correlated with unsafe storage of cleaning products. Furthermore first-time parents, younger children, high educational level of the mother and lower self-efficacy correlated with unsafe storage of medicines. These results indicate that the characteristics of parents who behave unsafely vary within the prevention of different types of injuries, in this case

Table 3.7 Odds ratios (OR), 95% confidence intervals and explained variance (Nagelkerke R^2) from multiple logistic regression analyses with reported unsafe storage medicines as dependent variable and number of children (Model 1), other demographic variables (Model 2) and Protection Motivation Theory (PMT) variables (Model 3) as independent factors (n=1439)

		Unsafe storage of medicines		
		Model 1	Model 2	Model 3
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Demographic variables				
Number of children	First-time parents	**2.90 (2.31-3.63)*** **	**2.96 (2.35-3.73)*** **	**2.83 (2.23-3.60)*** **
	Non-first-time parents	1.00	1.00	1.00
Infant's age	0-6 months		**0.67 (0.48-0.93)***	**0.69 (0.50-0.97)***
	6-12 months		1.00	1.00
Infant's gender	Girl		1.07 (0.85-1.34)	1.09 (0.85-1.38)
	Boy		1.00	1.00
Infant can crawl	No		1.23 (0.96-1.59)	1.16 (0.89-1.50)
	Yes		1.00	1.00
Mother's educational level	High		**2.26 (1.59-3.23)*** **	**1.96 (1.35-2.84)*** **
	Intermediate		**1.53 (1.08-2.17)***	1.40 (0.98-2.02)
	Low		1.00	1.00
Mother's ethnicity	Non-Western		0.92 (0.59-1.44)	0.90 (0.58-1.41)
	Other Western		1.26 (0.74-2.17)	1.41 (0.80-2.48)
	Dutch		1.00	1.00
PMT constructs				
Self-efficacy	-2, +2			**0.72 (0.61-0.85)*** **
Response efficacy	-2, +2			1.15 (0.93-1.42)
Vulnerability	-2, +2			1.15 (1.02-1.29)
Severity	-2, +2			0.95 (0.80-1.14)
Nagelkerke R^2		0.09	0.12	0.14

* Significant at the 0.05 level, *** significant at the 0.001 level
Note: Bold numbers indicate significant *P*-values

poisoning. Despite the decrease in the past years in the number of poisoning related injuries due to improved poisoning prevention strategies, still too many of these injuries occur [19]. Previous studies showed that parents do not adopt the recommendations for safe storage of poisonings [20].

Methodological considerations

Some limitations of this study need to be addressed. First, because our study relied on self-report of safe and unsafe behaviour by parents, misclassification might have occurred; parents might have given socially desirable answers (overstating their safe behaviour) [21, 22]. This might result in an underestimation of unsafe households, and bias in the assessment of significant correlates.

Of the 1439 participants that completed the questionnaire, only 7% were not born in the Netherlands. We assume that these participants had adequate knowledge of the

Dutch language to enable participation in the study and complete the questionnaire. We recommend future studies to address language skills of participants in the study.

Not all PMT constructs were measured on all behaviours, for example self-efficacy and response efficacy in stair gate presence in the house and response efficacy, vulnerability and severity in use of a window guard on windows.

Participation rate in this study, 46%, was low. This study was part of a randomized controlled trial which aims to assess the effects of internet-based, tailored safety information combined with personal counselling. Therefore, participants were invited to complete more than one questionnaire. Also, this study required participants to have access to the Internet. This may have contributed to the low participation rate.

There is no data available on the characteristics of parents who did not wish to participate in this study. It is difficult to ascertain whether the associations found would be different in non-responders.

This study used an opportunity sample of five preventive youth health care centres in the Netherlands. The participation rate and the use of an opportunity sample may have caused limited generalizability of our study results.

Future research

We suggest to measure safety behaviour and PMT constructs longitudinal in order to investigate when parents change their behaviour and which variables are associated with the change in safety behaviour. Furthermore, the study could be extended with home safety observations in order to eliminate possible misclassification.

Conclusion

First-time parents are not well prepared for the safety of their infant, causing unnecessary unsafe situations. Especially when their infant cannot crawl yet, parents behave unsafely on not having a stair gate and the storage of medicines. The various parents' safety behaviours were influenced by different variables, e.g. age of the infant, crawling of the infant, mother's educational level, mother's ethnicity, self-efficacy vulnerability, and severity. These variables could be taken into account when providing safety information to parents.

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Chapter 4

Associations of socio-demographic, family and psychosocial correlates with parents' child safety behaviour: a systematic review

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Submitted

Part II

Evaluation of an intervention to promote parents' child safety behaviour

Chapter 5

Web-Based E-health to support counselling in routine well-child care: pilot study of E-health4Uth home safety

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ABSTRACT

Introduction

Providing safety education to parents of young children is important in the prevention of unintentional injuries in and around the home. We developed a Web-based, tailored safety advice module to support face-to-face counselling in the setting of preventive youth health care (E-health4Uth home safety) in order to improve the provision of safety information for parents of young children. This pilot study evaluated a Web-based, tailored safety advice module (E-health4Uth home safety) and evaluated the use of E-health4Uth home safety to support counselling in routine well-child care visits.

Methods

From a preventive youth health care centre, 312 parents with a child aged 10-31 months were assigned to the E-health4Uth home safety condition or to the care-as-usual condition (provision of a generic safety information leaflet). All parents completed a questionnaire either via the Internet or paper-and-pencil, and parents in the E-health4Uth condition received tailored home safety advice either online or by a print that was mailed to their home. This tailored home safety advice was used to discuss the safety of their home during the next scheduled well-child visit. Parents in the care-as-usual condition received a generic safety information leaflet during the well-child visit.

Results

Mean age of the parents was 32.5 years (SD 5.4), 87.8% (274/312) of participants were mothers; mean age of the children was 16.9 months (SD 5.1). In the E-health4Uth condition, 38.4% (61/159) completed the online version of the questionnaire (allowing Web-based tailored safety advice), 61.6% (98/159) preferred to complete the questionnaire via paper (allowing only a hardcopy of the advice to be sent by regular mail). Parents in the E-health4Uth condition evaluated the Web-based, tailored safety advice (n=61) as easy to use (mean 4.5, SD 0.7), pleasant (mean 4.0, SD 0.9), reliable (mean 4.6, SD 0.6), understandable (mean 4.6, SD 0.5), relevant (mean 4.2, SD 0.9), and useful (mean 4.3, SD 0.8). After the well-child visit, no significant differences were found between the E-health4Uth condition and care-as-usual condition with regard to the satisfaction with the information received (n=61, P= 0.51). Health care professionals (n=43) rated the tailored safety advice as adequate (mean 4.0, SD 0.4) and useful (mean 3.9, SD 0.4).

Discussion

Less than half of the parents accepted the invitation to complete a Web-based questionnaire to receive online tailored safety advice prior to a face-to-face consultation. Despite wide access to the Internet, most parents preferred to complete questionnaires using

paper-and-pencil. In the subgroup that completed E-health4Uth home safety online, evaluations of E-health4Uth home safety were positive. However, satisfaction scores with regard to tailored safety advice were not different from those with regard to generic safety information leaflets. We recommend developing strategies to improve the uptake of E-health applications and the perceived benefits of online tailored information in the practice of preventive youth health care by involving both parents and professionals.

INTRODUCTION

Unintentional injury is a major cause of death among young children in Europe and the United States [1, 2]. It is also a major source of morbidity and loss of quality of life [3, 4]. The most common causes of child mortality and morbidity by injury in and around the home are drowning, poisoning, burns, and falls [1]. Parents can reduce the risk of injuries by applying various safety behaviours. However, necessary safety behaviours are still not taken by a large number of parents, causing unnecessary risk of injury of young children [5-7].

Many countries have installed preventive youth health care, which refers to various activities to improve and protect the health, growth, and development of young people, and also to prevent illness and disability in early life. These activities include a system of maternal and child health care, which serves children from birth to 18 years of age [8]. In the Netherlands, all parents are invited to attend regularly scheduled well-child visits at the preventive youth health care centre, free of charge. During these well-child visits growth and development of the children is monitored and relevant health information and vaccinations are provided. In the Netherlands, around 93% of parents attend one or more well-child visits with their child under 4 years of age. The attendance rates may vary from circa 50% to 93% between the specific child-age related scheduled visits [9]. Parents receive health information on several topics, including information about nutrition, growth, and child home safety [10]. Currently this health information is provided to parents by using generic information leaflets that parents receive at regular well-child visits.

With the current strain on health care, greater efficiency is required. Providing health information through the Internet, as an additional source of information, might be beneficial in various ways. For example, tailored safety information can be provided to parents prior to a preventive youth health care visit, and the information gathered by the E-health module regarding specific safety behaviours can be provided to the physician/nurse to enhance the efficiency of face-to-face counselling, as is done with regard

to other health topics, such as nutrition and physical activity [11-14]. However the use of E-health modules has not yet been evaluated in providing home safety information in the setting of day-to-day preventive youth health care. The application of E-health in preventive youth health care provides the opportunity of giving individual, tailored information.

E-health is a broad, emerging field in the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies [15]. It is the use of information and communications, especially the Internet, to improve or enable health and health care [16]. E-health could be used for providing information for parents on several health topics, including information to promote home safety. Because tailored information combined with counselling, which can be provided by using E-health, is based on the personal situation, parents could find the information more useful than general information materials [17]. Furthermore parents could be inclined to change their behaviour, when the information they receive is perceived as personally relevant [18, 19]. However, E-health is currently not extensively applied in preventive youth health care. We developed a Web-based, tailored safety advice module to support face-to-face counselling at preventive youth health care centres (E-health4Uth home safety) to provide safety information for parents of young children [7, 20]. By using this E-health module, parents can prepare for the next well-child visit at the preventive youth health care centre, with regard to issues concerning the safety of the child at home [20]. In addition, the health care professional can evaluate the results of the E-health4Uth home safety module prior to or during each visit in order to improve communication with the parents [20]. It is unknown whether such Web-based, tailored information can be fitted within current daily practice, existing organizational goals, and parent-health care professional interactions, which is known to be important for such an E-health approach to be successful [21].

This pilot study evaluates a Web-based, tailored safety advice module (E-health4Uth home safety) and evaluates the use of E-health4Uth home safety to support counselling in routine well-child care.

METHODS

Sample and setting

Physicians and nurses of 4 preventive youth health care centres situated in the Rotterdam area in the Netherlands participated in this study. These preventive youth health care centres were chosen because of their on-going collaboration with the Erasmus Uni-

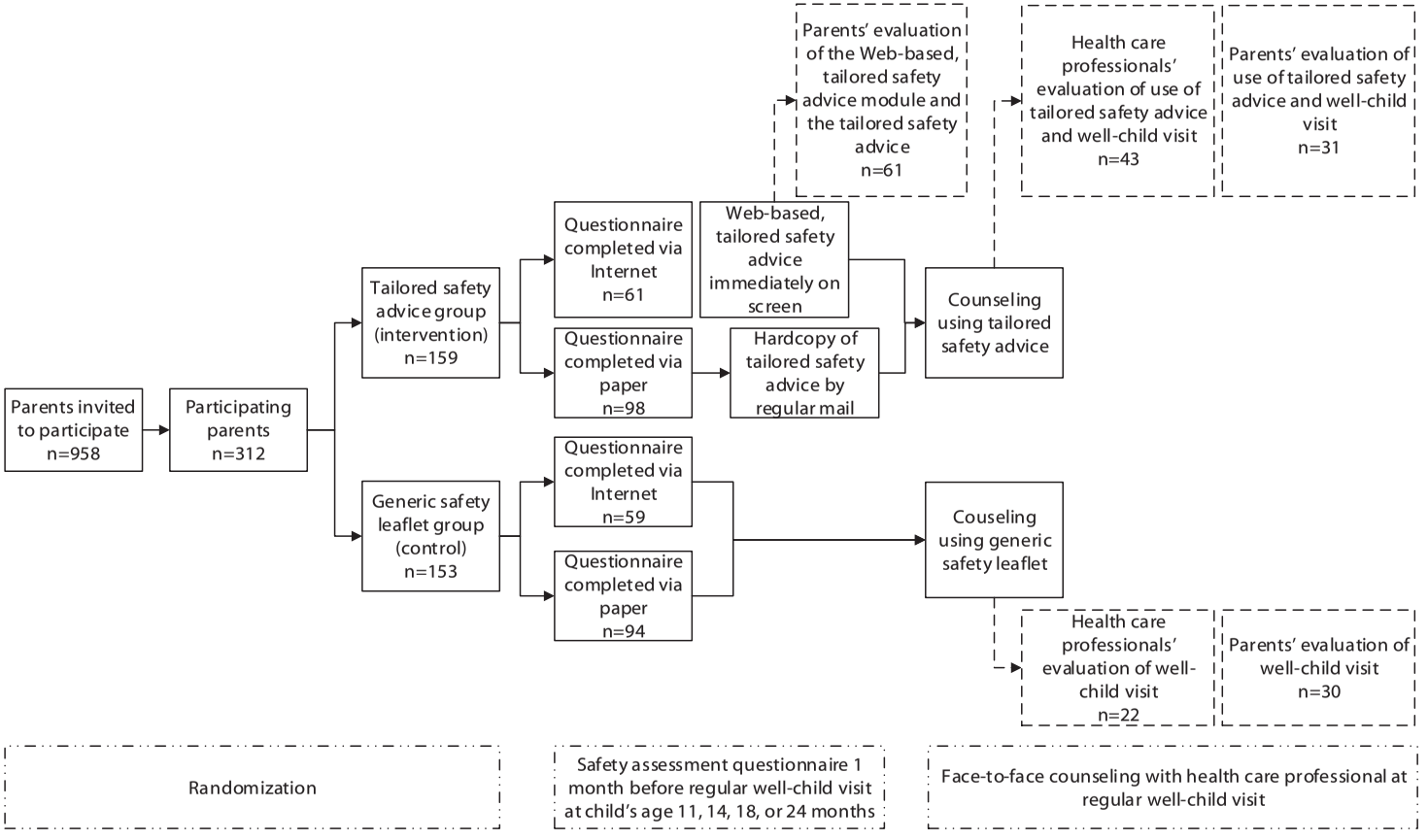

Figure 5.1 Study design, participant flow and evaluations

versity Medical Centre in Rotterdam. In 2006 and 2007, parents (N=958) were invited to participate in the study one month before their regular well-child visit at the preventive youth health care centre at child's age 11, 14, 18, or 24 months. Parents received written information about the study and provided written or online informed consent (check-box). The Medical Ethics Committee of the Erasmus Medical Center gave a "declaration of no objection" for this study (MEC-2004-256).

Study design

Parents within each participating preventive youth health care centre were randomly assigned to a Web-based, tailored safety advice and counselling group (i.e., the E-health4Uth condition), or to a group receiving the generic safety information (i.e., the care-as-usual condition, Figure 5.1).

E-health4Uth home safety condition

A Web-based, tailored safety advice module (E-health4Uth home safety) was developed. Parents completed a self-report questionnaire (via the Internet or paper-and-pencil) to assess safety behaviours on the following safety topics: falls, poisoning, drowning, and burns [7]. When a situation was not applicable (e.g., when parents did not have stairs in their house), they did not receive any more questions about that subject. After completing this safety assessment questionnaire parents received a tailored safety advice immediately on the screen when completed via Internet. The parents mailed the completed paper-and-pencil questionnaires back to the research centre. The responses were entered into the database and a hardcopy of the resulting tailored safety advice was printed and sent to the parents via mail.

When parents failed to practice a particular safety behaviour ("unsafe behaviour"), they received a tailored message on how they can improve their safety behaviour. When parents successfully showed a specific safety behaviour ("safe behaviour") they received positive reinforcement and no safety advice on that item. The tailored safety messages were based on the guidelines of the Consumer Safety Institute [22]. Table 5.1 presents the contents and application of the tailored safety advices used in this study.

After completing the safety assessment questionnaire, parents were invited to visit the health care professional of their preventive health care centre for their regular well-child visit. All the advices given to parents about safety were copied to the relevant health care professional, in order to enable the discussion of the advice with the parent during the visit. Parents and health care professionals could prepare for the well-child visit by formulating specific questions about the safety situation at home.

Table 5.1 Contents and application of the tailored safety advice in the prevention of falls, poisoning, drowning, and burns

	Applicable if:	Reinforcement with no tailored safety advice, when:	Tailored safety advice when:
Prevention of falls			
Stair gate	The house has a staircase which the child can reach	A stair gate is present and is closed at all times	No stair gate is present A stair gate is present but is not closed at all times
Balcony	The house has a balcony	The child is never left alone on the balcony	The child is left alone on the balcony
Prevention of poisoning			
Cleaning products	Always	Stored above adult chest-height or in a locked cupboard	Stored below adult chest height or in an unlocked cupboard
Medicines	Always	Stored above adult chest-height or in a locked cupboard	Stored below adult chest height or in an unlocked cupboard
Prevention of drowning			
Bath tub	The child takes a bath	Child is never left alone in the bath tub	Child is left alone in the bath tub
Swimming pool	The child swims in the swimming pool	Never left alone in the swimming pool	Child is left alone in the swimming pool
Pond	There is a pond in the garden	Always the advice is to fill up the pond	A pond is present
Prevention of burns			
Thermostat-controlled tap	Always	Thermostat-controlled tap present in the bathroom	Thermostat-controlled tap not present in the bathroom
Hot drinks	Always	Child is never on parent's lap when drinking hot liquids	Child on parent's lap when drinking hot liquids
Kitchen	Always	Child is never in the kitchen when the parent is cooking Parent cooks on the back griddle Handles of pans are turned to the back during cooking	Child is in the kitchen when the parent is cooking Parent does not cook on the back griddle Handles of pans are not turned to the back during cooking

Care-as-usual condition

Parents of the care-as-usual condition completed the same self-administered questionnaire assessing parents' child safety behaviours, either by using the Internet or paper-and-pencil. However they did not receive any tailored safety advice after completing the questionnaire. After completing the safety assessment questionnaire, parents visited the health care professional of their preventive health care centre for a regular well-child visit. Parents received a generic safety information leaflet from their health care professional during their regular well-child visit (care-as-usual) [23, 24]. This generic safety information leaflet was developed by the Consumer Safety Institute [22]. Each age group was provided with a different information leaflet, divided into 0-6 months, 6-12 months, 1-2 years, and 2-4 years of age. The safety information leaflets contained information on the prevention of injuries in and around the home, divided into general information about the development and environment of the child, and safety advice about the prevention of falls, poisoning, drowning, and burns.

Measures

Socio-demographic data and parents' safety behaviours were collected through a self-administered assessment questionnaire completed by the parents. Immediately after receiving the tailored safety advice, the parents (only those in the E-health4Uth condition who used the Internet to complete the questionnaire) were invited to complete a Web-based evaluation form about the tailored safety advice received and the use of the tailored safety advice module.

When parents attended the scheduled well-child visit, they were invited to complete an evaluation form about the well-child visit. Parents in the E-health4Uth condition were specifically asked about the use of tailored information during the face-to-face counselling. The youth health care professionals were also invited to complete evaluation forms regarding the well-child visit, and, if applicable, the use of the tailored information during the face-to-face counselling.

Evaluation items of the tailored safety advice, the Web-based tailored safety advice module, and the well-child visit, were measured on 5-point Likert scales ranging from 1 (most negative evaluation) to 5 (most positive evaluation), unless stated otherwise.

Evaluation of the Web-based tailored safety advice module (immediately after receiving the tailored safety advice)

Parents in the E-health4Uth condition, who completed the Internet version of E-health4Uth home safety, were invited to complete a Web-based questionnaire after having read the tailored safety advice. The questions were: (1) reading of the safety advice (i.e., having read the advice completely, partly or not at all), (2) the reliability, understandability, relevance, and usefulness of the tailored safety advice, (3) the ease of use of the module, and (4) the pleasantness of the information source.

Health care professionals' and parents' evaluation of the use of the tailored safety advice during the well-child visit

After the well-child visit, health care professionals reported the duration of the visit for both conditions on their evaluation form. Furthermore, health care professionals were invited, directly after each face-to-face consultation, to complete items regarding the following topics: (1) adequacy of the generated tailored safety advice, (2) usefulness of the tailored safety advice during the well-child visit, (3) the rating for the application of the tailored safety advice on a scale from 1 (most negative evaluation) to 10 (most positive evaluation), (4) whether the information of the tailored safety advice was in accordance with what the parent indicated (yes/no), (5) health care professionals' satisfaction with the information given to the parent, and (6) health care professionals'

overall satisfaction with the well-child visit. Health care professionals rated both the use of the tailored safety advice and the well-child visit on a scale from 1 (most negative evaluation) to 10 (most positive evaluation).

In both the E-health4Uth condition and the care-as-usual condition, all parents that attended the scheduled well-child visit, at the end of the visit, were invited to complete items regarding the satisfaction with the safety information they received (tailored or generic), the overall satisfaction with the well-child visit, and the rating for the well-child visit on a scale from 1 (most negative evaluation) to 10 (most positive evaluation). Parents in the E-health4Uth condition completed an additional item on whether discussing the tailored safety advice was a valuable supplement.

Furthermore both parents in the E-health4Uth condition and the care-as-usual condition had to report their intention to change safety in and around the home after the well-child visit (i.e., prevention of falls, poisoning, drowning, and burns: yes/no).

Statistical analysis

Statistical analyses were performed using SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Frequency tables were used to explore the socio-demographic characteristics of the total study population and of both conditions (E-health4Uth and care-as-usual). The frequency of safe and unsafe behaviour on each safety topic was determined. The differences were examined with chi-square tests. Items about the well-child visit and the intention to change safety behaviour after the well-child visit were compared between the current method of providing safety information (care-as-usual condition) and the tailored safety advice (E-health4Uth condition). Differences were determined with student's *t* tests. Mann–Whitney *U* tests were used to assess data that were not normally distributed.

RESULTS

Family and child characteristics

A total of 312 parents (312/958, 32.6%) provided informed consent and participated in the study—159 parents were assigned to the E-health4Uth condition and 153 to the care-as-usual condition. The mean age of the parents was 32.5 (range 20-48, SD 5.4) years, 87.8% (274/312) of parents were mothers and 17.3% (54/312) of parents had a low educational level (intermediate secondary education or lower). In this study, 90.4% (282/312) of responding families included both parents and 50.6% (158/312) of families had one child. The age of the children ranged from 10-31 (mean 16.9, SD 5.1) months,

49.4% (154/312) of children were boys. Almost all children could crawl (303/312, 97.4%), and 92.6% (288/312) could pull up to standing (Table 5.2). Unsafe behaviours related to risk of falls were performed by 28.8% (90/312) of the parents, while 36.5% (114/312) of

Table 5.2 Characteristics of all parents and by E-health4Uth condition and care-as-usual condition (n=312)

	Total participants n (%)	E-health4Uth condition n (%)	Care-as-usual condition n (%)	*P*-value
Family characteristics				
Mean age of respondent in years (range, SD)	32.5 (20-48, SD 5.4)	32.3 (20-48, SD 5.7)	32.8 (20-44, SD 5.1)	0.41[a]
Mother is respondent	274/312 (87.8)	139/159 (87.4)	135/153 (88.2)	0.83
Non-Dutch mother	83/312 (26.6)	43/159 (27.0)	40/153 (26.1)	0.83
Non-Dutch father	82/312 (26.3)	45/159 (28.3)	37/153 (24.2)	0.53
Educational level of the respondent is low[b]	54/312 (17.3)	32/159 (20.1)	22/153 (14.4)	0.14
Single parent	30/312 (9.6)	15/159 (9.4)	15/153 (9.8)	0.82
One child in family	158/312 (50.6)	84/159 (52.8)	74/153 (48.4)	0.71
Child characteristics				
Mean age of child in months (range, SD)	16.9 (10-31, SD 5.1)	17.4 (10-30, SD 5.0)	16.5 (10-31, SD 5.3)	0.14[a]
Gender child, boys	154/312 (49.4)	80/159 (50.3)	74/153 (48.4)	0.73
Child can crawl	303/311 (97.4)	154/158 (97.5)	149/153 (97.4)	0.96
Child can pull up to standing	288/311 (92.6)	145/158 (91.8)	143/153 (93.5)	0.57
Child can walk independently	221/311 (71.1)	117/158 (74.1)	104/153 (68.0)	0.24
Child can climb	211/271 (77.9)	108/137 (78.8)	103/134 (76.9)	0.70
Safe and unsafe behaviors				
Risk of falls				0.27
Safe behavior	198/312 (63.5)	99/159 (62.3)	99/153 (64.7)	
Unsafe behavior	90/312 (28.8)	44/159 (27.7)	46/153 (30.1)	
Not applicable[c]	24/312 (7.7)	16/159 (10.1)	8/153 (5.2)	
Risk of poisoning				0.62
Safe behavior	198/312 (63.5)	103/159 (64.8)	95/153 (62.1)	
Unsafe behavior	114/312 (36.5)	56/159 (35.2)	58/153 (37.9)	
Risk of drowning				0.03
Safe behavior	190/310 (61.3)	90/158 (57.0)	100/152 (65.8)	
Unsafe behavior	107/310 (34.5)	57/158 (36.1)	50/152 (32.9)	
Not applicable[d]	13/310 (4.2)	11/158 (7.0)	2/152 (1.3)	
Risk of burns				0.03
Safe behavior	14/312 (4.5)	11/159 (6.9)	3/153 (2.0)	
Unsafe behavior	198/312 (95.5)	148/159 (93.1)	150/153 (98.0)	

[a]Mann-Whitney *U*-test

[b]Low educational level: intermediate secondary education or less

[c]Not applicable on falls; when no staircase and balcony is present

[d]Not applicable on drowning; when parents do not bath their child, parents do not go swimming with their child, and no pond is present

parents performed unsafe behaviours with regard to risk of poisoning, 34.5% (107/312) with regard to drowning, and 95.5% (298/312) of parents performed unsafe behaviours with regard to risk of burns. More parents in the E-health4Uth condition performed unsafe behaviours with regard to the risk of drowning compared to the care-as-usual condition (36.1% vs. 32.9%, *P*= 0.03). More parents in the care-as-usual condition performed unsafe behaviours with regard to the risk of burns compared to parents in the E-health4Uth condition (98.0% vs. 93.1%, *P*= 0.03).

In the E-health4Uth condition, 38.4% (61/159) completed the online version of the questionnaire (allowing Web-based tailored safety advice); while 61.6% (98/159) preferred to complete the questionnaire via paper (allowing only a hardcopy of the advice to be sent by regular mail).

Evaluation of the Web-based tailored safety advice module (immediately after receiving the tailored safety advice)

All of the parents in the E-health4Uth condition who completed the questionnaire via the Internet completed the Web-based evaluation of the safety advice and the safety advice module, directly after receiving the advice (n=61). Of these, 82.0% (50/61) of parents reported having read their safety advice completely, 13.1% (8/61) of parents read the advice only partly, and 4.9% (3/61) of parents (5%) did not read the advice at all (Table 5.3). Parents considered the tailored safety advice to be reliable (mean 4.6, SD 0.6); understandable (mean 4.6, SD 0.5); relevant (mean 4.2, SD 0.9); and useful (mean 4.3, SD 0.8). Furthermore, these parents evaluated the Web-based, tailored safety advice

Table 5.3 Parents' evaluation of the tailored safety advice and the Web-based, tailored safety advice module (n= 61)

Reading of the Web-based, tailored safety advice	**n (%)**
Have read their advice completely	50/61 (82.0)
Have read their advice partly	8/61 (13.1)
Have not read their advice	3/61 (4.9)
Tailored safety advice	**Mean (SD)**
Was the safety advice reliable? [a]	4.6 (0.6)
Was the safety advice understandable? [a]	4.6 (0.5)
Was the safety advice relevant? [a]	4.2 (0.9)
Was the safety advice useful? [a]	4.3 (0.8)
Web-based, tailored safety advice module	
Was the module easy to use? [a]	4.5 (0.7)
Was the module a pleasant information source? [a]	4.0 (0.9)

[a] Scores on a 5-point Likert scale ranging from 1 (most negative evaluation) to 5 (most positive evaluation

module as easy to use (mean 4.5, SD 0.7) and found it a pleasant information source (mean 4.0, SD 0.9).

Health care professionals' and parents' evaluation of the use of the tailored safety advice during the well-child visit

We received 65 evaluation forms completed by health care professionals with regard to the well-child visits (43 in the E-health4Uth condition, 22 in the care-as-usual condition) and we received 61 evaluation forms from parents who attended the scheduled preventive youth health care visit (31 in the E-health4Uth condition, 30 in the care-as-usual condition).

Table 5.4 Health care professionals' and parents' evaluation of the well-child visit and the use of the tailored safety advice during the well-child visit (if applicable)

	E-health4Uth condition	Care-as-usual condition	*P*-value
Health care professionals:	**Mean (SD) n=43**	**Mean (SD) n=22**	
Was discussing the safety at home adequate? [a]	4.0 (0.4)	NA[c]	
Was the tailored safety advice useful to discuss during the well-child visit? [a]	3.9 (0.4)	NA[c]	
Rating for the application of the tailored safety advice [b]	7.3 (1.0)	NA[c]	
Was the information of the tailored safety advice in accordance with what the parent indicated? n (%)	29/36 (80.6%)	NA[c]	
Satisfaction with information given[a]	4.1 (0.6)	4.3 (0.5)	0.31[f]
Overall satisfaction with the well-child visit [a]	4.2 (0.4)	4.3 (0.4)	0.16[e]
Rating for the well-child visit [b]	7.5 (0.9)	7.8 (0.8)	0.23[f]
Parents:	**Mean (SD) n=31**	**Mean (SD) n=30**	
Satisfaction with information discussed[a]	3.7 (0.8)	3.4 (1.3)	0.51[f]
Was discussing the tailored safety advice valuable supplement? [a]	3.4 (1.3)	NA[c]	
Overall satisfaction with the well-child visit [a]	4.4 (0.5)	4.4 (0.5)	0.92[f]
Rating for the well-child visit [b]	8.0 (1.2)	8.0 (0.9)	0.92[f]
Intention to change safety behavior in or around the home after the well-child visit, in the prevention of:	**n (%)**	**n (%)**	
Falls	13/30 (43.3)	5/27 (18.5)	0.04[d]
Poisoning	15/28 (53.6)	8/27 (29.6)	0.07[d]
Drowning	10/28 (35.7)	4/27 (14.8)	0.08[d]
Burns	16/28 (57.1)	6/27 (22.2)	0.008[d]

[a] Scores on a 5-point Likert scale ranging from 1 (most negative evaluation) to 5 (most positive evaluation)
[b] Scores from 1 (most negative evaluation) to 10 (most positive evaluation)
[c] Not Applicable
[d] Chi square
[e] Student's *t*-test
[f] Mann-Whitney *U*-test

The mean duration of the well-child visit, as reported by the health care professionals, was 27.2 minutes (SD 11.1) in the E-health4Uth home safety E-health4Uth condition versus 23.7 (SD 8.0) minutes in the care-as-usual condition (*P*= 0.32).

Health care professionals who completed and submitted the evaluation forms regarding the well-child visits found discussing the tailored safety advice with the parents to be adequate (mean 4.0, SD 0.4) and useful (mean 3.9, SD 0.4, Table 5.4). They rated the application of the advice positively (mean 7.3, SD 1.0). Eighty-one percent (29/36) of youth health care professionals reported that the information found in the tailored safety advice was in accordance with what the parent indicated. Health care professionals were satisfied with the information they gave to the parents of both conditions (mean 4.1, SD 0.6 for the E-health4Uth condition and mean 4.3, SD 0.5 for the care-as-usual condition, *P*= 0.31), and there was also no difference in overall satisfaction of the well-child visit between the E-health4Uth condition and care-as-usual condition (*P*= 0.16). Health care professionals rated the well-child visit with parents in the care-as-usual condition slightly higher than that with parents in the E-health4Uth condition (i.e., mean 7.8, SD 0.8 vs. mean 7.5, SD 0.9 respectively, *P*= 0.23).

Among parents that attended the scheduled well-child visit and who completed the evaluation forms, parents of both the E-health4Uth condition and care-as-usual condition were satisfied with the information received during the well-child visit (mean 3.7, SD 0.8 and mean 3.4, SD 1.3, respectively). Discussing the tailored safety advice with the youth health care professional was a valuable supplement to the well-child visit (mean 3.4, SD 1.3). No significant difference was found in satisfaction between the E-health4Uth condition and care-as-usual condition (*P*= 0.51). Parents in both the E-health4Uth condition and care-as-usual condition gave the well-child visit a mean rating of 8.0.

More parents in the E-health4Uth condition showed intentions to change safety in and around the home with regard to the prevention of falls (43.3% vs. 18.5%, *P*= 0.04), the prevention of poisoning (53.6% vs. 29.6%, *P*= 0.07), the prevention of drowning (35.7% vs. 14.8%; *P*= 0.08), and the prevention of burns (57.1% vs. 22.2%, *P*= 0.008) compared to parents in the care-as-usual condition.

DISCUSSION

Principal results

In the present pilot study, we evaluated a Web-based tailored safety advice and the application of an E-health module compared to the use of generic safety information

leaflets in well-child visits. This pilot study showed that although the tailored safety advice and the E-health4Uth module turned out to be positively evaluated, the majority of parents declined to complete the online questionnaires that enabled online tailored safety advice, and preferred to use paper-and-pencil to complete the questionnaires. This diminishes the convenience of the use of Internet to deliver online tailored safety information. In the small subgroup of parents that attended the scheduled well-child visits and those that completed the evaluation form after the visit, the ratings regarding satisfaction in the E-health4Uth condition were equal to those in the care-as-usual condition, stating that parents have no preference with regard to the method of providing safety information during the well-child visit. However, among these parents, more parents in the E-health4Uth condition reported a favourable intention to change the safety situation in and around the home compared to parents in the care-as-usual condition.

Limitations and considerations

In this study, the participation rate (312/958, 32.6%) was relatively low. One reason for the low participation rate could be the lack of sending reminders. There is no data available on the characteristics of parents who did not wish to participate in this study. Baseline characteristics show that in the study population, over 90% of children were living in a two-parent home. In the general population of the Netherlands, the percentage of two-parent homes is comparable with the numbers we found in our study [25]. The relatively low participation rate might limit the generalizability of the results.

Slightly more parents in the E-health4Uth condition carried out unsafe behaviours with regard to the risk of drowning compared to the care-as-usual condition and slightly more parents of the care-as-usual condition behaved unsafe with regard to the risk of burns compared to parents of the E-health4Uth condition. Given the random allocation to both conditions, this was a chance finding.

All parents who provided informed consent completed the safety behaviours questionnaire, either by using Internet or by paper-and-pencil; and all parents in the E-health4Uth condition who completed the online questionnaire, provided answers to the evaluation form regarding the online tailored safety advice. However, relatively few evaluation forms from both parents (n=61) and professionals (n=65) were collected after the scheduled preventive youth health care visit. At the time of the study, there was no digital database regarding the preventive youth health care visits; so we were unaware whether the scheduled visits were realized or not. Furthermore, the empty form (that should have been completed) might have been missing in the dossier of the child (due to logistical problems), or the parent/professional did not want to complete the form.

There was no significant difference in parent and child characteristics between parents who did and who did not complete the evaluation ($P>0.05$; data not shown).

For the present study, since most well-child visits did not involve a vaccination (which is in the Netherlands associated with a high attendance), we might assume that circa 50% of the invited parents attended the scheduled visit. If this was the case, only circa 4/10 evaluation forms after the visits were collected. In future studies, we recommend the use of digital patient files to record attendance to the scheduled visits and the topics that were discussed during these visits. Brief evaluation questions may be integrated in such digital patient files with informed consent from the study participants. In the present study the results with regard to the evaluations after the preventive youth health care visits should be interpreted with utmost care, since non-response bias may have occurred, and given the relatively low numbers of completed forms. Furthermore, the evaluation of the well-child visit could depend on more items than just the ones we measured in this study.

Over 60% of parents preferred completing the safety behaviour questionnaire by paper-and-pencil. In the E-health4Uth condition, this meant that less than 40% of participants could benefit from the online tailored safety advice. In this study, a hard copy of the tailored advice was generated after data-entry of the paper-and-pencil questionnaire results and mailed to both parent and health professional. This is however time consuming, costly, and diminishes the convenient nature of using the Internet to deliver online tailored safety information. According to Statistics Netherlands, the number of Internet connections in the Netherlands was 80% during the time of the study, rising to 94% in 2011 [25]. Lack of Internet connections does not fully explain why parents preferred to complete the health behaviour questionnaire by using paper. Apparently, the majority of parents did not highly appreciate the possibility of online tailored advice. On the other hand, the parents that did complete the online version of E-health4Uth home safety read the advice and provided favourable ratings. We recommend, however, developing strategies to improve the uptake of E-health applications and the perceived benefits of online tailored information in the practice of preventive youth health care by involving both parents and professionals.

One element may be to increase the perceived benefits from online tailored advice as opposed to current generic advice (most often provided as leaflets during well-child visits). This study showed, unexpectedly, a lack of difference between levels of satisfaction regarding tailored safety information provided between the E-health4Uth module and the generic safety information leaflet. We saw that parents were highly satisfied with both the current generic version as well as the tailored safety information, which

implies that parents might not have a preference for either method. Safety information is only one topic in preventive youth health care. When the E-health4Uth module covers more relevant topics in the future, more advantage may be gained by providing tailored advice. We recommend involving both panels of parents and health professionals in such developments, in order to achieve maximum profit for the target audience of such E-health tools. The current pilot study shows that a high uptake, let alone higher appreciation of tailored advice compared to high-quality generic advice cannot be taken for granted.

Although the difference was not statistically significant, the well-child visit lasted slightly longer in the E-health4Uth condition compared to the care-as-usual condition. The youth health care professionals reported a significantly longer duration of the visit in the E-health4Uth condition when a Web-based, online tailored information was generated and provided to both parent and professional (n=21, mean 31.4 minutes, SD 11.8) compared to when parents completed the questionnaire online and a hard copy of the advice was generated and provided to both parent and professional (n=22, mean 23.1 minutes, SD 8.8, *P*= 0.01, data not shown). For practical reasons we suppose the online generated tailored advice was more likely to be available at the moment of the health visit to both professional and parent, compared to the hard copy that had to be generated and mailed. Presence of the tailored advice might trigger more and longer discussions between parent and professional. Although this may be beneficial from the viewpoint of behaviour goals to be attained, the duration of visits after provision of online tailored advice requires attention in future projects for logistical and financial reasons.

The current study, although in a relatively small and potentially biased subgroup, illustrated that the tailored advice may induce more intention to change behaviours in a favourable direction. This supports favourable results from early initiatives [20, 26]. To determine whether the Web-based tailored safety advice is more effective to promote parents' child safety behaviours compared to generic advice using information leaflets, it is recommended that an effect-evaluation of E-health4Uth home safety is performed [27, 28].

Conclusions

There are many potential benefits of gathering health and health behaviour data [29-31] and providing tailored information and support through E-health in preventive youth health care. Online information sources and algorithms to generate tailored information can be easily updated, and wide-scale distribution can be arranged at relatively low cost. However, given the fact that the majority of parents did not accept the invitation

to complete E-health4Uth home safety online and preferred paper-and-pencil instead, we recommend developing strategies to improve the uptake of E-health applications and the perceived benefits of online tailored information in the practice of preventive youth health care by involving both parents and professionals. An example could be that parents are unaware of the benefits of tailored health information, due to lack of knowledge about this way of providing information. This lack of knowledge could lead to the fact that parents rather choose the regular approach in receiving health information, i.e., with generic leaflets. Health care professionals could explain the goals and benefits to parents, so parents can better choose between these two forms of information provision. To examine why parents may not prefer an E-health intervention, an overview of the advantages and disadvantages of the E-health intervention by users could be collected, for instance how to deal with privacy issues.

Tailored information has the potential to be more effective in realizing favourable health behaviours compared to generic information, but not all potentially effective elements were already included in the prototype in this study. The current Web-based, tailored safety advice module and the use of the safety advice during the well-child visit could be extended using personal cognitive factors, social factors, or parents' barriers to show safety behaviour [32].

Changing behaviour is difficult, requiring time, effort, and motivation. Health care professionals could benefit from techniques to help them motivate parents to change their behaviour. Previous research has shown positive effects of motivational interviewing on health behaviour [33-35]. Motivational interviewing provides techniques that can be applied by health care professionals to promote safe behaviour. Motivational interviewing could be applied to the discussion of the tailored safety advice by the health care professional with the parent [36].

We propose future effect-evaluations of tailored safety advice, by exploring whether tailored safety advice is more effective on parents' child safety behaviours compared to generic safety leaflets. When proven to be effective, E-health combined with personal counselling could also be used in health promotion on multiple other areas relevant for prevention such as nutrition, physical activity, or sleep. It may be useful for parents to prepare themselves for the well-child visit and to formulate specific questions on these topics. Furthermore E-health could help parents and youth health care professionals to focus on issues that need further attention.

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Chapter 6

‘BeSAFE’, effect-evaluation of internet-based, tailored safety information combined with personal counselling on parents’ child safety behaviours: study design of a randomized controlled trial.

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ABSTRACT

Introduction

Injuries in and around the home are the most important cause of death among children aged 0-4 years old. It is also a major source of morbidity and loss of quality of life. In order to reduce the number of injuries, the Consumer Safety Institute introduced the use of Safety Information Leaflets in the Netherlands to provide safety education to parents of children aged 0-4 years. Despite current safety education, necessary safety behaviours are still not taken by a large number of parents, causing unnecessary risk of injury among young children. In an earlier study an E-health module with internet-based, tailored safety information was developed and applied. It concerns an advice for parents on safety behaviours in their homes regarding their child. The aim of this study is to evaluate the effect of this safety information combined with personal counselling on parents' child safety behaviours.

Methods

Parents who are eligible for the regular well-child visit with their child at child age 5-8 months are invited to participate in this study. Participating parents are randomized into one of two groups: 1) internet-based, tailored safety information combined with personal counselling (intervention group), or 2) personal counselling using the Safety Information Leaflets of the Consumer Safety Institute in the Netherlands for children aged 12 to 24 months (control group). All parents receive safety information on safety topics regarding the prevention of falls, poisoning, drowning and burns. Parents of the intervention group will access the internet-based, tailored safety information module when their child is approximately 10 months old. After completion of the assessment questions, the program compiles a tailored safety advice. The parents are asked to devise and inscribe a personal implementation intention. During the next well-child visit, the Child Health Clinic professional will discuss this tailored safety information and the implementation intention with the parents. The control group will receive usual care, i.e. the provision of Safety Information Leaflets during their well-child visit at the child's age of 11 months.

Discussion

It is hypothesized that the intervention, internet-based, tailored safety information combined with personal counselling results in more parents' child safety behaviours.

INTRODUCTION

Injuries in and around the home are the most important cause of death among children aged 0-4 years old. It is also a major source of morbidity and loss of quality of life [1-3]. In the Netherlands each year 30 children aged 0-4 years die caused by injuries in and around the home. Additionally 57.000 children aged 0-4 years are medically treated, of which 46.000 children at the emergency room of a hospital because of home injuries [4]. In order to reduce the number of injuries, the Consumer Safety Institute introduced the use of Safety Information Leaflets in the Netherlands to provide safety education to parents of children aged 0-4 years. These leaflets are well used in Child Health Clinics (CHC) and indications for a small effect on parental behaviours were gained through observational research [5, 6]. However, despite current safety education, necessary safety behaviours are still not taken by a large number of parents, causing unnecessary risk of injury of young children. Improving the effectiveness of safety education to parents at CHC is therefore desirable. In an earlier study an E-health module with internet-based, tailored safety information was developed and applied. It concerns internet-based, tailored information in combination with personal counselling for parents of infants on safety behaviours to be taken to the homes for their child [7-9]. In a process-evaluation it was found that majority of parents experience the new internet-based, tailored safety information as useful and applicable and that the CHC professionals are enthusiastic about the E-health module [8]. However there are no insights in the effects of the new internet-based, tailored safety information on parents' child safety behaviours compared to the current way of safety education.

Objectives

The objective of this study is to evaluate the effect of online, internet-based, tailored safety information combined with personal counselling on parents' child safety behaviours. Additionally a process evaluation will be conducted to provide insight in the feasibility of the intervention. In this article the design of the study is described.

Study hypothesis

The hypothesis of the study is that, after follow-up, parents of the intervention group show more safety behaviours regarding the prevention of falls, poisoning, drowning and burns compared to the control group. Furthermore we hypothesize that, determinants of safe behaviour, i.e. severity and self-efficacy positively improve in the intervention group [10-14].

METHODS/DESIGN

Study design

The study design is a randomized controlled trial (RCT), with a baseline measure point prior to the intervention and a follow-up measure point six months after the intervention. The course of the study with the specific items at each time point is described in Table 6.1.

Table 6.1 Course of the BeSAFE study

Age of the child	Intervention-group	Control-group
5-8 months	- Informing parents about the study - Request for participation (max. 2 reminders) - Information letter - Information folder - Questionnaire	- Informing parents about the study - Request for participation (max. 2 reminders) - Information letter - Information folder - Questionnaire
5-8 months	- Parents log in on the website - Parents provide informed consent - Parents complete the **Baseline Questionnaire**	- Parents log in on the website - Parents provide informed consent - Parents complete the **Baseline Questionnaire**
	Randomization in intervention or control group	
10 months	Parents are invited through e-mail to complete the **online, internet-based, tailored safety information questionnaire** (max. 2 reminders)	
11 months	**Well-child visit** - Personal counselling to discuss the **internet-based, tailored safety information and implementation-intention plan** - Complete process-evaluation form by parents - Complete process-evaluation form by child health care professional	**Well-child visit** - Usual Care: Safety Information Leaflets
12 months	Repeating the **internet-based, tailored safety information and implementation intention**, send to the parent by e-mail	
17 months	**Follow-up questionnaire** Follow up questionnaire send to the parent (max. 2 reminders)	**Follow-up questionnaire** Follow up questionnaire send to the parent (max. 2 reminders)

Parents are individually randomized in an intervention group or a control group, according to a computerized random allocation generator. Parents had an equal probability of assignment to the groups. Parents of the intervention group receive internet-based, tailored safety information concerning the prevention of falls, poisoning, drowning and burns, combined with personal counselling at the CHC. Parents of the control group receive 'care as usual', personal counselling at the CHC using the Safety Information Leaflets (children 12-24 months old) of the Consumer Safety Institute in the Netherlands, concerning the same four safety topics.

Data collection started in 2009 and will continue until 2011. This study is approved by the Medical Ethics Committee of Erasmus MC (MEC-2008-370).

Study procedure and participants

Parents who are eligible for the regular well-child visit with their child at child age 7.5 months receive written information about the study and are invited to provide informed consent to participate in the study. All parents receive a singular, personal code to log in at the website of the study (www.besafe-onderzoek.nl). In 2009, 90% of all households in the Netherlands had access to the internet [15]. At the study website parents can find more information about the study and they can complete the questionnaires.

Youth health care organisations and Child Health Clinic teams

Managers of an opportunity sample of 26 youth health care (YHC) organisations in the Netherlands were informed about the study and were contacted by the researchers to provide further information. Five YHC organisations in the provinces of Zuid-Holland, Noord-Brabant and Zeeland volunteered to participate in the study, with a total of 30 CHC teams. These teams cover both urban and rural regions in the Netherlands. Prior to the start of the study, the researchers arranged meetings to explain the procedure of the study and to instruct the participating CHC professionals.

Children and their parents or caregivers

The study population consists of parents or caregivers of toddlers (one per family). They are included in the study when their child is 5-8 months old and measurements continue until the child is circa 17 months old. Parents of children in the age range of this study have a high attendance percentage (90%) at Child Health Clinics [15]. Only parents who understand the Dutch language and have access to the internet are eligible to be included in the study. The study design and participant flow are shown in Figure 6.1.

Intervention

The BeSAFE intervention aims at 4 major topics on safety in and around the home of children aged 12 to 24 months; prevention of falls, poisoning, drowning and burns [5, 8, 16-22]. The different components of the safety topics of the intervention can be found in Table 6.2.

The intervention is based on the social ecological model, where safety and health are influenced by a combination of environment (in and around the home) and personal factors (the parents) and the interaction between them [23]. Parents are the most important mediators of the environment of these young and vulnerable children. Parents influence both the physical environment as the social environment of the child, medi-

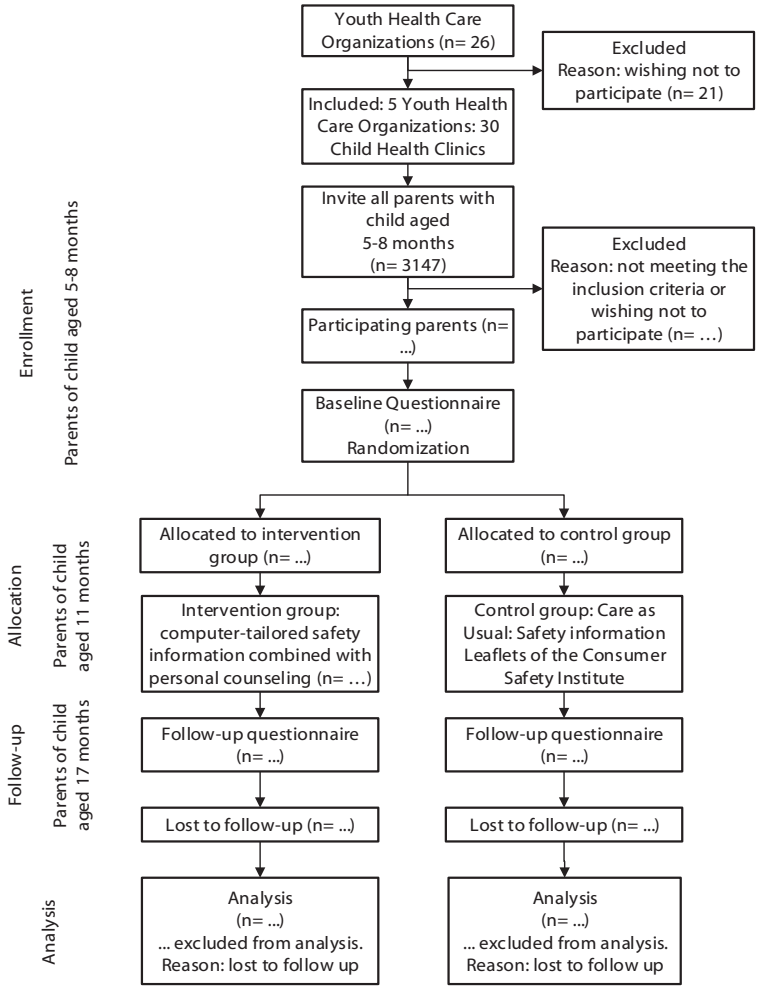

Figure 6.1 Flow chart of the participants and allocation through the trial.

ated by the parenting style and specific parenting practices [24-27]. Therefore interventions should be aimed at the parents to guarantee the safety and health of the young child. Determinants of parents' behaviours can be found in the Protection Motivation Theory (PMT) and the theory of planned behaviour and includes severity, vulnerability, response efficacy, self-efficacy and intentions [10, 12-14].

The BeSAFE intervention consists of internet-based, tailored safety information combined with personal counselling at the CHC. The BeSAFE intervention module consists of a questionnaire assessing ten specific parents' child safety behaviours in the prevention of falls, poisoning, drowning and burns and determinants of safety behaviour (intentions, possible barriers and self-efficacy); a library of safety messages; and algorithm

Table 6.2 Safety advices of the intervention based on safety behaviour in and around the home

Safety behaviour concerning the prevention of	Applicable if:	Reinforcement or NO information when:
Falling		
- Stair gate	- The house has a staircase which the child can reach	- A stair gate is present en is being used at all times
- Balcony	- The house has a balcony	- The child is never left alone on the balcony
Poisoning		
- Cleaning products	- Always	- Stored in a closet with a lock or higher than 1.50 meters
- Medicines	- Always	- Stored in a closet with a lock or higher than 1.50 meters
Drowning		
- Bath tub	- The child takes a bath	- Never left alone in the bath tub
- Swimming pool	- The child swims in the swimming pool	- Never left alone in the swimming pool
- Pond	- There is a pond in the garden	- Always the information to fill up the pond
Burns		
- Thermostat-controlled tap	- Always	- Thermostat-controlled tap present
- Hot drinks	- Always	- Child never on parents lap when drinking hot drinks
- Kitchen	- Always	- Child never in the kitchen when cooking

to compose tailored health information for the parent [28]. Parents who give informed consent and fill in the baseline questionnaire receive an e-mail, when their child is about 10 months old, inviting them to participate in the BeSAFE intervention. As a first step parents complete a questionnaire, which is used to generate an online tailored safety advice. When parents have read their personal advice, they are invited to devise and inscribe an implementation intention. In this implementation intention parents plan specific actions for improving their safety behaviour and implementing them in their home situation at a specified time [29, 30]. It consists of three parts, i.e. what, when and where. The safety information and implementation intention of each parent will be sent by e-mail to both the parent and the CHC professional, in order to prepare them for the well-child visit at 11 months. At the well-child visit the CHC professional will discuss the safety information and the implementation intention with the parent, using the techniques of motivational interviewing (MI). Motivational interviewing is believed to represent a brief and effective method for addressing behaviour change. Positive attitudes and experienced barriers of the parents are discussed in order to improve parents' child safety behaviours. One aspect of this motivational interviewing is giving attention to transforming positive intention into real behaviour [29-31]. CHC professionals were trained to apply motivational interviewing. Approximately four weeks after the well-child visit parents receive a reminder of their safety information and the implementation intention in order to strengthen the message.

Control

The control group will receive care us usual; i.e. parents receive a Safety Information Leaflet (for children aged 12-24 months) of the Consumer Safety Institute during their

CHC visit at the child age of approximately 11 months [6, 21, 22, 32]. The Safety Information Leaflets contain relevant information about the prevention of injuries of toddlers in and around the home, divided in general information and safety advices about the prevention of falls (i.e. window protection, stair gates, practice walking down the stairs), poisoning (i.e. safe storage of cleaning products and medicines), drowning (i.e. ponds) and burns (i.e. hot fluids, hot pans) [22].

Measurements

Primary outcome measures

The primary outcomes of the study are parents' child safety behaviours measured at the child's age of 17 months, regarding the prevention of falls, poisoning, drowning and burns, i.e. presence and use of stair gates, never leaving the child alone on the balcony, safe storage of cleaning products and medicines, never leaving the child alone in the bathtub, safety of a swimming pool or a pond in the garden, thermostat controlled taps, drinking hot fluids while the child is on the parent's lap and keeping the child out of the kitchen while the parents is cooking. In the questionnaires parents are asked which safety behaviours they take in their homes. Some behaviour is only assessed when they are applicable to the situation of the parent. For example, when there are no stairs in the homes, no questions about installing stair gates will be asked.

Presence of safety measures, i.e. stair gate or thermostatic controlled taps is defined as present/not present. Safety behaviour, i.e. closing the stair gate, storing cleaning products after use and drinking hot fluids with a child on parent's lap is scored on a five-point scale from 'never' to 'always'.

Secondary outcome measures

The secondary outcomes are the determinants of the above mentioned parents' child safety behaviours, i.e. severity, vulnerability, response efficacy, self-efficacy and intentions. Secondary outcomes, except intentions, are measured on five-point Likert scales. Severity is measured with one item per safety measure, asking how seriously they perceived the consequences of this event (from not serious at all to very serious). Vulnerability is measured by asking respondents their perception of their child's risk of an unintentional injury on each specific subject (from low risk to high risk). Response efficacy is assessed by asking how helpful parents perceived the specific behaviour to be for preventing an injury (from very helpful to not very helpful). Self-efficacy is measured by asking parents how difficult or easy they perceive taking the safety measures to be (from very easy to very difficult). Intentions are assessed by asking whether the parent intends to take the specific safety measure. Answers to be given are yes, within one month; yes, within one to six months, yes, but not within six months; or no intention.

Baseline questionnaire

The baseline questionnaire, completed at child age of circa 7.5 months, consists of questions on pregnancy, birth, gender, ethnicity of the child and the parents, educational level of the parents, household and family composition, the ten specific parents' child safety behaviours (presence and use of stair gates, never leaving the child alone on the balcony, safe storage of cleaning products and medicines, never leaving the child alone in the bathtub, safety of a swimming pool or a pond in the garden, thermostat controlled taps, drinking hot fluids while the child is on the parent's lap and keeping the child out of the kitchen while the parents is cooking) and the determinants of these safety behaviours (severity, vulnerability, response efficacy, self-efficacy and intentions).

Follow-up questionnaire

When the child is approximately 17 months old, 6 months after the intervention, all participating parents will receive a follow-up questionnaire. This questionnaire contains the same items on safety behaviours and the determinants of these safety behaviours.

Process-evaluation

In addition to the effect-evaluation a process-evaluation will be carried out. All parents who use the BeSAFE intervention module are asked to answer a few evaluating questions about the programme, i.e. which part of the advice parents have read, what their opinion is about the advice, do parents intend to change anything in their behaviour after reading the advice and what they think about the time they needed to complete the module. All parents in the intervention group and CHC professionals who provide the intervention will be asked to complete a process-evaluation form after the well-child visit at 11 months where the tailored safety information is discussed. It consists of questions regarding the feasibility of the intervention within the well-child visit, the perceived usefulness of the intervention and the discussed items during the well-child visit.

Power of the study

We will calculate sum scores of parents' child safety behaviours (0-10 points) of all participating parents, at follow-up as well as at baseline. Power calculations showed that a total number of 1200 parents are needed to detect a difference of 0.34 points between intervention and control group, assuming a mean score of 3.5 points and a standard deviation of 1.7 points, with a power of 0.80 and alpha 0.05. Assuming a participation of 50% and a loss-to-follow-up of 30%, we will have complete data at follow-up from 840 parents (420 in both the intervention and control group).

Considering the dichotomous outcome measures of 'stair gate present' we assume an unsafe situation in 30% of families in the control group [8]. A difference of 9% between the percentages unsafe families of the intervention group and the control group can be shown (21% in the intervention group, 30% in the control group). Considering the dichotomous outcome measures of 'safe storage of cleaning products' we assume an unsafe situation in 20% of families in the control group [33]. A difference of 8% between the percentages unsafe families of the intervention group and the control group can be shown (12% in the intervention group, 20% in the control group).

Statistical analyses

Statistical analyses are performed using SPSS 16.0 (SPSS Inc., Chicago, IL.). Descriptive statistics are used to describe parents and child characteristics and variable scores (behaviours) for the intervention and control group at baseline and follow-up.

Effect-evaluation

The aim of the study is to assess the effect of internet-based, tailored safety information combined with personal counselling on parents' child safety behaviours. An intention-to-treat analysis will be applied [34]. Regression analysis will be used to evaluate continuous outcome (sum scores) variables, with group (intervention or control group) as independent variable and the baseline values as covariates. Logistic regression analysis will be performed for the evaluation of dichotomous outcomes. Additionally effect modification by composition of the family (one versus two children), educational level and ethnicity of the parents will be explored.

Process-evaluation

In addition to the effect-evaluation a process-evaluation will be carried out. Adherence of both the CHC professionals and parents to the different elements of the BeSAFE intervention will be evaluated [35].

DISCUSSION

This article describes the design of a randomised controlled trial regarding the BeSAFE intervention intended to promote parents' child safety behaviours. The study evaluates the effect of internet-based, tailored safety information combined with personal counselling on parents' child safety behaviours. We want to look at parents' child safety behaviours and want to compare these behaviours between the intervention and the control group. The new elements which are applied in the intervention group include a tailored safety advice for the parent, an implementation intention filled in by the parent

and the discussion of this advice and implementation intention by the CHC professional with the parents using the techniques of motivational interviewing.

It is hypothesized that after 6 months of follow-up, parents in the intervention group show more child safety behaviour regarding the prevention of falls, poisoning, drowning and burns. Differences between subgroups (ethnicity and socio-economic status) regarding the effects of the intervention will be explored.

Strengths of the study are the power of the study, the randomized controlled design, and providing the intervention in daily practice of the CHC, which have a high attendance. The follow-up at 6 months allows investigating the effect of the intervention within an appropriate time schedule in the development of the child. Regarding the generalizability of the study results there can be noticed that it is a randomized controlled study conducted in the practice setting. The intervention is applicable in daily practice of the CHC professional, which will facilitate the implementation of the internet-based, tailored safety information if it is found effective. The data will be collected in both rural and urban areas of the Netherlands, resulting in higher generalizability.

Because the study relies on self-report by parents, misclassification might occur. Parents might give socially desirable answers by overstating their safety behaviours. A limitation of the study to be addressed includes the questionnaire and intervention being available in Dutch only. For this reason it is likely that only parents who master the Dutch language will participate in the study.

In conclusion, this study evaluates the effect of internet-based, tailored safety for parents of young children, combined with personal counselling at the Child Health Clinic.

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Study website

www.besafe-onderzoek.nl

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Chapter 7

Effectiveness of Web-based, tailored safety advice on psychosocial correlates associated with parents' child safety behaviours

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Submitted

Chapter 8

Effectiveness of Web-based, tailored advice on parents' child safety behaviours: a randomized controlled trial

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ABSTRACT

Introduction

Injuries at home are a major cause of death, disability and loss of quality of life among young children. Despite current safety education, required safety behaviour of parents is often lacking. To prevent various childhood disorders, the application of Web-based tools has increased the effectiveness of health promotion efforts. Therefore, an intervention with Web-based, tailored safety advice combined with personal counselling (E-health4Uth home safety) was developed and applied. The objective was to evaluate the effect of E-health4Uth home safety on parents' safety behaviours with regard to the prevention of falls, poisoning, drowning and burns.

Methods

A randomized controlled trial was conducted (2009-2011) among parents visiting well-baby clinics in the Netherlands. Parents were randomly assigned to: 1) Web-based, tailored safety advice combined with personal counselling (E-health4Uth home safety intervention), or 2) usual care, i.e. counselling with generic written safety information leaflets (control condition). Parents in the intervention condition completed a Web-based safety behaviour assessment questionnaire, resulting in tailored safety advice which was discussed with their child healthcare professional at the well-child visit (around 11 months of age). Parents in the control condition received counselling using generic safety information leaflets at the well-child visit (around 11 months of age). Parents' child safety behaviours were derived from self-report questionnaires at baseline (7 months of age) and at follow-up (17 months of age). Each specific safety behaviour was classified as safe/unsafe, and a total risk score was calculated. Logistic and linear regression analyses were used to reveal differences in safety behaviour between the intervention and the control condition at follow-up.

Results

A total of 1292 parents (response rate 44.8%) were analysed. At follow-up, parents in the intervention condition (n= 643) showed significantly less unsafe behaviour compared to parents in the control condition (n= 649) with regard to the safety topics: top of staircase (23.9% vs. 32.2%; OR 0.65, 95% CI 0.50-0.85); bottom of stair case (63.5% vs. 71.9%; OR 0.69, 95% CI 0.53-0.88); top and bottom of staircase (68.9% vs. 78.3%; OR 0.62, 95% CI 0.48-0.81); storage of cleaning products (30.3% vs. 39.9%; OR 0.67, 95% CI 0.53-0.85); bathing of the child (23.5% vs. 32.2%; OR 0.65, 95% CI 0.51-0.84); drinking hot fluids (34.8% vs. 41.7%; OR 0.76, 95% CI 0.61-0.96); and using rear hotplates (79.3% vs. 85.3%; OR 0.67, 95% CI 0.50-0.90); and with regard to the total risk score [mean 13.6 (SD 6.1 vs. 15.3 (SD 6.1); beta -1.59, 95% CI -2.26;-0.93] (higher score indicating more unsafe be-

haviour). There were no significant differences with regard to other specific behaviours between the two study conditions.

Discussion

Compared to generic written materials, the E-health4Uth home safety intervention seems more effective in promoting parents' safety behaviour with regard to safe staircases, storage of cleaning products, bathing, drinking hot fluids, and cooking. This study supports the application of Web-based, tailored safety advice for the prevention of unintentional injuries in the youth healthcare setting.

INTRODUCTION

Unintentional injuries are a major cause of death, and a major source of morbidity and loss of quality of life, among children aged 0-4 years [1-3]. In children aged ≤ 5 years, over 90% of unintentional injuries occur in and around the home [1]. Although the type and cause of injury vary by age, the most common injuries of children aged 0-4 years are falls, poisoning, drowning and burns [1]. In the Netherlands, each year 18 children aged 0-4 years die due to injuries in/around the home [4]. Moreover, an additional 46,000 children aged 0-4 years are medically treated because of home injuries [4]. To reduce the number of injuries, the Dutch Consumer Safety Institute introduced the use of safety information leaflets at preventive youth healthcare centres to provide safety education for parents of children aged 0-4 years [5]. These leaflets are successfully employed in preventive youth healthcare and appear to have a modest effect on parental behaviour [6, 7]. Many countries have installed preventive youth healthcare, which refers to various activities to improve and protect the health, growth and development of young people, and to prevent illness and disability in early life. These activities include a system of maternal and child healthcare, which serves children from birth to age 18 years [8, 9].

In the Netherlands, all parents are invited to regularly attend (free of charge) scheduled well-child visits at their well-baby clinic. During these visits, the growth and development of the child is monitored and relevant health information and vaccinations are provided. In the Netherlands, about 93% of parents attend one or more well-child visits when their child is aged ≤ 4 years; the attendance rates range from about 50-93% between the specific age-related scheduled visits [10]. Parents receive health information on various topics, including nutrition, growth and child home safety [11]. Currently, this safety information is provided to parents using generic information leaflets which they receive at their regular visits to the well-baby clinic. Nevertheless, the required safety behaviour of parents is often lacking, causing unnecessary risk of injury of young children [12-14].

To prevent other childhood disorders, the application of Web-based, tailored tools (E-health) has increased the effectiveness of health promotion effects [15-17]. E-health is a broad, emerging field at the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies [18]. It involves the use of information and communications (especially the Internet) to improve or enable health and healthcare [19]. E-health could be used to provide information for parents on several health topics, including home safety. Because tailored information combined with counselling, which can be provided by using E-Health, is based on the personal situation, parents could find the information more useful than general information materials [20]. Furthermore parents could be inclined to change their behaviour, when the information they receive is perceived as personally relevant [21, 22].

An E-health4Uth home safety intervention with Web-based, tailored safety information was developed and applied. This concerns Web-based, tailored safety information in combination with personal counselling at well-baby clinics on safety behaviours required for their child at home. A pilot study showed that most parents found this new internet-based, tailored safety information to be useful and applicable, and that the child healthcare professionals are enthusiastic about the E-health intervention [23]. However, no information is available about the effects of the new internet-based, tailored safety information on parents' child safety behaviours compared to the older method of safety education. Tailored information is thought to promote behaviour change by providing personally-relevant feedback. Tailoring is defined as '*any combination of information or change strategies intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and have been derived from an individual assessment*' [24]. Although (online) computer-tailored interventions seem to have a positive effect on adult behaviours compared to generic information or no information [14, 25], there is no evidence for the efficacy of a tailored intervention on specific parents' child safety behaviour in the prevention of unintentional injuries.

Objective of the study

This study evaluates the effect of Web-based, tailored safety information combined with personal counselling on parents' child safety behaviours with regard to the prevention of falls, poisoning, drowning and burns. The hypothesis is that parents in the E-health4Uth home safety intervention condition will show less unsafe behaviour and will have a lower total risk score 6 months post-intervention, compared to parents in the control condition with usual care. In addition, the use and application of the E-health4Uth home safety module and the well-child visit, including the use of the tailored safety advice, were evaluated.

METHODS

Study design

The 'E-health4Uth home safety' study (BeSAFE study) is a randomized controlled trial with a baseline measure point prior to the intervention and a follow-up measure point 6 months after the intervention; the study is described in detail elsewhere [26]. The Medical Ethics Committee of the Erasmus Medical Center gave a 'declaration of no objection' for this study (MEC-2008-370).

Participants and procedures

A flow diagram of the enrolment and follow-up of study participants is schematically described in Figure 8.1. Managers of an opportunity sample of 26 youth healthcare organizations in the Netherlands were informed about the study and invited to participate. Five youth healthcare organizations in the mixed urban-rural provinces of Zuid-Holland, Noord-Brabant and Zeeland volunteered to participate, with a total of 30 well-baby clinics.

All parents with a child aged 5-8 months (one parent per family) who were eligible for a routine well-child visit at their well-baby clinic from June 2009 until December 2010 received written information about the study and were invited to provide informed consent to participate (n= 3147). Parents who provided informed consent were invited to complete the baseline questionnaire. Subsequently, parents were randomly assigned to one of two conditions: 1) Web-based, tailored safety advice module combined with discussion of the tailored safety advice at the well-child visit (E-health4Uth home safety intervention condition), or 2) care as usual, i.e. receiving a generic written safety information leaflet at the well-child visit (control condition). Randomization was done using a computerized random allocation generator.

Parents in the intervention condition were invited to complete the E-health4Uth home safety module when their child was around 10 months old, i.e. one month before their routine well-child visit at the well-baby clinic (the intervention is described in detail in the following section). Parents in the control condition also visited their well-baby clinic when their child was around 11 months of age (see Control condition below).

All parents received a follow-up questionnaire when their child was around 17 months old (6 months post-intervention). The baseline and follow-up data were collected from June 2009 until July 2011.

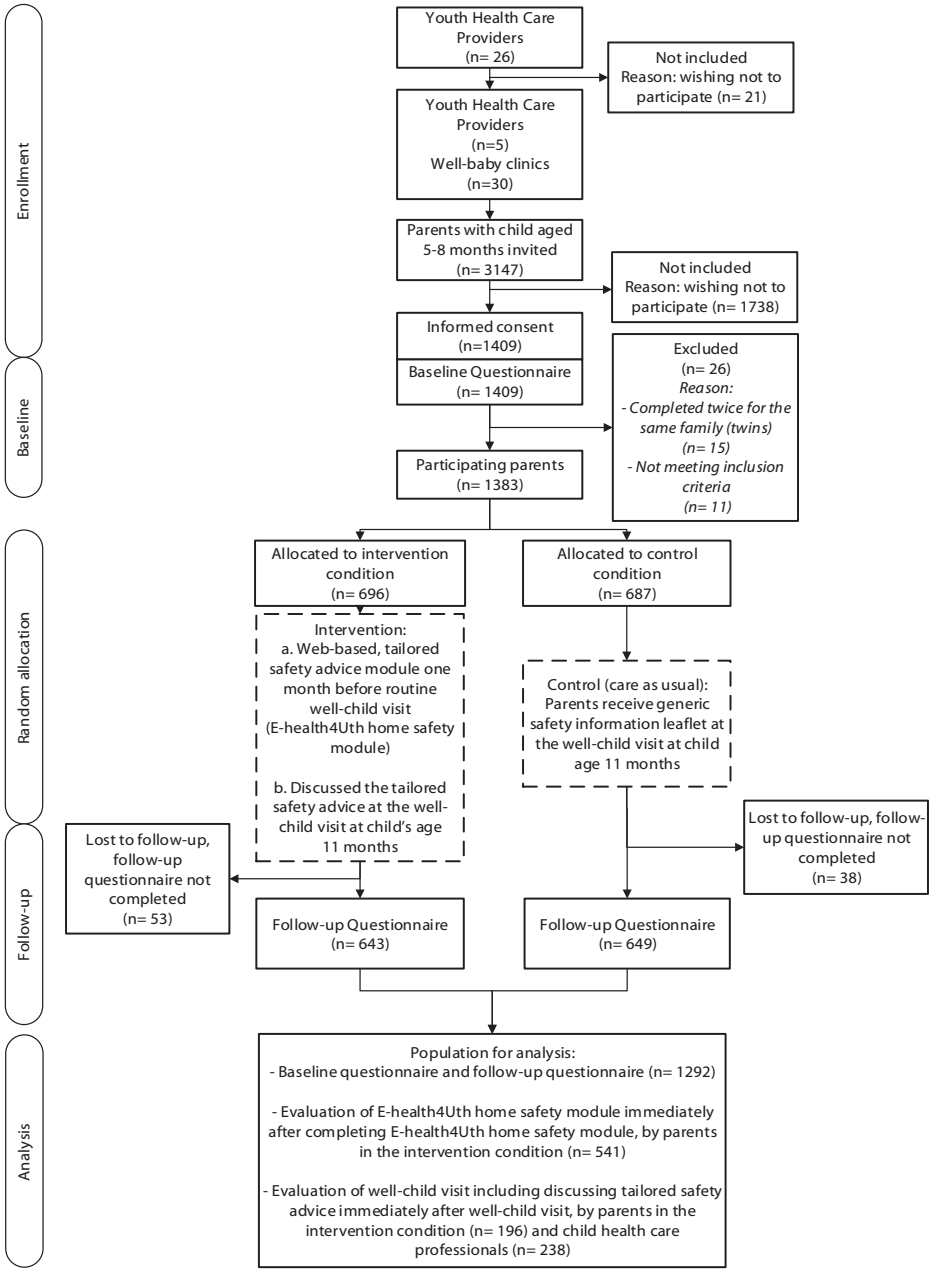

Figure 8.1 Flow diagram of the enrolment and follow-up of study participants.

Parents received a maximum of two reminders for completing the questionnaires. Parents who did not respond to the invitations to complete the follow-up questionnaire received a telephone call to motivate them to complete the intervention or the ques-

tionnaire. Parents in the intervention condition received a maximum of two reminders to complete the E-health4Uth home safety module. If they did not respond, they received a telephone call to motivate them to complete the E-health4Uth home safety module. Parents in both conditions who completed the baseline questionnaire received a gift voucher of € 15. Parents who also completed the follow-up questionnaire received a (second) gift voucher of € 10.

E-health4Uth home safety intervention condition

The E-health4Uth home safety intervention aims at four major topics with regard to safety in/around the home of children aged 12-24 months, i.e. prevention of falls, poisoning, drowning and burns [5, 6, 14, 27-31]. The components of the four safety topics of the intervention are shown in Appendix 8.1.

Parents allocated to the E-health4Uth home safety intervention condition received a personal login name and password by e-mail, when their child was around 10 months old. Parents were asked to complete the E-health4Uth home safety module before their next routine well-child visit at around 11 months of age. Parents could complete the E-health4Uth home safety module wherever they wished (e.g. at home, at work, etc.) as long as internet was available. As a first step, parents completed a safety assessment questionnaire. The answers to this assessment questionnaire were used to generate a Web-based, tailored safety advice, which parents could read immediately online. The tailored safety advice was personalized with the child's name, and consisted of messages tailored to the parent's current situation and safety behaviour (Multimedia Appendices 8.2, 8.3, and 8.4). This included sections with general information on the importance and relevance of the injury area. A total of 114 messages, which could be combined in various ways based on the parent's answers to the assessment questionnaire, were developed for this tailored safety advice.

When parents had completed reading their personal safety advice, they were invited to formulate an implementation-intention plan. In this implementation-intention plan, parents planned specific actions, i.e. what, when and where, to improve their safety behaviour and implement these in their home situation at a specified time [32, 33].

The tailored safety advice and implementation-intention plan of each parent was sent by e-mail to both the parent and the child healthcare professional, to prepare for the routine well-child visit at age 11 months. At the well-child visit, the child healthcare professional discussed the tailored safety advice and the implementation-intention plan with the parent, using motivational interviewing techniques [32-34]. Preceding the start of the study, healthcare professionals received a training from the researchers. In this

training the study was explained and examples of the tailored safety advice were used to give instructions on how the intervention should be delivered, in order to ensure integrity of delivery of the tailored safety advice. Parents in the intervention condition received the E-health4Uth home safety intervention, but could also receive the generic safety information leaflet, as a part of usual care.

About 4 weeks after the well-child visit, parents received a reminder about their tailored safety advice and the implementation-intention plan by e-mail, to strengthen the message.

The content and development of the E-health4Uth home safety module was not changed during the study. Intervention software (TailorBuilder) was developed by OverNite Software Europe (OSE, Sittard, the Netherlands).

Control condition

Parents in the control condition received 'care as usual'; i.e. parents received a generic safety information leaflet (for children aged 12-24 months) published by the Dutch Consumer Safety Institute [5, 7, 8, 31] during their routine well-child visit at around 11 months of age. During this well-child visit, the child healthcare professional discussed the safety in and around the home with the parents, using the generic safety information leaflet and motivated parents to adopt safety measures in their home.

The safety information leaflet contained relevant information on the prevention of injuries of toddlers in/around the home, i.e. information on safety and advice about the prevention of falls (i.e. window protection, stair gates, practice walking down the stairs), poisoning (i.e. safe storage of cleaning products and medicines), drowning (i.e. ponds) and burns (i.e. hot fluids, hot pans) [5].

Outcomes/measures

Data on demographic factors and parents' child safety behaviours were collected at enrolment at about 7 months of age (baseline), and 6 months post-intervention at around 17 months of age (follow-up), by self-report questionnaires.

Parents' child safety behaviours

In the two study conditions, specific parents' child safety behaviours with regard to the prevention of falls, poisoning, drowning and burns, were assessed. Some behaviours were assessed only when they were applicable to the situation of the parent. Each specific safety behaviour was first classified as being safe or unsafe. Both the E-health4Uth

home safety intervention and the generic safety information leaflet covered the same topics with regard to the prevention of falls, burns, drowning and poisoning.

Prevention of falls was assessed with regard to the safety of staircases (only when a staircase was present) and window safety (only when a window a child could reach was present). Safety of staircases was assessed with 4 items; presence of a stair gate on the top of the stairs (yes/no); closing a stair gate on the top of the stairs (always/often/sometimes/rarely/never); presence of a stair gate on the bottom of the stairs (yes/no); and closing a stair gate on the bottom of the stairs (always/often/sometimes/rarely/never). Safe behaviour of the top of the staircase was defined as having a stair gate at the top of the staircase and always closing the stair gate. Safe behaviour of the bottom of the staircase was defined as having a stair gate at the bottom of the staircase and always closing the stair gate. Additionally, safe behaviour regarding the top/bottom of the staircase was defined as having a stair gate at the top/bottom of the staircase and always closing the stair gates. Safety of windows was assessed with one item, i.e. having window guards on windows a child can reach (yes/no). Safe behaviour was defined as having a window guard on windows a child can reach.

Prevention of poisonings was assessed with regard to the storage of cleaning products and medicines. Storage of cleaning products was assessed with 12 items, i.e. presence of cleaning products at different storage locations (yes/no). Safe storage of cleaning products was defined as storing it on a shelf, drawer or cabinet without a lock higher than 1.50 m, or storing it in a drawer or cabinet with lock. Storage of medicines was assessed with 13 items, i.e. presence of medicines at different storage locations (yes/no). Safe storage of medicines was defined as storing it on a shelf, drawer or cabinet without a lock higher than 1.50 m, or storing it in a drawer or cabinet with lock.

Prevention of drowning was assessed with regard to bathing (only if the child was bathed), safety around ponds (only if a pond was present), safety around private swimming pools (only if a swimming pool was present) and swimming (only if the child swims). Safety of bathing was assessed with one item, i.e. how often the child is left unsupervised in the bathtub, even for a short period (very often/often/sometimes/rarely/never). Safe bathing was defined as never leaving the child unsupervised in the bathtub. Safety of a pond was assessed with one item, i.e. presence of a fence around the pond (yes, fence higher than 1.20 m/yes, fence lower than 1.20 m/no). A safe pond was defined as having a fence higher than 1.20 m around the pond. Safety of a private swimming pool was assessed with one item, i.e. presence of a fence around the swimming pool (yes, fence higher than 1.20 m/yes, fence lower than 1.20 m/no). A safe private swimming pool was defined as having a fence higher than 1.20 m around the swimming pool. Swimming was assessed

with two items; whether the child wears a flotation device (always/often/sometimes/rarely/never) and how often the child is left alone in the swimming pool (very often/often/sometimes/rarely/never). Safe swimming was defined as the child always wears a flotation device in the swimming pool and is never left alone in the swimming pool (either a private swimming pool or a small (inflatable) swimming pool).

Prevention of burns was assessed with regard to hot water safety in bath and shower (depending on what is present in the home), drinking hot fluids with child on parent's lap, safety during cooking. Presence of thermostatic-controlled taps was assessed with two items, i.e. does your hot water tap in the bath have a thermostatic-controlled tap (yes/no) and does your hot water tap in the shower have a thermostatic-controlled tap (yes/no). Safe hot water taps in bath/shower was defined as having a thermostatic-controlled tap present. Drinking hot fluids was assessed with one item, i.e. how often the parent drinks hot fluids with the child on their lap (always/often/sometimes/rarely/never). Safe drinking of hot fluids was defined as never drinking hot fluid with their child on their lap. Safe cooking was assessed with four items; presence of a stove guard (yes/no); child present in the kitchen during cooking (always/often/sometimes/rarely/never); use of rear hotplates during cooking (always/often/sometimes/rarely/never); and turning panhandles away during cooking (always/often/sometimes/rarely/never). Safe cooking was defined as a stove guard present, the child never in the kitchen during cooking, always using rear hotplates during cooking; or always turning panhandles away during cooking.

Subsequently, a total risk score was calculated for each parent by summing each specific parent's safety behaviour for the four topics assessed (according to allocated scores shown in Appendix 8.5). A higher score indicates more unsafe behaviour. When a situation was not applicable, a score of 'zero' was assigned. A maximum score of 53 points could be obtained. The individual scores of the total risk score were based on previous literature [14] and expert consultation (Consumer Safety Institute, the Netherlands).

Demographic factors

Parents' gender, age, educational level, employment status and ethnicity were assessed in the baseline questionnaire. Educational level was categorized as 'high', 'intermediate', and 'low'; high level being defined as higher professional education or academic higher education; intermediate level as senior secondary vocational education, senior general secondary education or university preparatory education; low educational level being defined as preparatory secondary vocational education or lower [35]. Employment status was defined as 'unemployed' if they had neither a part-time or full-time job. Parents' ethnicity was determined based on their own parents' country of birth (grandparents

of the infant). A parent was of Dutch ethnicity if both grandparents were born in the Netherlands; if one of the grandparents was born in another Western country, a parent was of other Western ethnicity. If both grandparents were born in another Western or non-Western country, ethnicity was determined by the grandmother's country of birth [35].

Furthermore, family situation, number of children, child's gender, age and ability to crawl or walk were reported. Family situation was defined as single parent, or living with child or children and other parent or caregiver. Number of children in the family was dichotomized as first child in the family, and second child or more children in the family. Crawling of the child was assessed and defined as an infant's ability to: 'crawl on hands and knees and/or crawl on their tummy and/or shuffle on their bottom' (yes/no).

Evaluation of the E-health4Uth home safety module, immediately after completing the module, by parents in the intervention condition

Parents in the E-health4Uth home safety intervention were asked to evaluate the E-health4Uth home safety intervention module. Unless stated otherwise, all evaluation items were assessed on a 5-point Likert scale ranging from 'totally disagree' (1) to 'totally agree' (5).

An objective measure of parents' exposure to the intervention was obtained from the login data from the intervention registration, which stores information on parents' use of the intervention, including receiving the tailored safety advice and completion of an implementation-intention plan.

Parents' evaluation of the E-health4Uth home safety intervention was assessed immediately after receiving the tailored safety advice and formulating an implementation-intention plan, using a Web-based evaluation form. Parents reported the following items on the evaluation forms: the reading of the Web-based tailored safety advice (read completely, read partly, or did not read their advice); whether they found the advice to be reliable, understandable, relevant, useful and motivating to take action; their intention to change behaviour with regard to falls, poisoning, drowning and burns (yes/no); whether it was easy or difficult to complete an implementation-intention plan (from very difficult to very easy); time needed to answer the questions and read the safety advice (in minutes); whether they perceive this time to be long or short (from very long to very short); the ease of use of the E-health4Uth home safety intervention (from very difficult to very easy); and whether they perceived it as being a pleasant source of information (from very unpleasant to very pleasant). Furthermore they rated the E-health4Uth home safety intervention on a scale from 1 (most negative) to 10 (most positive).

Evaluation of the well-child visit including discussing the tailored safety advice, immediately after the well-child visit, by parents and child healthcare professionals in the intervention condition

Parents and child healthcare professionals in the E-health4Uth home safety intervention were asked to evaluate the well-child visit, including the discussion of the tailored safety advice, immediately after the well-child visit at around 11 months of age.

Parents reported their satisfaction with the information they discussed at the well-child visit; whether discussing the tailored safety advice was a valuable supplement to receiving tailored safety advice; the overall satisfaction with the well-child visit; and they rated the well-child visit on a scale from 1 (most-negative evaluation) to 10 (most-positive evaluation).

Child healthcare professionals reported the time they needed for the well-child visit (in minutes); the time needed to discuss the safety at home (in minutes); whether they gave a safety information leaflet to the parent (yes/no); whether the tailored safety advice was present in the child's dossier (yes/no); whether the tailored safety advice was brought to the well-child visit by the parent (yes/no); and whether the tailored safety advice was discussed with the parent during the well-child visit (yes/no). Furthermore, the evaluation assessed whether the tailored safety advice was useful to discuss safety at home during the well-child visit; the satisfaction with the information given; and the overall satisfaction with the well-child visit. Child healthcare professionals rated the well-child visit on a scale from 1 (most-negative evaluation) to 10 (most-positive evaluation).

Statistical analyses

An intention-to-treat analysis was applied [36]. Parents who were randomly assigned to either the intervention condition or the control condition were analysed as such, regardless of whether they received the intervention or not. Cases with complete data on outcomes at follow-up were analysed on the effectiveness of the intervention compared to the control condition.

Descriptive statistics were used to describe the characteristics of parents, children and housing in the two study conditions. Differences between the intervention and control condition, as measured at baseline, were tested with an independent samples t-test or the Mann-Whitney *U*-test (continuous variables) and Chi-square test (categorical variables).

Effect evaluation

The effectiveness of the E-health4Uth home safety intervention was studied by means of logistic regression analyses (for all specific safety behaviours) and linear regression analyses (for total risk score). Regression analyses were performed with unsafe behaviour of total risk score as dependent variable and condition (E-health4Uth home safety intervention condition vs. control condition) as independent variables. All regression analyses were adjusted for demographic factors that showed a significant difference between the two study conditions at baseline ($P< 0.05$).

Subsequently, it was determined whether the number of children, parents' educational level and parents' ethnicity moderated the effects of the E-health4Uth home safety intervention on unsafe behaviour. This was done by adding an interaction term (group*demographic factor) to the regression analysis. If these interaction terms were significant at $P< 0.05$, stratified analyses were conducted.

Results with a P-value ≤ 0.05 were considered to be statistically significant. All analyses were performed using SPSS 20.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Participants

A total of 1409 parents provided informed consent and completed the baseline questionnaire; response rate 44.8% (Figure 8.1). A total of 26 parents were excluded because they completed the questionnaire twice for the same family (one questionnaire was at random removed from the database), or they did not meet the inclusion criteria (child's age $\leq$ 12 months). After completing the baseline questionnaire, 696 parents were allocated to the E-health4Uth home safety condition and 687 parents to the control condition. A total of 1292 parents completed the follow-up questionnaire (drop-out rate 6.6%). Drop-out was higher among mothers with a low educational level, unemployed mothers, and parents of non-Western ethnicity ($P< 0.05$). No other differences were observed between parents who completed the follow-up questionnaire and parents who were lost to follow-up. A study population of 1292 parents and their child was used in the analyses.

Table 8.1 shows the family, child and housing characteristics of the participants in the two study conditions. Most participants were mothers (93.6%); mean age 32.1 (SD 4.6) years; 15.2% had a low educational level; 83.4% was employed; and 88.5% was of Dutch ethnicity. Father's mean age was 34.5 (SD 5.2) years; 22.4% had a low educational level;

Table 8.1 Descriptive characteristics of the study sample, as measured at baseline; intervention condition and control condition (n=1292)[a]

	Total	*Intervention condition*	*Control condition*	*P-value* [b]
[missing data]	n=1292	n=643	n=649	
Family characteristics				
Mother is respondent (%) [0]	93.6	92.8	94.3	.16
Mean mother's age (SD; range), years [20]	32.1 (4.6); 19-48	32.1 (4.6); 20-48	32.0 (4.7); 19-47	.92
Mean father's age (SD; range), years [20]	34.5 (5.2); 21-56	34.5 (5.1); 22-56	34.5 (5.2); 21-55	.96
Mother's educational level (%) [2]				.26
High	40.6	39.6	41.7	
Intermediate	44.2	43.6	44.8	
Low	15.2	16.8	13.6	
Father's educational level (%) [11]				.17
High	36.7	34.2	39.2	
Intermediate	40.9	42.2	39.6	
Low	22.4	23.6	21.2	
Mother is employed (%) [12]	83.4	80.3	86.6	**.002**
Father is employed [23]	95.7	94.9	96.4	.20
Mother's ethnicity (%) [1]				.67
Dutch	88.5	88.6	87.3	
Other Western	4.6	5.0	4.3	
Non-Western	6.9	6.4	7.4	
Father's ethnicity (%) [7]				.43
Dutch	87.9	88.6	87.3	
Other Western	5.1	5.3	4.8	
Non-Western	7.0	6.1	7.9	
Single parent (%) [2]	2.3	2.0	2.5	.58
First child in family (%) [0]	48.1	49.3	47.0	.41
Child characteristics				
Gender (% boys) [0]	51.3	49.3	53.3	.15
Mean age (SD; range), months [0]	7.2 (1.1); 4.7-11.6	7.3 (1.1); 4.7-11.6	7.2 (1.1); 4.8-11.5	.17
Child can crawl (%) [3]	34.0	35.9	32.0	.14
Child can walk (%) [2]	0.5	0.5	0.5	.99
Housing characteristics				
Main staircase present (%) [2]	87.5	87.7	87.3	.83
Windows a child can reach (%) [1]	37.0	37.5	35.3	.42
Pond present (%) [5]	11.1	11.4	10.7	72
Private swimming pool present (%) [4]	3.2	3.6	2.8	.42

[a] Participants with complete data available at baseline and follow-up

[b] Differences between intervention condition and control condition, as measured at baseline, tested with independent-samples t-test (continuous variables) and Chi-square test (categorical variables)

Note: Numbers printed **bold** indicate significant *P*-values

95.7% was employed; and 87.9% was of Dutch ethnicity. In the present study, 2.3% of families included a single parent; 48.1% had one child. Of all children, 51.3% were boys; mean age 7.2 (SD 1.1) months; 34.0% could crawl and 0.5% could walk. A main staircase

was present in 87.5% of the homes; 37.0% had a window a child could reach; 11.1% had a pond present; and 3.2% had a private swimming pool present in the home.

E-health4Uth home safety Intervention effects

Because the proportion of employed mothers (86.6%) was significantly higher in the control condition compared to those in the intervention condition (80.3%) ($P< 0.05$), regression analyses were adjusted for mother's employment status.

Concerning the prevention of falls, parents in the intervention condition showed significantly less unsafe behaviour at follow-up with regard to the top of the staircase (23.9% vs. 32.2%; OR 0.65, 95% CI 0.50-0.85); the bottom of the staircase (63.5% vs. 71.9%; OR 0.69, 95% CI 0.53-0.88); and the top and bottom of the staircase (68.9% vs. 78.3%; OR 0.62, 95% CI 0.48-0.81) compared to parents in the control condition (Table 8.2 and Table 8.3). Concerning the prevention of poisoning, parents in the intervention condition showed significantly less unsafe behaviour with regard to the storage of cleaning products (30.3% vs. 39.9%; OR 0.67, 95% CI 0.53-0.85) compared to parents in the control condition. Concerning the prevention of drowning, parents in the intervention condition showed significantly less unsafe behaviour with regard to bathing of the child (23.5% vs. 32.2%; OR 0.65, 95% CI 0.51-0.84) compared to parents in the control condition. Concerning the prevention of burns, parents in the intervention condition showed significantly less unsafe behaviour with regard to drinking hot fluids (34.8% vs. 41.7%; OR 0.76, 95% CI 0.61-0.96) and using rear hotplates on the stove (79.3% vs. 85.3%; OR 0.67, 95% CI 0.50-0.90) compared to parents in the control condition. There were no significant differences with regard to other specific behaviours between the two study conditions.

From baseline to follow-up, the prevalence of unsafe behaviour with regard to bathing of the child increased in both the intervention (5.7%-23.5%) and the control condition (6.3%-32.2%). Furthermore, from baseline to follow-up, the prevalence of unsafe behaviour with regard to children present in the kitchen increased in both the intervention (64.3%-91.2%) and the control condition (64.8%-93.2%). All other unsafe behaviours showed a decrease between baseline and follow-up.

At follow-up, parents in the intervention condition had a significantly lower total risk score [mean 13.6 (SD 6.1); range 1-33] compared to parents in the control condition [mean 15.3 (SD 6.1); range 0-37] (beta coefficient -1.59, 95% CI -2.26; -0.93).
Explorative interaction analyses showed no significant interactions between number of children, parents' educational level and parents' ethnicity, and the intervention and control condition on unsafe behaviour; therefore stratified analyses were not conducted.

Table 8.2 Descriptive statistics of parents' child safety behavior as measured at baseline and at follow-up; intervention and control condition (n= 1292)

		Baseline			*Follow-up*		
		Intervention condition n=643	*Control condition n=649*	*Difference between intervention condition and control condition at baseline*	*Intervention condition n=643*	*Control condition n=649*	*Difference between intervention condition and control condition at follow-up*
Behavior		*%*	*%*	*P-value* [c]	*%*	*%*	*P-value* [c]
Falls		n= 564	n= 565		n= 573	n= 581	
	Unsafe top of staircase [a]	72.3	72.1	.96	**23.9**	**32.2**	**.002**
	Unsafe bottom of staircase [a]	88.1	89.5	.46	**63.5**	**71.9**	**.002**
	Unsafe top and bottom of staircase [a]	90.4	91.7	.47	**68.9**	**78.3**	**< .001**
		n= 241	n= 229		n= 207	n= 197	
	Unsafe windows a child can reach [a]	57.7	54.6	.50	46.9	51.5	.35
Poisoning		n= 643	n= 649		n= 643	n= 649	
	Unsafe storage of cleaning products	60.2	62.0	.30	**30.3**	**39.9**	**.001**
	Unsafe storage of medicines	38.4	39.4	.90	30.0	34.2	.14
Drowning		n= 629	n= 637		n= 601	n= 619	
	Unsafe bathing of the child [a]	5.7	6.3	.68	**23.5**	**32.2**	**.001**
		n= 65	n= 62		n= 53	n= 53	
	Unsafe pond [a]	88.5	81.7	.29	77.4	77.4	1.0
		n= 23	n= 18		n= 12	n= 14	
	Unsafe swimming pool [a]	82.6	83.3	.95	50.0	78.6	.13
		n= 402	n= 395		n= 564	n= 570	
	Unsafe swimming [a]	64.4	65.1	.82	51.6	52.7	.71
Burns		n= 643	n= 649		n= 643	n= 649	
	Unsafe hot water taps in bath/shower	30.2	27.8	.35	26.1	25.2	.70
	Unsafe drinking hot fluids	54.7	50.9	.17	**34.8**	**41.7**	**.011**
	Unsafe cooking (not using a stove guard)	97.8	96.1	.08	92.5	94.6	.13
	Unsafe cooking (child in kitchen)	64.3	64.8	.84	91.2	93.2	.19
	Unsafe cooking (not using rear hotplates on stove)	91.9	89.9	.21	**79.3**	**85.3**	**.005**
	Unsafe cooking (not turning panhandles away) [9-8]	52.1	50.0	.45	27.3	28.3	.67
	Total risk score, mean (SD); range [b]	16.4 (5.8); 1-34	16.1 (5.7); 0-32	0.34	**13.6 (6.1); 1-33**	**15.3 (6.1); 0-37**	**< .001**

[a] Only when applicable: i.e. a staircase is present (n= 1154); a window a child can reach is present (n= 404); the child is bathed (n= 1220); a pond is present (n= 106); a private swimming pool is present (n= 26); or the child swims (n= 1134)

[b] Higher scores indicate more unsafe behavior, possible scores range from 0-53

[c] Mann-Whitney *U*-test for continuous outcome, Chi-square test for binominal outcomes

Note: Numbers printed **bold** indicate significant *P*-values

Table 8.3 Outcomes of logistic regression analyses and linear regression analysis of the effect of E-health4Uth home safety intervention on unsafe behavior at follow-up, with control condition as reference (n= 1292)

	Behavior	OR (95% CI)[a]	*P*-value
		n= 1154	
Falls	Top of staircase [c]	**0.65 (0.50; 0.85)**	**.001**
	Bottom of staircase [c]	**0.69 (0.53; 0.88)**	**.003**
	Top and bottom of staircase [c]	**0.62 (0.48; 0.81)**	**< .001**
		n= 404	
	Windows a child can reach [c]	0.86 (0.58; 1.27)	.44
		n= 1292	
Poisoning	Storage of cleaning products	**0.67 (0.53; 0.85)**	**.001**
	Storage of medicines	0.88 (0.69; 1.12)	.30
		n= 1220	
	Bathing of the child [c]	**0.65 (0.51; 0.84)**	**.001**
		n= 106	
Drowning	Pond [c]	1.12 (0.44; 2.83)	.82
		n= 26	
	Private swimming pool [c]	0.27 (0.05; 1.51)	.14
		n= 1134	
	Swimming [c]	0.98 (0.77; 1.24)	.87
		n= 1292	
	Hot water taps in bath/shower	1.05 (0.82; 1.35)	.73
	Drinking hot fluids	**0.76 (0.61; 0.96)**	**.02**
Burns	Cooking (using a stove guard)	0.76 (0.48; 1.20)	.23
	Cooking (child in kitchen)	0.81 (0.54; 1.23)	.33
	Cooking (using rear hotplates)	**0.67 (0.50; 0.90)**	**.008**
	Cooking (turning panhandles away)	0.94 (0.74; 1.20)	.63
		Beta coefficient (95% CI)[b]	
		n= 1292	
	Total risk score	**-1.59 (-2.26; -0.93)**	**< .001**

[a] Logistic regression analyses with unsafe behavior as dependent variable and group (intervention condition vs. control condition) as independent variable, adjusted for mother's employment status
[b] Linear regression analyses with unsafe behavior as dependent variable and group (intervention condition vs. control condition) as independent variable, adjusted for mother's employment status
[c] Only when applicable: i.e. a staircase is present (n= 1154); a window a child can reach is present (n= 404); the child is bathed (n= 1220); a pond is present (n= 106); a private swimming pool is present (n= 26); or the child swims (n= 1134)
Note: Numbers printed **bold** indicate significant *P*-values

Evaluation of the E-health4Uth home safety module, immediately after completing the module, by parents in the intervention condition

Of all parents in the intervention condition, 587 completed the E-health4Uth home safety module (91.3%). The Web-based evaluation form, immediately after completing the E-health4Uth home safety module, was completed by 541 parents (84.1%) (Table 8.4).

Table 8.4 Evaluation of the E-health4Uth home safety module, immediately after completing the module, by parents in the intervention condition (n= 541)

Reading of the web-based, tailored safety advice (%)	
Have read their advice completely (%)	72.1
Have read their advice partly (%)	24.4
Have not read their advice (%)	3.5
Tailored safety advice	
The safety advice was reliable [a] (mean; SD)	4.2 (0.8)
The safety advice was understandable [a] (mean; SD)	4.4 (0.6)
The safety advice was relevant [a] (mean; SD)	3.5 (0.9)
The safety advice was useful [a] (mean; SD)	3.9 (0.8)
The safety advice motivated to take action [a] (mean; SD)	3.6 (0.9)
Implementation-intention plan	
Completed an implementation-intention plan (%)	86.5
Completed a second implementation-intention plan (%)	31.2
Was it easy to complete an implementation-intention plan? [a] (mean; SD)	4.1 (0.8)
E-health4Uth home safety intervention	
Minutes spent to answer the questions and read the safety advice [a] (mean; SD)	14.4 (7.1)
Did you think that the time spent to answer the questions and read the safety advice was (very) long or (very) short? [a] (mean; SD)	3.2 (0.6)
Was the intervention easy to use? [a] (mean; SD)	4.1 (0.6)
Was the intervention a pleasant source of information? [a] (mean; SD)	3.7 (0.8)
Rating for the web-based, tailored safety advice intervention [b] (mean; SD)	7.3 (1.1)
[a] Scores on a 5-point Likert scale ranging from 1 (most-negative evaluation) to 5 (most-positive evaluation)	
[b] Scores from 1 (most-negative evaluation) to 10 (most-positive evaluation)	

The Web-based evaluation forms show that 72.1% of parents had read the tailored safety advice completely, 24.4% had read it partly, and 3.5% had not read their advice. Parents evaluated the received tailored safety advice as being reliable (mean 4.2, SD 0.8), understandable (mean 4.4, SD 0.6), relevant (mean 3.5, SD 0.9), useful (mean 3.9, SD 0.8), and motivating to take action with regard to safety at home (mean 3.6, SD 0.9).

An implementation-intention plan was completed by 86.5% of parents; a second implementation-intention plan was completed by 31.2% of parents. Parents positively evaluated the ease of completing an implementation-intention plan for their own situation (mean 4.1, SD 0.8). Parents spent a mean time of 14.4 (SD 7.1) min to answer the questions and read the safety advice; they evaluated this as being a short time (mean 3.2, SD 0.6). Parents positively evaluated the use of the E-health4Uthe home safety intervention (mean 4.1, SD 0.6) and found the intervention to be a pleasant source of information (mean 3.7, SD 0.8). Parents rated the E-health4Uth home safety intervention with a mean score of 7.3 (SD 1.1).

Evaluation of the well-child visit including discussing the tailored safety advice, immediately after the well-child visit, by parents and healthcare professionals in the intervention condition

During the well-child visit, the tailored safety advice was discussed with 48.9% of the parents, was not discussed with 18.9%, and in 32.2% of the parents it was unclear whether the advice was discussed because no evaluation form was available and child healthcare professionals could not recall whether (or not) they had discussed this advice with the parent.

Parents (n= 196) and child healthcare professionals (n= 238) completed written evaluation forms immediately after the well-child visit at which the tailored safety advice was discussed with the parent (Table 8.5).

Parents had a positive evaluation of the information discussed during the well-child visit (mean 4.4, SD 0.6), rated discussing the tailored safety advice as a valuable supplement (mean 3.8, SD 0.9), and overall were satisfied with the well-child visit (mean 4.4, SD 0.6). Parents rated the well-child visit, including discussing the tailored safety advice, with a mean score of 8.2 (SD 0.9).

Table 8.5 Evaluation of the well-baby visit including discussing the tailored safety advice, immediately after the well-baby visit, by parents (n=196) and health care professionals (n= 238) in the intervention condition

	E-health4Uth condition
PARENTS	
Satisfaction with information discussed [a] (mean; SD)	4.4 (0.6)
Discussing the tailored safety advice was a valuable supplement to the tailored safety advice? [a] (mean; SD)	3.8 (0.9)
Overall satisfaction with the well-baby visit [a] (mean; SD)	4.4 (0.6)
Rating for the well-baby visit [b] (mean; SD)	8.2 (0.9)
CHILD HEALTH CARE PROFESSIONALS	
Total time for well-baby visit; min (mean; SD)	20.4 (4.5)
Time for safety during well-baby visit; min (mean; SD)	5.7 (2.3)
Safety information leaflet given to the parent (%)	72.0
Tailored safety advice present in dossier (%)	87.8
Tailored safety advice brought by parent (%)	21.6
Was the tailored safety advice useful to discuss safety at home during the well-baby visit? [a] (mean; SD)	3.8 (0.8)
Satisfaction with information given [a] (mean; SD)	3.9 (0.6)
Overall satisfaction with the well-baby visit [a] (mean; SD)	4.0 (0.6)
Rating for the well-baby visit [b] (mean; SD)	7.3 (0.8)

[a] Scores on a 5-point Likert scale ranging from 1 (most-negative evaluation) to 5 (most-positive evaluation)

[b] Scores from 1 (most-negative evaluation) to 10 (most-positive evaluation)

Child healthcare professionals reported that the mean total time spent for the well-child visit was 20.4 (SD 4.5) min, with a mean of 5.7 (SD 2.3) min used for discussing the safety at home. In addition to receiving tailored safety advice, the generic safety information leaflet was given to 72.0% of the parents. The tailored safety advice was present in 87.8% of the child dossiers and it was brought to the well-child visit by 21.6% of parents. Child healthcare professionals positively evaluated the tailored safety advice with regard to its usefulness to discuss safety at home during the well-child visit (mean 3.8, SD 0.8); were satisfied with the information given to parents (mean 3.9, SD 0.6); and had an overall satisfaction with the well-child visit (mean 4.0, SD 0.6). They rated the well-child visit, including discussing the tailored safety advice, with a mean score of 7.3 (SD 0.8).

DISCUSSION

This study evaluated the effect of web-based, tailored safety advice combined with personal counseling on parents' child safety behaviors. Compared to counseling with generic written materials, the E-Health4Uth home safety intervention appeared to be effective in promoting several relevant parents' child safety behaviors. As hypothesized, parents in the intervention condition showed significantly less unsafe behavior with regard to safe staircases, storage of cleaning products, bathing, drinking hot fluids, and cooking, compared to parents who received counseling with generic written safety information. There were no significant differences with regard to other specific behaviors between the two study conditions. At follow-up, parents in the intervention condition also showed a significantly lower total risk score compared to parents in the control condition.

With regard to the users of the intervention, parents were positive about the E-Health4Uth home safety module, and its use in well-baby visits was positively evaluated by both parents and child healthcare professionals.

This study confirms the results of previous studies which showed that applying techniques of computer-tailored safety education in a primary care setting was effective in adopting safety behaviors of parents when compared with receiving generic safety advice [17, 40]. The present study focused on total risk scores, and also investigated the effects of the E-Health4Uth home safety intervention on specific safety behaviors. This approach allowed to clarify for which specific safety behaviors the intervention is (or is not) effective. These insights may guide the development and evaluation of additional approaches to improve parental safety behavior. To our knowledge, this is the

first experimental study on the effectiveness of computer-tailored education to change parents' safety behaviors.

These results support the use of web-based tailored methods to help increase the effectiveness of parental safety advice. With regard to the prevention of poisoning, the E-Health4Uth home safety intervention was effective on the storage of cleaning products. Although we anticipated that the intervention would have a similar effect on the storage of medicines, no difference was found in the unsafe storage of medicines between the intervention and control condition. At baseline, the prevalence of unsafe storage of medicines was in fact lower than the prevalence of unsafe storage of cleaning products. It is possible that the content of the intervention did not sufficiently increase parents' motivation to store their medicines in a more safe way.

The E-Health4Uth home safety intervention was not effective on behaviors with regard to window safety, storage of medicines, ponds, swimming pools and swimming, hot water taps of bath/showers, and some items of burns prevention. It is possible that the intervention did not sufficiently address these specific determinants of safe behavior. An explanation why the E-Health4Uth home safety intervention showed no effect on the behavior with regard to window safety, ponds and swimming pools could be the low numbers of households that had a pond or swimming pool. This affects statistical power and these results on these behaviors should be interpreted with utmost care.

Despite a lower prevalence in the E-Health4Uth intervention condition, some behaviors appeared to be more unsafe at follow-up compared to baseline, e.g. bathing of the child and cooking with the child present in the kitchen. This result was found in both the intervention and the control condition, and might be due to the change in both age and development of the child between baseline and follow-up (Appendix 6). For example, with increasing age parents might assume they can leave the child alone in the bathtub, or it may be more difficult for the parent to keep the child out of the kitchen. However, such behavior is not recommended and current safety advice on this aspect (either generic or individually tailored) still seems suboptimal. Moreover, despite the decrease of unsafe behavior in the two study conditions between baseline and follow-up, the prevalence of many unsafe behaviors remains high. The prevalence of unsafe behavior with regard to top/bottom of staircase, ponds, swimming pools and some items of burns prevention, is still over 70%. This indicates that the content of the tailored safety advice for these behaviors needs to be improved.

When parents reported at follow-up (child age approximately 17 months) that their child swims, they reported to leave their child unsupervised in the swimming pool

(sometimes: 0.8%; rarely 4.2%; never 95.0%; data not shown). Despite the fact that most parents never leave their child unsupervised in the swimming pool, still 5% does leave their child unsupervised, although this are very young children (around 17 months of age). These children are at risk of drowning and should never be left unsupervised. These young children do not have any swimming skills yet.

This study used a tailored home safety intervention delivered in a primary care setting. Next to primary care settings, computer-tailored home safety information can be applied to other health care settings, such as emergency departments [41]. This study also showed that computer- tailored home safety information is effective in improving parents' child safety behavior.

Parents and youth healthcare professionals are positive about the tailored safety advice and the use of the tailored safety advice in well-baby visits. On the other hand, the intervention effect may have been diluted by suboptimal uptake of the novel method by parents and/or healthcare workers.

The E-Health4Uth home safety intervention consists of a home safety assessment questionnaire, web-based tailored safety advice, an implementation-intention plan, and discussing the tailored safety advice with the child healthcare professional. However, the evaluations of the child healthcare professionals showed that the tailored safety advice was discussed with only 48.9% of the parents.

Unfortunately, we only received evaluation forms of about one third of the health care professionals, so it is unknown whether the health care professionals discussed the tailored safety advice with the other parents. According to the evaluation forms we did receive from the health care professionals, there was a considerable chance of not having discussed the tailored safety advice. Examining this issue as a possible confounder in the logistic regression models showed similar results of the effect of the intervention on parents' child safety behaviors compared to our findings without adjustment for the discussion of the tailored advice (data not shown). The main reasons for not discussing the safety advice with the parents were that: i) the well-baby visit was made by another child healthcare professional from another well-baby clinic who was not familiar with the study, ii) parents indicated that discussing the tailored safety advice was not necessary, and iii) the tailored safety advice was not present in the child's dossier. However, although the tailored safety advice was not discussed with about 50% of the parents, and uptake among parents needs improvement, a positive effect on parents' child safety behavior was shown.

In daily practice all parents (in both the intervention or control condition) receive care as usual; the generic safety information leaflet. Parents in the intervention condition received the E-Health4Uth home safety intervention, but could also receive the generic safety information leaflet, as a part of usual care.

Strengths and limitations

Our focus on the effect of a tailored intervention on both specific parents' child safety behaviors and on an overall safety risk score, is a major strength of this study. Other strengths include the randomized controlled design, the large number of participants (n=1292) and the small number lost to follow-up; only 6.6% of the participants failed to complete the follow-up questionnaire. However, dropout was higher among mothers with a low educational level, unemployed mothers, and parents of non-Western ethnicity, which could affect the generalizability of the results. Moreover, because the participation rate was 45%.

We may have recruited parents who are more receptive to this way of providing safety education; in this case, this could have led to an overestimation of the intervention effect. On the other hand, the study population was a reasonable reflection of the general population in the Netherlands [42].

Because we had low numbers of missings and lost to follow-up (6.6%), missing data was not imputed. Given these low numbers, it is not likely that missing data leads to loss of power of the study [43].

The intervention was developed for use on computers as long as the parent has connection to the internet. The intervention was not tested for functionality on mobile phones and tablets. Perhaps in the near future, when implementing the intervention, it could be made accessible on all mobile devices which have access to the internet.

Receiving gift vouchers may cause recall bias since parents could expect receiving further incentives in the future. This may have positively biased total effectiveness for both the experimental and control condition although the magnitude of any effects would be small. Despite this possible recall bias, the E-health4Uth intervention is effective in specific parents' child safety behaviors compared to receiving the control condition.

A high percentage of youth health care organizations declined to participate in the study. Of the 26 youth health care organizations that were initially invited to participate in the study, five volunteered to take part in the study. The main reason why health care

providers did not wish to participate was that they were already involved in one or more other studies.

Finally, the high prevalence of unsafe parental behaviors might even be an underestimation of the real situation with regard to childhood safety. Because the present study relied on self-report of safety behavior by parents, misclassification might have occurred if parents gave socially desirable answers in order to look good, i.e. overstating their safe behavior [44-46]. Furthermore, self-report can be subject to recall bias or inaccurate responses. We tried to minimize the occurrence of socially desirable answers by ensuring confidentiality of the questionnaires. Earlier validation studies showed that there is an acceptable agreement between parents reported safety behavior and observations in homes of the parent [46]. Future studies with smaller samples assessing specific behaviors could include the use of home observations.

Implications and future research

Findings from this study support the use of a tailored education approach involving the provision of tailored safety information. The tailored safety information was found to be more effective than generic safety information in promoting preventive behaviour. Providing tailored safety information prior to a visit at the well-baby clinic might be more efficient, because parents and child healthcare professionals can better prepare for the visit in which safety at home is discussed [44-47]. Moreover, the parents receive more specific information because it is tailored to the personal situation of the parent [20]. However, because the prevalence of unsafe behaviour remains relatively high, additional approaches to improve parental safety behaviour need to be developed.

To improve parents' child safety behaviours various cognitions (such as perceived self-efficacy, perceived response efficacy, perceived vulnerability and perceived severity) could be addressed [48-50]. Changing these cognitions about injury prevention behaviour could possibly lead to more safe behaviour. More insight is needed into why the Web-based, tailored safety advice intervention is effective in some parents and not in others. Perhaps different determinants are correlated with different safety behaviours.

It is possible that parents have different motivations for change for different injury mechanisms. This is supported by the finding that the intervention is not equally effective for all parents' child safety behaviours. Therefore, this issue needs to be further explored. Future studies should also investigate the effect of discussing the tailored safety advice during the well-baby clinic visit in a larger sample, as well as other approaches to increase the effectiveness of the E-health4Uth intervention. Also, more insight is needed

on the effect of the intervention among various subgroups, e.g. based on ethnicity or educational level.

Conclusions

Compared to counselling with generic written materials, the E-health4Uth home safety advice combined with counselling is effective in promoting parents' child safety behaviour with regard to safe staircases, storage of cleaning products, bathing, drinking hot fluids and cooking. There were no significant differences with regard to other specific behaviours between the two study conditions.

Parents are positive about the E-health4Uth home safety module, and its use in well-child visits is positively evaluated by both parents and child healthcare professionals. The results of this study support the application of Web-based, tailored safety advice for the prevention of unintentional injuries in the youth healthcare setting.

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Appendix 8.1 Safety advice of the intervention based on safety behavior in and around the home.

Safety behavior concerning the prevention of	*Applicable if:*	*Reinforcement or NO advice when:*
Falls		
- Stair gate	- The house has a staircase which the child can reach	- A stair gate is present at the top and bottom of the staircase and is being used at all times
- Windows	- The house has windows a child can reach	- A window restrictor is present
Poisoning		
- Cleaning products	- Always	- Stored in a closet with a lock or higher than 1.50 meters
- Medicines	- Always	- Stored in a closet with a lock or higher than 1.50 meters
Drowning		
- Bath tub	- The child takes a bath	- Never left alone in the bath tub
- Pond	- There is a pond present	- A fence higher than 1.20 meters is present around the pond
- Private swimming pool	- There is a swimming pool present	- A fence higher than 1.20 meters is present around the swimming pool
- Swimming	- The child swims	- The child always wears a flotation device and is never left alone in the swimming pool
Burns		
- Hot water taps of bath/shower	- Always	- Thermostat-controlled tap present
- Hot fluids	- Always	- Child never on parents lap when drinking hot drinks
- Cooking	- Always	- A stove guard is present
- Cooking	- Always	- Child never in the kitchen when cooking
- Cooking	- Always	- Always using rear hotplates during cooking
- Cooking	- Always	- Always turning panhandles away during cooking

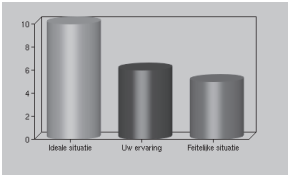
Appendix 8.2 Sample page 1 of tailored safety advice

Hoe veilig is uw huis voor Mark?

Hieronder geven we u een aantal tips waarmee u de veiligheidssituatie in uw huis zou kunnen verbeteren. Om het advies samen te stellen hebben
we gebruik gemaakt van de antwoorden die u zojuist heeft gegeven. U kunt het advies uitprinten (zie de printerknop rechtsbovenin) en meenemen
naar het volgende bezoek aan het consultatiebureau.

Kleine kinderen willen de wereld ontdekken en overal aanzitten. Mark kan een aantal dingen al zelf doen en gaat in huis op onderzoek uit. De juiste veiligheidsmaatregelen zorgen ervoor dat u niet steeds "niet doen" en "mag niet" hoeft te roepen en dat Mark de mogelijkheid krijgt om veilig de wereld te ontdekken. Wanneer u veiligheidsmaatregelen heeft genomen, kijk dan ook regelmatig wat u nog meer kunt doen om uw huis zo veilig mogelijk te maken voor Mark.

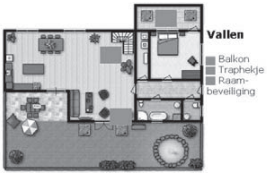
U heeft aangegeven dat u uw huis niet veilig en niet onveilig vindt voor uw kind.
In het plaatje hieronder kunt u zien hoe u de veiligheid in en om het huis ervaart (uw ervaring) en wat de feitelijke veiligheidssituatie (feitelijke situatie) in en om uw huis is. Dit laatste hebben wij berekend aan de hand van uw eigen antwoorden op de vragen.



Vallen

Kinderen worden groot met vallen en opstaan. Veel van deze ongelukken zijn onschuldig en niet of nauwelijks te voorkomen. Maar er zijn ook valongevallen die ernstiger zijn en misschien voorkomen hadden kunnen worden. Achteraf heeft u dan misschien spijt dat u niet eerder maatregelen heeft getroffen.
Welke veiligheidsmaatregelen zou u nu kunnen nemen tegen ernstige valongevallen? Ook al kan Mark nu bijvoorbeeld nog niet kruipen of lopen, voor u het weet kan hij meer dan u denkt. Daarom kunt u beter vroegtijdig maatregelen nemen.

In het huis hiernaast kunt u zien op welke plek veiligheidsmaatregelen genomen kunnen worden. Hieronder kunt u lezen welke veiligheidsmaatregelen u zelf kunt nemen.



Trappen en traphekjes.

U heeft een traphekje boven en beneden aan de trap van de woon- naar de slaapverdieping en u doet deze ook **altijd** dicht als Mark in de buurt van de trap is. Prima! Totdat Mark veilig zelf kan traplopen biedt het traphekje de nodige bescherming voor al die momenten dat u net even niet in de buurt bent.

U heeft een traphekje beneden aan de trap naar de zolder en u doet deze ook altijd dicht als Mark in de buurt van de trap is. Prima! Totdat Mark veilig zelf kan traplopen biedt het traphekje de nodige bescherming voor al die momenten dat u net even niet in de buurt bent.

Vergiftiging

Vergiftigingsongevallen komen vooral bij kleine kinderen voor. Zij weten niet wat gevaarlijk is en stoppen alles in hun mond. Een vieze smaak zorgt er niet voor dat kinderen iets niet opeten of drinken. Veel schoonmaakmiddelen zijn voorzien van een kindveilige sluiting. Deze kindveilige sluiting is echter geen garantie, dat je kind deze niet kan openen. Meestal werkt het slechts vertragend. Het is dus ondanks deze sluitingen belangrijk om schoonmaakmiddelen en medicijnen altijd hoog of achter slot en grendel op te bergen. Giftige producten, u heeft er meer in huis dan u denkt en ze liggen vaker voor het grijpen dan u voor mogelijk houdt. Denk bijvoorbeeld aan toiletblokjes, vaatwasmachinemiddel, chloor en andere huishoudelijke producten.

Appendix 8.3 Sample page 2 of tailored safety advice

In het huis hiernaast kunt u zien op welke plek veiligheidsmaatregelen genomen kunnen worden. Hieronder kunt u lezen welke veiligheidsmaatregelen u zelf kunt nemen.

Schoonmaakmiddelen.

U bewaart schoonmaakmiddelen niet kindveilig, maar u heeft aangegeven dat u van plan bent binnen een tot zes maanden schoonmaakmiddelen op een kindveilige plaats te bewaren, dus hoger dan 1.50 m of achter slot en grendel. Als u uw schoonmaakmiddelen vanaf nu een veilige plaats geeft kunt u voorkomen dat Mark in een onbewaakt ogenblik toch bij deze gevaarlijke producten kan komen. Dat kost u op dit moment misschien extra energie, maar geeft u straks meer rust als Mark steeds meer dingen gaat ondernemen.

Giftige spullen liggen vaker voor het grijpen dan u denkt. Gevaarlijke schoonmaakmiddelen zitten ook vaak in felgekleurde, vrolijke verpakkingen. Vooral kleine kinderen worden hierdoor aangetrokken en lopen zo het risico te worden vergiftigd. Loop eens met een frisse blik door uw eigen huis. Het helpt om eens door de knieën te gaan en uw huis te bekijken op kinderooghoogte! Op kasten met gevaarlijke stoffen kunt u veiligheidshaakjes maken zodat uw kind er niet meer bij kan.

Tip voor tijdens het schoonmaken: U heeft aangegeven dat u tijdens het schoonmaken de schoonmaakmiddelen vaak meteen weer op ruimt. Het is het veiligst als u schoonmaakmiddelen na gebruik **altijd** meteen weer op ruimt. Laat het schoonmaakmiddel niet naast de emmer of op het aanrecht staan, maar sluit een gebruikte fles of verpakking meteen weer en zet deze terug in de kast. Zet daarnaast emmers heet sop buiten bereik van Mark.

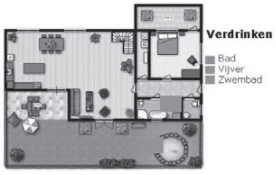
Medicijnen.

U heeft aangegeven dat u medicijnen op een veilige plaats bewaart, dus hoog of achter slot en grendel. Dat is inderdaad belangrijk want de meeste slachtoffers van een vergiftigingsongeval zijn kinderen in de leeftijd van 0 tot 4 jaar. Meestal gebeurt zo'n ongeluk in en om het huis waar ze zelf wonen.

Verdrinking

Spetteren, baden, en zwemmen: de meeste kinderen vinden water erg leuk. Maar de keerzijde van waterpret is verdrinkingsgevaar. Wist u dat een verdrinkingsongeluk vaak snel en zonder geluid verloopt? Dit gaat meestal ongemerkt want kinderen die verdrinken huilen of spartelen niet.

In het huis hiernaast kunt u zien op welke plek veiligheidsmaatregelen genomen kunnen worden. Hieronder kunt u lezen welke veiligheidsmaatregelen u zelf kunt nemen.



Badderen.

U heeft aangegeven dat u Mark zelden alleen laat als hij in het bad/babybadje zit. Dit is onverstandig want kleine kinderen kunnen al verdrinken in een klein laagje water van 5 cm diep. Laat Mark dus **nooit** alleen, ook al is het maar voor even.

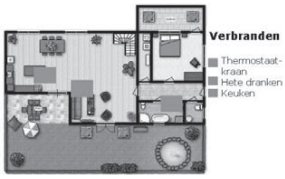
Ruim direct na het spelen het waterspeelgoed (zwembandjes, opblaasbare krokodillen, etc.) op zodat Mark niet in de verleiding komt weer terug in het water te gaan (als u er niet meer bij bent). Is er toch iets waardoor u even niet op Mark kan letten? Vraag dan een andere volwassene om op Mark te letten. Ga er niet van uit dat als u eventjes weg bent er automatisch wel iemand anders op zal letten. Laat nooit broertjes of zusjes op kinderen letten die niet kunnen zwemmen.

Verbranding

Ongelukken waarbij kleine kinderen zich verbranden gebeuren vaak gewoon thuis. In veel van de gevallen is iemand – ten tijde van het ongeval – bij het kind in de buurt. Brandwonden zijn zeer pijnlijk maar kunnen worden voorkomen door de juiste maatregelen te treffen.

Appendix 8.4 Sample page 3 of tailored safety advice

In het huis hiernaast kunt u zien op welke plek veiligheidsmaatregelen genomen kunnen worden. Hieronder kunt u lezen welke veiligheidsmaatregelen u zelf kunt nemen.



Hete dranken.

U heeft aangegeven dat Mark soms bij u op schoot zit als u zelf hete dranken zoals koffie of thee drinkt. Dit is onverstandig want kinderen jonger dan twee jaar kunnen niet onthouden dat een kop koffie of thee heet is en dat ze daar dus niet aan mogen zitten. Bovendien kan Mark op schoot een onverwachte beweging maken waardoor hij hete drank over zich heen kan krijgen. Het is beter om Mark nooit bij u op schoot te laten zitten als u zelf hete dranken drinkt.

De grootste boosdoeners van brandwonden zijn hete thee of koffie. Daarom is het belangrijk om Mark van uw schoot te zetten als u zelf koffie of thee gaat drinken. Mark kan op schoot een onverwachte beweging maken en daardoor toch hete thee of koffie over zich heen krijgen. Zet kopjes hete thee of koffie altijd buiten bereik van kinderen. Attendeer ook uw bezoek hierop. Gebruik geen overhangende tafelkleden om te voorkomen dat Mark kopjes met hete vloeistof over zich heen trekt.

Tip voor het drinken van koffie of thee: U heeft aangegeven dat u koffie en thee soms in een thermoskan bewaart. Schenk koffie of thee al in de keuken in, zodat er geen thee of koffie op tafel staat. Gebruik een thermoskan om de rest van de koffie of thee in te bewaren. Gebruik geen thee- of koffiepot. De sluiting van een thermoskan kan niet zomaar los en daardoor is er een kleinere kans op ongelukken als Mark de thermoskan onverwacht omgooit. Koop wel een thermoskan die hij niet gemakkelijk open kan krijgen.

Keuken.

U heeft aangegeven dat u geen fornuishekje heeft. Het is beter om wel een fornuishekje te plaatsen. Met een fornuishekje voorkomt u dat pannen omvallen of dat Mark pannen kan omtrekken van het fornuis. U kunt een fornuisrekje kopen bij babyspeciaalzaken, thuiszorgwinkels of doe-het-zelfzaken. Let op: het fornuishekje kan warm worden.

Tip voor tijdens het koken: U heeft aangegeven dat u tijdens het koken soms de stelen van pannen naar achteren draait. Probeer de stelen van pannen altijd naar achteren plaatsen. Zo is de kans kleiner dat Mark tijdens het koken in een onverwacht moment een pan over zich heen kan trekken.

U heeft aangegeven dat Mark zelden in de keuken is als u aan het koken bent. Het is beter als u Mark altijd uit de keuken houdt want een belangrijke oorzaak van het oplopen van een verbranding is het omvallen of omtrekken van een pan van het fornuis of aanrecht tijdens het koken.

Plaats indien mogelijk een traphekje voor de ingang naar de keuken, zo kan Mark wel bij u in de buurt blijven maar kan hij niet in de keuken zelf komen. Er zijn ook extra brede traphekjes.

Kijk voor meer informatie over veiligheid in en om het huis ook eens op de website van Consument & Veiligheid:
www.veiligheid.nl

Appendix 8.5 Risk scores* assigned to injury safety behaviors

Injury safety behavior		Score
Falls	Stair gate present only at top or bottom of stairs	2
	No stair gate present	4
	Closing stair gate often	2
	Closing stair gate some of the time	3
	Rarely closing stair gate	4
	Never closing stair gate	4
	No window restrictor on windows a child can reach	2
Poisoning	Cleaning products stored unlocked above 1.50 m	1
	Cleaning products stored unlocked below 1.50 m	3
	Cleaning products stored on the floor	4
	Medicines stored unlocked above 1.50 m	1
	Medicines stored unlocked below 1.50 m	3
	Medicines stored on the floor	4
	Medicines stored in handbag	3
Drowning	Child left alone in bath tub	5
	Pond present	3
	Pond with fence below 1.20 m	4
	Pond with no fence	5
	Pool with fence below 1.20 m	4
	Pool with no fence	5
	Often wearing (inflatable) flotation device when swimming	1
	Some of the time wearing (inflatable) flotation device when swimming	2
	Rarely wearing (inflatable) flotation device when swimming	2
	Never wearing (inflatable) flotation device when swimming	2
	Left alone in pool	5
Burns	No thermostatic controlled taps on hot water taps in bath or shower	4
	Child on parents' lap when drinking hot liquids	4
	Not using a stove guard	1
	Child in kitchen when parent is cooking	2
	Not using rear hotplates, when a stove guard is not present	1
	Not turning panhandles away from the front of the cooker, when a stove guard is not present	1

* Risk scores based on literature and expert consultation (Consumer Safety Institute, the Netherlands); when a situation is not applicable or safe, risk score is equal to 0.

Higher scores indicate more unsafe behavior

Appendix 8.6 Child characteristics at baseline and follow-up divided in intervention condition and control condition (n=1292)

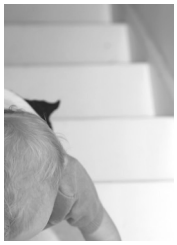
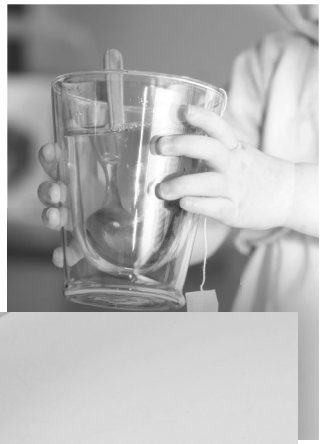
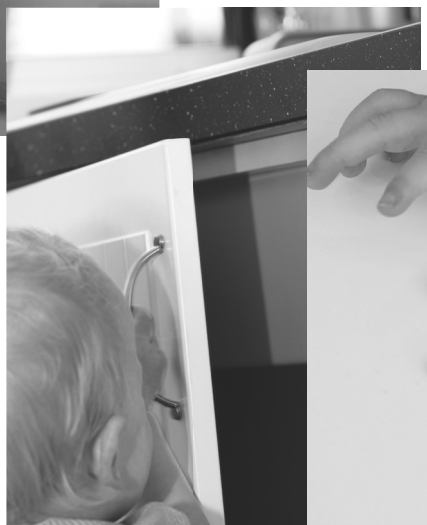
[missing data baseline-follow-up]	*Intervention condition* n=643	*Control condition* n=649	*P-value**
	Baseline		
Mean age (SD; range), months [8-0]	7.3 (1.1); 4.7-11.6	7.2 (1.1); 4.8-11.5	.17
Child can crawl (%) [0-3]	35.9	32.7	.14
Child can walk (%) [0-1]	0.4	0.4	.99
Lifetime prevalence of medically attended injury (%) [3-6]	3.0	2.7	.39
	Follow-up		
Mean age (SD; range), months [8-0]	16.8 (0.7); 15.8-22.5)	16.8 (0.8); 15.6-21.7)	.72
Child can crawl (%) [0-3]	98.6	99.2	.28
Child can walk (%) [0-1]	89.4	86.5	.12
Lifetime prevalence of medically attended injury (%) [3-6]	10.3	8.3	.30

* Differences between intervention condition and control condition, tested with independent-samples t-test (continuous variables) and Chi-square test (categorical variables)

Chapter 9

General discussion



This thesis reports on safety behaviours of parents of young children, the correlates of these safety behaviours and the evaluation of an injury prevention intervention.

The first aim of this thesis was to determine what preventive measures parents take to avoid unintentional injuries and which socio-demographic, family and psychosocial correlates are associated with unsafe behaviour. Two cross-sectional studies were carried out to explore the socio-demographic, family and psychosocial correlates of infant bathing (**chapter 2**) and safety behaviour with regard to falls and poisoning (**chapter 3**). A systematic review of the literature was conducted to gain insight in the socio-demographic, family and psychosocial correlates of parents' safety behaviour with regard to the prevention falls, poisoning, drowning and burns (**chapter 4**).

The second aim was to study the effect of an E-health4Uth home safety intervention, a Web-based, tailored safety advice module combined with personal counselling, on parents' child safety behaviour. Two randomized controlled trials (RCT) were conducted. The first RCT was a pilot study which evaluated the Web-based, tailored safety advice module (E-health4Uth home safety) and evaluated the use of E-health4Uth home safety to support counselling in routine well-child care visits (**Chapter 5**). The design of the second RCT was described in detail in **Chapter 6**. This RCT evaluated the effect of Web-based, tailored safety advice combined with personal counselling on psychosocial correlates with regard to parents' child safety behaviours (**Chapter 7**), as well as the effect on parents' child safety behaviour (**Chapter 8**).

In this chapter, the main findings are summarized, and the results are discussed and linked to current research to highlight new insights. Furthermore, the strengths and limitations of the studies are discussed. Finally, implications for practice and future studies are discussed.

MAIN FINDINGS

Question 1: What preventive measures do parents take to avoid unintentional injuries?

A cross-sectional study showed that of the parents who bathed their child, one in 16 parents left their child unsupervised in the bathtub (**chapter 2**). The percentage of children who were left unsupervised in the bathtub rose with increasing age. These children were aged less than twelve months. These children may be able to sit up unsupported, although some are still unable to right themselves if they fall over in the bathtub [1, 2].

Table 9.1 Correlates of unsafe parents' child safety behaviour with regard to the prevention of falls, poisoning, and drowning

	Behaviour	Association
Socio demographic correlates		
Child's age	Unsupervised bathing	+[1]
Older	Unsafe storage of medicines	+[2]
Child development		
Child cannot crawl	Absence of stair gate	+[2]
Number of children	Unsupervised bathing	-[1]
One vs. multiple	Absence of stair gate	+[2]
	Absence of window guard	+[2]
	Unsafe storage of cleaning products	+[2]
	Unsafe storage of medicines	+[2]
Educational level	No adequate use of stair gate	+[2]
Higher mother's educational level	Unsafe storage of cleaning products	+[2]
	Unsafe storage of medicines	+[2]
Ethnicity		
Non-Western (1) father vs. Western father (0)	Unsupervised bathing	-[1]
Non-Western mother (1) vs. Western mother (0)	Unsafe storage of cleaning products	+[2]
Psychosocial correlates		
Self-efficacy	Unsupervised bathing	-[1]
Higher	No adequate use of stair gate	-[2]
	Unsafe storage of cleaning products	-[2]
	Unsafe storage of medicines	-[2]
Response efficacy	Unsupervised bathing	-[1]
Higher		
Vulnerability	Absence of stair gate	+[2]
Higher	Unsafe storage of cleaning products	+[2]
Severity	Unsupervised bathing	-[1]
Higher	Absence of stair gate	-[2]

+ Positive association with unsafe behaviour; - Negative association with unsafe behaviour

[1] Results from chapter 2

[2] Results from chapter 3

A second study analysed the safety behaviour of first-time parents, with regard to the prevention of falls and poisoning (**chapter 3**). Overall, regardless of number of children or crawling abilities, over half of parents reported to have no stair gate installed, 41% reported inadequate use of the stair gate, over half of parents reported to have no window guard present. Furthermore, 60% of parents reported to store their cleaning products unsafe, and 38% stored their medicines unsafe. If their infant could not crawl, more first-time parents had not installed a stair gate (90%) than first-time parents with an infant that could crawl (75%). If their infant could not crawl, more first-time parents stored medicines unsafely (54%) than first-time parents with an infant that could crawl (44%). There were no differences in the safety behaviours between non-first-time parents whose infant could crawl and those whose infants could not crawl. These studies show that still a lot of parents, and in particular first-time parents, do not take enough precautions to protect their children from an unintentional injury. On the other hand,

also in parents with more than one child the prevalence of unsafe behaviour remains high. Improvements can be made in safety behaviour of prevention of falls, poisonings and drowning, especially in parents of a first child, and parents of children that are unable to crawl.

Question 2: What socio-demographic, family and psychosocial correlates are associated with unsafe parents' child safety behaviour?

Table 9.1 shows significant correlates of unsafe behaviour of parents with regard to falls, poisonings, and drowning, as reported in our studies from **chapter 2** and **chapter 3**.

These studies show that the age of the child is associated with more unsafe behaviour. When children grow older until the age of 12 months, parents behave more unsafe in the prevention of poisoning and drowning. Perhaps parents assume that their child does not need very strict protection when their child is older. For example, parents may think they can leave their child alone in the bathtub, not realizing that their child is still at risk of drowning. A small child can drown in a few centimetres of water at the bottom of the bathtub [3].

When children cannot crawl, parents show more unsafe behaviour, especially in installing a stair gate. They assume their child is not at risk of falls from the stairs. Parents, however, do not realize that they do not know exactly when their child will be able to crawl. The development of their child goes fast and suddenly the child is able to crawl and move themselves around the house. It is too late to take precautions than, and parents should be prepared for the safety of their child, before their child starts moving around.

Number of children is associated with various safety behaviours. We noticed that for most behaviour, families with one child behave more unsafely, except for unsupervised bathing. Apparently when parents have more children they are more likely to leave their child unsupervised in the bathtub. Maybe the parents are distracted by other children in the home and are therefore more inclined to leave their young child unsupervised in the bathtub. Another explanation could be that these parents rely on their older children to supervise their younger brother or sister during bathing, although this is not recommended [4]. Parents with one child behave more unsafe with regard to falls and poisoning. Interventions could therefore be aimed at parents who expect or just had their first child.

Highly educated mothers reported more unsafe behaviour compared to low educated mothers on prevention of falls and poisonings.

Ethnicity was associated with unsafe behaviour of parents, where fathers of non-Western ethnicity reported less unsupervised bathing, and mothers of non-Western ethnicity were more likely to store cleaning products unsafe.

In these studies we used the Protection Motivation Theory to assess psychosocial correlates of unsafe behaviour of parents. Parents with higher self-efficacy reported less inadequate use of a stair gate, less unsafe storage of cleaning products and medicines, and less unsupervised bathing. Parents with higher response efficacy reported less unsupervised bathing of their child. Parents with higher vulnerability reported more absence of stair gates and unsafe storages of cleaning products. Finally, parents with higher severity reported less absence of stair gates in their home and less unsupervised bathing of their young child.

A systematic review of the literature on correlates of parents' child safety behaviour with regard to the prevention of falls, poisoning, drowning, and burns showed that different correlates are associated with parents' safety behaviour (**chapter 4**). Thirty-four articles were included which identified various parental socio-demographic, family and psychosocial correlates of unsafe behaviour. Mixed findings were found on most factors dependent on the type of behaviour, but the majority of studies found lower levels of protective measures among non-white parents, single-parent families and low income families. We also identified a tendency towards less safe behaviours among parents with less perceived benefits, more perceived barriers, less knowledge, less self-efficacy, and lower perceived severity. The findings are comparable with the findings from our studies.

Interventions focusing on the prevention of falls, poisoning, drowning, and burns should be tailored to specific parental risk groups, and take the socio economic position, family structure and psychosocial correlates into account.

Question 3: How do parents and child health care professionals evaluate the use of Web-based, tailored safety advice to support counselling in routine well-child care?

A pilot study on the evaluation of a Web-based, tailored safety advice module (E-health4Uth home safety) showed that parents evaluated the Web-based, tailored safety advice module as easy to use, pleasant, reliable, understandable, relevant, and useful (**chapter 5)**. In this study, the use of E-health4Uth home safety to support counselling in routine well-child care visits was also evaluated. After the well-child visit, no significant differences were found between parents who received the Web-based, tailored safety advice and discussed this with their child health care professional and parents who received a safety information leaflet, which was discussed with their child health care

professional (control condition) with regard to the satisfaction with the information received. Health care professionals rated the tailored safety advice as adequate and useful. It is very important to know whether users of an intervention are satisfied with the contents of an intervention, before an intervention is implemented in daily practice. This study shows that parents and child health care professionals have no specific preference for one method of receiving safety information. In order to decide which method of providing safety advice could be used in daily practice, information about the effect of the intervention on psychosocial correlates and parents' child safety behaviours compared to the behaviours of parents in the control condition needs to be explored, as done in **chapter 7**, and **chapter 8**.

Question 4: What is the effect of Web-based, tailored safety advice combined with personal counselling on psychosocial correlates of parents' child safety behaviour?

Parents' child safety behaviour is directly influenced by environmental and personal factors [5-9]. We used Protection Motivation Theory for the influence of psychosocial correlates, which are associated with unsafe behaviour [8-16]. A randomized controlled trial on the effect of Web-based, tailored safety advice combined with personal counselling on psychosocial correlates showed that the E-health4Uth home safety intervention had only limited effects on psychosocial correlates compared to parents receiving counselling using a generic safety leaflet (**chapter 7**).

In 37 of 43 measured psychosocial correlates no statistically significant difference was found between parents in the intervention condition and parents in the control condition. Parents in the E-health4Uth home safety intervention condition had slightly, yet statistically significant, higher scores for six of 43 Protection Motivation Theory items measured compared to parents in the control condition. At follow-up, parents in the intervention condition reported a significantly higher self-efficacy of never leaving a child unsupervised in the bathtub and keeping a child out of the kitchen during cooking compared to parents in the control condition. Parents in the intervention condition reported a significantly higher response efficacy of using a stair gate and never drinking hot fluids with a child on their lap compared to parents in the control condition. Finally, parents in the intervention condition reported a significantly higher perceived severity of an injury with a swimming pool and hot water compared to parents in the control condition. However, when applying the Bonferroni correction, there remain no significant differences between the intervention and control condition on perceived self-efficacy, perceived response efficacy, and perceived severity scores at follow-up [17].

All psychosocial correlates were already relatively high, except for the perceived vulnerability of the child getting injured, giving little space for improvement. Perceived vulnerability remained low on all items, meaning that parents perceived there was a low risk of an injury could occur in their home. This could explain why parents did not take enough precautions in their home for the safety of their child. Perhaps a large effect could be retrieved here, when parents have more insight in the risks of their child to get injured. It could be possible that the E-health4Uth intervention does not give enough attention to the high risks of injuries at home, and could be improved on this item to get an effect on the perceived vulnerability. Another option to improve the intervention could be using other theoretical behavioural models, such as the 'Theory of Planned behaviour' [18]. This theory, however, does not include any items on risk perception and seems therefore less suitable to explain and influence safety behaviours.

Question 5: What is the effect of Web-based, tailored safety advice combined with personal counselling on parents' child safety behaviour?

The randomized controlled trial on the effect of Web-based, tailored safety advice combined with personal counselling on parents' child safety behaviours showed that compared to counselling with generic written materials, the E-health4Uth home safety intervention appeared to be effective in promoting several relevant parents' child safety behaviours (**chapter 8**). Concerning the prevention of falls, parents in the intervention condition showed significantly less unsafe behaviour at follow-up with regard to the top of the staircase (23.9% vs. 32.2%; OR 0.65, 95% CI 0.50-0.85); the bottom of the staircase (63.5% vs. 71.9%; OR 0.69, 95% CI 0.53-0.88); and the top and bottom of the staircase (68.9% vs. 78.3%; OR 0.62, 95% CI 0.48-0.81) compared to parents in the control condition. Concerning the prevention of poisoning, parents in the intervention condition showed significantly less unsafe behaviour with regard to the storage of cleaning products (30.3% vs. 39.9%; OR 0.67, 95% CI 0.53-0.85) compared to parents in the control condition. Concerning the prevention of drowning, parents in the intervention condition showed significantly less unsafe behaviour with regard to bathing of the child (23.5% vs. 32.2%; OR 0.65, 95% CI 0.51-0.84) compared to parents in the control condition. Concerning the prevention of burns, parents in the intervention condition showed significantly less unsafe behaviour with regard to drinking hot fluids (34.8% vs. 41.7%; OR 0.76, 95% CI 0.61-0.96) and using rear hotplates on the stove (79.3% vs. 85.3%; OR 0.67, 95% CI 0.50-0.90) compared to parents in the control condition.

There were no significant differences with regard to other specific behaviours between the two study conditions. At follow-up, parents in the intervention condition had a significantly lower total risk score [mean 13.6 (SD 6.1); range 1-33] compared to parents

in the control condition [mean 15.3 (SD 6.1); range 0-37] (beta coefficient -1.59, 95% CI -2.26; -0.93). The prevalence of unsafe behaviour, however, remains high.

The E-health4Uth intervention was effective on parents' child safety behaviour, while it had only limited effect on psychosocial correlates of parents' child safety behaviour and the prevalence of unsafe behaviour remains high. Since we know psychosocial correlates have an association with safety behaviour of parents, we would expect that improving the psychosocial correlates, where possible, might lead to more safe behaviour. However, the current intervention appeared to have changed the safety behaviour itself without affecting constructs of the Protection Motivation Theory. This could be the result of providing more safety knowledge to parents. On the other hand, because the prevalence of unsafe behaviour was still relatively high, more effect could possibly be achieved when also psychosocial correlates, such as perceived benefits of prevention, perceived vulnerability and self-efficacy are improved by interventions.

METHODOLOGICAL CONSIDERATIONS

The results of this thesis should be interpreted in light of some methodological considerations.

Study design

Cross-sectional studies

The results described in chapter 2 and 3 were based on a cross-sectional design to study parents' child safety behaviours and the associations of socio-demographic and psychosocial correlates and safety behaviour of parents of infants at one time point. During cross-sectional studies data can be collected on individual characteristics, including exposure to specific risk factors, and information about the outcome, in this case, safety behaviour. Cross-sectional studies are often used to determine prevalence and are useful at identifying associations [19, 20]. The samples are generally taken from the whole population. With limitations due to the cross-sectional design, the results can be used for public health planning, i.e. development of interventions and is considered efficient for generating stronger hypotheses for further research [19, 20]. It is important to note that because cross-sectional studies are carried out at one time point and give no indication of the sequence of events, it is impossible to infer causality [19, 20].

Randomized controlled trials

The studies described in chapter 5, 7 and 8 were part of two randomized controlled trials. Randomized controlled trials are experimental studies where the effect of an intervention is assessed by collecting data before and after an intervention has taken place [21]. In completely randomized designs, participants are allocated to an intervention at random with no matching or stratification [22]. Results from randomized controlled trials are considered stronger evidence for the effect of an intervention because internal validity of a randomized controlled trial is larger than for an observational study [23, 24]. In the randomized controlled trials we compared an intervention condition (E-health4Uth home safety intervention) with a control condition (care as usual; generic safety information leaflets). Because participants in our studies were randomly assigned to the intervention or control condition bias is minimised.

Measurements

The studies on this thesis used opportunity samples of preventive youth health care centres in the Netherlands. The use of an opportunity sample may have caused limited generalizability of our study results. Conducting the study in daily practice of preventive youth health care centres, which have a high attendance rate, is a strength of the study. Also, the follow-up at 6 months allows investigating the effect of the intervention within an appropriate time schedule in the development of the child.

All studies relied on data collected through self-reported questionnaires, assessing safe and unsafe behaviour of parents. Misclassification might have occurred, e.g. parents might have given socially desirable answers (overstating their safe behaviour) [25, 26]. This might have resulted in an underestimation of unsafe households, and bias in the assessment of significant correlates. On the other hand, validation studies showed that there is an acceptable agreement between parents reported safety behaviour and observations in homes of the parent [26].

The studies described in chapter 2, 3, 5, 7, and 8 were all carried out in the Netherlands.

Our sample consisted of a large amount of high educated parents, especially mothers. This response bias could have had an effect on the prevalence of safety behaviour we found in our studies, since high educated mothers reported more unsafe behaviour. In the general population, the prevalence of unsafe behaviour could therefore be lower compared to the prevalence in our study population. It is also possible that the intervention is (only) effective in higher educated parents. To know whether the intervention is effective in lower educated parents, future studies could focus on the effect of the intervention in this population.

It has been shown that low educated persons are less likely to participate in studies [27]. Possible reasons why low educated parents showed low participation in our study could be that they experience less trust in science, other priorities, or a barrier of reporting about safety behaviour out of fear of possible consequences (when their child health care professionals know about their safety behaviour).

The intervention focussed on multiple safety items in the prevention of falls, poisoning, drowning, and burns in and around the home of young children. One items with regard to the prevention of drowning, assessed the presence of a private swimming pool and a gate around the swimming pool. Since only three per cent of households had a private swimming pool present, this item is only relevant to a small part of the Dutch population. The intervention could be extended with other items, such as falls from changing units or couches, poisoning from eating plants, and burns from candles, lighters or matches and presence of smoke alarms, which are also items that are applicable to Dutch (and more general, global) households.

Non-response

Non-response is a common problem in studies. Response rates in surveys vary considerably. Low response rates might limit the generalizability of the results [28]. Furthermore, low response rates could limit the ability to get an accurate estimate of the intervention effect. Reminders can improve the response rate in surveys [29]. Techniques such as financial incentives are not associated with higher response rates [28]. The participation rate in the randomized controlled pilot study was low, 32%. Reasons for the relatively low participation rate could be the relatively high burden for study participants, the requirement of written informed consent, and the lack of sending reminders in this study. There was no data available on the characteristics of parents who did not wish to participate in this study. In this study the results with regard to the evaluations after the preventive youth health care visits should be interpreted with utmost care, since non-response bias may have occurred, and given the relatively low numbers of completed forms. Furthermore, the evaluation of the well-child visit could depend on more items than just the ones we measured in this study.

In the randomized controlled trial of the effect-evaluations we used several techniques to minimise this non-response, i.e. maximum of two mail reminders and one telephone reminders. The participation rate in the randomized controlled trial of the E-health4Uth module was 45%. Because of the study design, participants were invited to complete more than one questionnaire. Also, this study required participants to have access to the Internet, in order to take part in the intervention module. This may have contributed to the low participation rate, because participants may have concerns for their privacy

and confidentiality of their responses [30]. There was no data available on the characteristics of parents who did not wish to participate in this study. It is difficult to ascertain whether the associations found would be different in non-responders. Response rates of the E-health4Uth intervention was high, 91%, and of the follow-up questionnaire was also very high, 93%. This could be due to the extensive use of reminders, i.e. mailed reminders and telephone calls to participants.

FUTURE RESEARCH

The results presented in this thesis have several implications for future research. The following recommendations for future research could be made.

Further research is needed to **explore other safety behaviours** as well in and around the home (such as falls from changing units, poisoning from plants) as in the environment of the child (such as car safety, bicycle safety, and playground safety). The intervention could then be improved by adding other relevant safety items.

Furthermore, it could be explored whether **the intervention could also be applied to parents of children of other age groups** when the contents of the intervention are modified to that age group.

Associations found in cross-sectional studies can be confirmed by longitudinal data to explore possible predictive relations between determinants of behaviour and safety behaviour. Childhood injury prevention research could be embedded in cohort studies [31].

Before implementing the intervention in daily practice, **information on the perceptions of child health care professionals and other users of the intervention about possible barriers and facilitators** that could be encountered with implementation of the intervention should be assessed. This could be done by qualitative research, for example focus groups.

In current daily practice the child health care professional provides health education on subjects he or she thinks are important for the parent. Research could focus on what the **reasons are for child health care professionals to choose specific subjects to discuss** with the parent at the well-child visit, and how tailored advice could help the child health care professional to provide useful information for each parent, not only

for safety education, but for various health topics, such as nutrition, sleep, and physical activity.

For the present study, since most well-child visits did not involve a vaccination (which is in the Netherlands associated with a high attendance), we might assume that circa 50% of the invited parents attended the scheduled visit. In future studies, we **recommend the use of digital patient files to record attendance to the scheduled visits and the topics that were discussed during these visits**. Brief evaluation questions may be integrated in such digital patient files with informed consent from the study participants.

The tailored safety advice was discussed with only half of the parents who completed the E-health4Uth module, at the regular well-child visit with their child health care professional. **The influence of discussing the tailored safety advice on parents' safety behaviour** needs to be further explored in order to see whether the discussion leads to more safe behaviour. A study done by Nansel, et al showed that discussing the tailored safety advice with their child health care professional was associated with significantly greater behaviour change of parents in the E-health4Uth intervention condition, compared to parents in the control condition [32]. Perhaps an even greater effect could have been achieved if the tailored safety advice was discussed in all cases. On the other hand, future research could also focus on **studying whether Web-based, tailored advice could replace a well-child visit** in specific situations.

Although we know that psychosocial correlates of the Protection Motivation Theory are associated with parents' child safety behaviour, the effect of the E-health4Uth home safety intervention on these psychosocial correlates is limited. Further research could be done on **how the intervention could be improved**, possibly with other theoretical models, in order to improve the psychosocial correlates of safety behaviour. Perhaps an even higher effect on parents' child safety behaviour could then be achieved.

Finally, it could be studied whether the intervention is **also effective in other populations**, such as lower educated parents or non-Dutch speaking parents.

IMPLICATIONS FOR PRACTICE

The results from the cross-sectional studies imply that in order to change undesirable parental beliefs and, more importantly, parental behaviours, physicians and nurses may contribute to the safety education of parents about the risks and consequences of injuries in and around the home of young children. Parents need to be informed about

the risks and we recommend discussing possible safety solutions for this issue during the well-child visits at the preventive youth health care centres. Interventions could particularly be aimed at parents who expect or just had their first child, since there is especially a need for improvement here. They could be informed not to wait with taking safety measures until the moment their child starts crawling and moving around.

Findings from the randomized controlled trials support the use of a tailored education approach involving the provision of tailored safety information. The tailored safety information was found to be more effective than generic safety information in promoting preventive behaviour. Providing tailored safety information prior to a visit at the well-baby clinic might be more efficient, because parents and child healthcare professionals can better prepare for the visit in which safety at home is discussed [33-36]. Moreover, the parents receive more specific information because it is tailored to the personal situation of the parent [37]. Furthermore, parents and youth health care professionals are satisfied with the E-health4Uth module and the use of tailored safety advice during well-child visits. For an intervention to be successful in daily practice the feasibility and acceptability of an intervention could be important.

Daily practice of youth health care has a high reach (up to 93%) [38] and is very suitable for providing safety education to parents of young children. Currently, the Safety Information Leaflets are well embedded in daily practice of youth health care. Parents receive their Safety Information leaflet at the well-child visit at specific ages of the child. Perhaps the Safety Information Leaflet could be provided to the parents, even electronically, before the well-child visit. This way, parents have the possibility to read the Safety information Leaflet before the well-child visit and they can ask the child health care professional specific questions about the safety of their home. Child health care professionals may play an important role in the prevention of unintentional injuries in and around the home of young children. The well-child visit at youth health care centres have a high attendance rate [38].

All parties involved in the prevention of unintentional injuries, such as child health care professionals, the government and other experts should work closely together companies in order to improve parents' child safety behaviour, resulting in reducing the number of unintentional injuries. The child health care professionals may play a key role in this cooperation [39].

The E-health4Uth intervention shows a positive effect on parents' child safety behaviour. On the other hand, unsafe behaviour still remains prevalent. Before implementing the intervention in daily practice, the intervention could be further optimized. Youth health

care professionals could play an important role in determining possible barriers of implementing the intervention in daily practice.

GENERAL CONCLUSION

Socio-demographic, family and psychosocial correlates are associated with parents' child safety behaviour. However, specific correlates are associated with specific safety behaviours. Interventions focusing on the prevention of falls, poisoning, drowning, and burns should be tailored to specific parental risk groups, and take the socio economic position, family structure and psychosocial correlates into account.

Despite current generic safety information and its successful use in preventive youth health care, still many parents do not show safe behaviour with regard to the prevention of unintentional injuries, causing children to be unnecessary at risk. A Web-based, tailored safety advice module combined with personal counselling is effective in changing various parents' child safety behaviours. Parents and youth health care professionals are satisfied with the use of the intervention in daily practice. In order to achieve an even greater effect of the intervention, the intervention could be further optimized and broadly implemented in daily practice of child health care.

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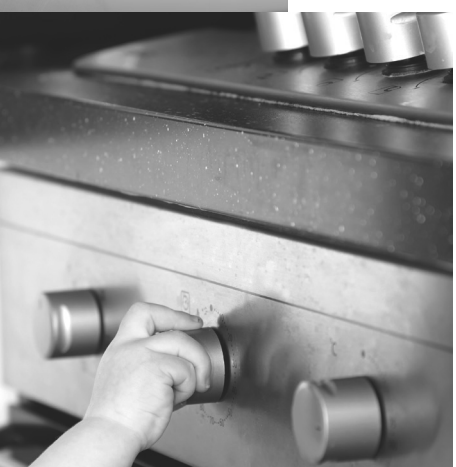
Summary / Samenvatting










SUMMARY

Unintentional injury is a major cause of death of children throughout the world. Unintentional injuries are also a major cause of disabilities and loss of quality of live, which can have a long-lasting impact on all facets of children's lives, i.e. relationships, learning and play, and their parents' lives. In the Netherlands, unintentional injuries are the problem with the largest impact on population health among children. Each year, still many children are medically treated or even die due to an unintentional injury in and around the home. Among preschool children, toddlers have the highest risk of getting injured.

Promoting healthy behaviour of parents is important in order to reduce the number of unintentional injuries in young children. This thesis presents studies on the prevention of unintentional injuries in and around the home with regard to falls, poisoning, drowning, and burns. In order to develop effective intervention strategies to improve parents' child safety behaviour, and prevent unintentional injuries, insight into underlying correlates of unsafe behaviour is necessary. Behaviours are influenced by a complex, interrelated set of determinants, which include various socio-demographic (e.g. gender, educational level, ethnicity) and psychosocial correlates. In this thesis we used the Protection Motivation Theory (PMT) to assess the influence of psychosocial correlates on parents' child safety behaviours; i.e. perceived self-efficacy, perceived response efficacy, perceived vulnerability, and perceived severity.

In part 1 of this thesis we explored parents' child safety behaviour and the socio-demographic, family and psychosocial correlates of unsafe behaviour of parents by conducting a youth health care-based study and a review of the literature. Prevention of unintentional injuries could result from promoting parents' child safety behaviour. It may be induced through promotion of the application of safety devices, like stair gates, window guards or locks on cabinets with poisonous products, or by conducting safe behaviour, like always closing a stair gate, never leaving a child unsupervised in the bathtub or never drinking hot fluids with a child on your lap.

Education and counselling provided by youth health care professionals may positively impact parents' child safety behaviours. Tailored information is thought to promote behaviour change by providing personally-relevant feedback. Although (online) computer-tailored interventions seem to have a beneficial effect on adult behaviours compared to generic information or no information, there is no evidence for the efficacy of a tailored intervention on specific parents' child safety behaviour in the prevention of unintentional injuries.

In part 2 of this thesis we evaluated an intervention to promote parents' child safety behaviour by conducting two preventive youth health care-based randomized controlled trials. An E-health4Uth home safety intervention with Web-based, tailored safety information was developed, pilot-tested and applied. This concerns Web-based, tailored safety information in combination with personal counselling at well-baby clinics on safety behaviours required for their child at home. The intervention aims at 4 major topics on safety in and around the home of children aged 12 to 24 months; prevention of falls, poisoning, drowning and burns.

The following research questions are addressed in this thesis:

Question 1: What preventive measures do parents take to avoid unintentional injuries?

A cross-sectional study showed that of the parents who bathe their child, one in 16 parents left their child unsupervised in the bathtub (**chapter 2**). The percentage of children who were left unsupervised in the bathtub rose with increasing age. These children were aged less than twelve months. These children may be able to sit up unsupported, although some are still unable to right themselves if they fall over in the bathtub.

A second study aimed at the safety behaviour of first-time parents, with regard to the prevention of falls and poisoning (**chapter 3**). Overall, regardless of number of children or crawling abilities, over half of parents reported to have no stair gate installed, 41% reported inadequate use of the stair gate, over half of parents reported to have no window guard present. Furthermore, 60% of parents reported to store their cleaning products unsafe, and 38% stored their medicines unsafe. If their infant could not crawl, more first-time parents had not installed a stair gate (89%) than first-time parents with an infant that could crawl (75%). If their infant could not crawl, more first-time parents stored medicines unsafely (54%) than first-time parents with an infant that could crawl (43%). There were no differences in the safety behaviours between non-first-time parents whose infant could crawl and those whose infants could not crawl.

These studies show that still a lot of parents do not take enough precautions to protect their children from an unintentional injury.

Question 2: What socio-demographic and psychosocial factors are associated with unsafe parents' child safety behaviour?

The studies described in **chapter 2** and **chapter 3** show that the age of the child is associated with more unsafe behaviour. When children are older, parents behave more unsafely in the prevention of poisoning and drowning. When children cannot crawl, parents show more unsafe behaviour, especially in installing a stair gate. They assume

their child is not at risk of falls from the stairs. Parents, however, do not realize that they do not know exactly when their child will be able to crawl.

Number of children is associated with various safety behaviours. We noticed that for most behaviours, families with one child behave more unsafely than families with more than one child, except for unsupervised bathing. Apparently when parents have more children they are more likely to leave their child unsupervised in the bathtub. Parents with one child behave more unsafely with regard to falls and poisoning.

Highly educated mothers reported more unsafe behaviour compared to low educated mothers with regard to falls and poisonings and ethnicity was associated with unsafe behaviour of parents, where fathers of non-Western ethnicity reported less unsupervised bathing, and mothers of non-Western ethnicity were more likely to store cleaning products unsafe.

In these studies we used the Protection Motivation Theory to assess psychosocial correlates of unsafe behaviour of parents. Parents with higher self-efficacy reported less inadequate use of a stair gate, less unsafe storage of cleaning products and medicines, and less unsupervised bathing. Parents with higher response efficacy reported less unsupervised bathing of their child. Parents with higher vulnerability reported more absence of stair gates and unsafe storages of cleaning products. Finally, parents with higher severity reported less absence of stair gates in their home and less unsupervised bathing of their young child.

A systematic review of the literature on correlates of parents' child safety behaviour with regard to the prevention of falls, poisoning, drowning, and burns showed that different correlates are associated with parental safety behaviour (**chapter 4**). Mixed findings were found on most studied factors dependent on the type of behaviour. We could not identify consistent directions of the associations between parental age, educational level and employment status on the one hand and parental safety behaviours on the other. But a majority of studies found a negative association between parental race/ethnicity and unsafe behaviour, where white parents reported less unsafe behaviour. With respect to family characteristics, a majority of studies found that parents receiving lower family income and single-parent families behave more unsafely in the prevention of falls, poisoning, drowning and burns. For other family characteristics no consistent direction of the association with safety behaviour could be observed. We were able to identify a tendency towards less safe behaviours among parents with specific psychosocial characteristics, such as less perceived benefits, more perceived barriers, less knowledge, less self-efficacy, and lower perceived severity.

Interventions focusing on the prevention of falls, poisoning, drowning, and burns should be tailored to specific parental risk groups, and take the socio economic position, family structure and psychosocial correlates into account.

Question 3: How do parents and child health care professionals evaluate the use of Web-based, tailored safety advice to support counselling in routine well-child care?

A pilot study on the evaluation of a Web-based, tailored safety advice module (E-health4Uth home safety) showed that parents evaluated the Web-based, tailored safety advice module as easy to use, pleasant, reliable, understandable, relevant, and useful (**chapter 5)**. In this study, the use of E-health4Uth home safety to support counselling in routine well-child care visits was also evaluated. After the well-child visit, no significant differences were found between parents who received the Web-based, tailored safety advice and discussed this with their child health care professional and parents who received a safety information leaflet, which was discussed with their child health care professional with regard to the satisfaction with the information received. Health care professionals rated the tailored safety advice as adequate and useful. This study showed that parents and child health care professionals had no specific preference for one method of receiving safety information. In order to decide which method of providing safety advice could be used in daily practice, information about the effect of the intervention on parents' child safety behaviour compared to the behaviours of parents in the control condition needed to be explored, as done in **chapter 7**, and **chapter 8**.

Question 4: What is the effect of Web-based, tailored safety advice combined with personal counselling on psychosocial factors of parents' child safety behaviour?

Parents' child safety behaviour is directly influenced by environmental and personal factors. We used Protection Motivation Theory constructs for the influence of psychosocial factor, which are associated with unsafe behaviour. A randomized controlled trial on the effect of Web-based, tailored safety advice combined with personal counselling on Protection Motivation Theory constructs showed that the E-health4Uth intervention had only limited and small effects on Protection Motivation Theory constructs (**chapter 7**).

In 37 of 43 measured Protection Motivation Theory constructs no statistically significant difference was found between parents in the intervention condition and parents in the control condition. Parents in the E-health4Uth home safety intervention condition had slightly, yet statistically significant, higher scores for six of 43 Protection Motivation Theory items measured compared to parents in the control condition. At follow-up, parents in the intervention condition reported a significantly higher self-efficacy of never leaving a child unsupervised in the bathtub and keeping a child out of the kitchen

during cooking compared to parents in the control condition. Parents in the intervention condition reported a significantly higher response efficacy of using a stair gate and never drinking hot fluids with a child on their lap compared to parents in the control condition.

All Protection Motivation Theory constructs were already relatively high, except for the perceived vulnerability of the child getting injured, giving little space for improvement. Perceived vulnerability remained low on all items, meaning that parents perceived there was a low risk of an injury could occur in their home. This could explain why parents did not take enough precautions in their home for the safety of their child.

Question 5: What is the effect of Web-based, tailored safety advice combined with personal counselling on parents' child safety behaviour?

The randomized controlled trial on the effect of Web-based, tailored safety advice combined with personal counselling on parents' child safety behaviours showed that compared to counselling with generic written materials, the E-health4Uth home safety intervention appeared to be effective in promoting several relevant parents' child safety behaviours (**chapter 8**). Concerning the prevention of falls, parents in the intervention condition showed significantly less unsafe behaviour at follow-up with regard to the top of the staircase (24% vs. 32%); the bottom of the staircase (63% vs. 72%); and the top and bottom of the staircase (69% vs. 78%) compared to parents in the control condition. Concerning the prevention of poisoning, parents in the intervention condition showed significantly less unsafe behaviour with regard to the storage of cleaning products (30% vs. 40%) compared to parents in the control condition. Concerning the prevention of drowning, parents in the intervention condition showed significantly less unsafe behaviour with regard to bathing of the child (24% vs. 32%) compared to parents in the control condition. Concerning the prevention of burns, parents in the intervention condition showed significantly less unsafe behaviour with regard to drinking hot fluids (35% vs. 42%) and using rear hotplates on the stove (79% vs. 85%) compared to parents in the control condition.

There were no significant differences with regard to other specific behaviours between the two study conditions. At follow-up, parents in the intervention condition had a significantly lower total risk score [mean 13.6 (SD 6.1); range 1-33] compared to parents in the control condition [mean 15.3 (SD 6.1); range 0-37]. The prevalence of unsafe behaviour, however, remains high.

Finally, in **chapter 9**, study findings were integrated and the main results for the research questions were summarized and discussed. Implications of the results for future research

and practice are presented. One of the main conclusions is that socio-demographic, family and psychosocial correlates are associated with parents' child safety behaviour. However, specific correlates are associated with specific safety behaviours. Interventions focusing on the prevention of falls, poisoning, drowning, and burns should be tailored to specific parental risk groups, and take the socio economic position, family structure and psychosocial correlates into account. Furthermore, despite current generic safety information and its successful use in preventive youth health care, still many parents do not show safe behaviour with regard to the prevention of unintentional injuries, causing children to be unnecessary at risk. A Web-based, tailored safety advice module combined with personal counselling is effective in changing various parents' child safety behaviours. Parents and youth health care professionals are satisfied with the use of the intervention in daily practice. This novel approach should be further developed and evaluated to accomplish further behavioural improvements and reductions of unintentional childhood injuries.

SAMENVATTING

Ongevallen zijn een belangrijke doodsoorzaak van kinderen over de hele wereld. Ongevallen zijn ook een belangrijke oorzaak van letsel en verlies van kwaliteit van leven, welke langdurige impact kunnen hebben op alle facetten van het leven van kinderen, zoals relaties, leren en spelen, en het leven van hun ouders. In Nederland zijn ongevallen het gezondheidsprobleem dat de meest ziektelast veroorzaakt bij kinderen. Elk jaar worden nog steeds veel kinderen behandeld bij de huisarts of op de eerste hulp en sterven zelfs kinderen als gevolg van een ongeval. De meeste ongevallen gebeuren bij kinderen van één tot twee jaar oud.

Om het aantal ongevallen van jonge kinderen terug te dringen is het bevorderen van veiligheidsgedrag van ouders belangrijk. Dit proefschrift beschrijft studies over de preventie van ongevallen in en om het huis met betrekking tot vallen, vergiftigen, verdrinken en verbranden. Om effectieve interventies te kunnen ontwikkelen, welke het veiligheidsgedrag van ouders bevorderen en daarmee ongevallen kunnen worden voorkomen, is inzicht nodig in onderliggende correlaten van onveilig gedrag. Gedrag wordt beïnvloed door complexe, samenhangende determinanten welke bestaan uit verschillende sociaal-demografische (zoals geslacht, opleidingsniveau en etniciteit) en psychosociale correlaten. In dit proefschrift maken we gebruik van de Protectie Motivatie Theorie om de invloed van psychosociale correlaten op veiligheidsgedrag van ouders te onderzoeken, bestaande uit de eigen-effectiviteit, response-effectiviteit, kwetsbaarheid en ernst.

In deel 1 van dit proefschrift hebben we het veiligheidsgedrag van ouders en de sociaal-demografische en psychosociale correlaten van onveilig gedrag onderzocht met een studie uitgevoerd in de preventieve Jeugdgezondheidszorg en een literatuuronderzoek.

Preventie van ongevallen bevat onder andere promotie van veiligheidsgedrag van ouders. Dit kan bestaan uit het installeren van veiligheidsproducten zoals traphekjes, raambeveiliging of veiligheidssloten op kastjes met giftige producten, maar ook uit veilig gedrag zoals altijd het traphekje sluiten, een kind niet alleen laten in bad of nooit hete dranken drinken met een kind op schoot.

Voorlichting en counseling door Jeugdgezondheidszorg professionals kan een positief effect hebben op het veiligheidsgedrag van ouders. Advies-op-Maat kan het gedrag bevorderen door het geven van persoonlijke, relevante feedback. Advies-op-Maat interventies lijken een positief effect te hebben op gedrag van volwassen, vergeleken met

generieke informatie of helemaal geen informatie. Er is geen bewijs dat een Advies-op-Maat interventie effectief is op het veranderen van specifieke veiligheidsgedragingen van ouders in de preventie van ongevallen.

In deel 2 van dit proefschrift hebben we een Advies-op-Maat interventie over het bevorderen van veiligheidsgedrag van jonge ouders onderzocht in twee studies uitgevoerd in de Jeugdgezondheidszorg (gerandomiseerde trials). Hiervoor is een E-health4Uth veiligheidsinterventie bestaande uit online Advies-op-Maat ontwikkeld en toegepast. Het bestaat uit online Advies-op-Maat, gecombineerd met persoonlijke counseling op het consultatiebureau over veiligheidsgedrag in en om het huis van jonge kinderen. De interventie richt zich op vier grote onderwerpen van veiligheid in en om het huis van kinderen van 12 tot 24 maanden, namelijk de preventie van vallen, vergiftigen, verdrinken en verbranden.

De volgende onderzoeksvragen worden behandeld in dit proefschrift:

Onderzoeksvraag 1: Welke preventieve maatregelen nemen ouders om ingevallen te voorkomen?

De resultaten van een cross-sectionele studie laten zien dat van de ouders die hun kind in bad doen één op 16 ouders hun kind alleen laat in het bad (**hoofdstuk 2**). Het percentage kinderen dat alleen werd gelaten in bad nam toe met de leeftijd van het kind. Deze kinderen waren allemaal jonger dan 12 maanden. Kinderen jonger dan 12 maanden kunnen wel zelfstandig rechtop zitten, maar een groot aantal kinderen kunnen niet zelf rechtop gaan zitten als ze omvallen in bad.

Een tweede studie richt zich op het veiligheidsgedrag van ouders van een eerste kind, met betrekking tot de preventie van vallen en vergiftigen (**hoofdstuk 3**). Ongeacht het aantal kinderen en ongeacht of de kinderen kunnen kruipen of niet had meer dan de helft van de ouders geen traphekje geïnstalleerd, 41% gebruikte het traphekje niet adequaat en meer dan de helft van de ouders had geen raambeveiliging geïnstalleerd. Verder had 60% van de ouders hun schoonmaakmiddelen en 38% hun medicijnen onveilig opgeborgen in huis. Meer ouders van een eerste kind dat niet kon kruipen (89%) had geen traphekje geïnstalleerd dan ouders van een eerste kind dat al wel kon kruipen (75%). Meer ouders van een eerste kind dat niet kon kruipen (54%) had medicijnen onveilig opgeborgen dan ouders van een eerste kind dat al wel kon kruipen (43%). Er werden geen verschillen gevonden in veiligheidsgedrag van ouders met meerdere kinderen wiens kinderen al wel konden kruipen en wiens kinderen nog niet konden kruipen.

Deze studies laten zien dat veel ouders nog steeds onvoldoende maatregelen nemen om hun kind te beschermen tegen een ongeval.

Onderzoeksvraag 2: Welke sociaal-demografische en psychosociale factoren zijn geassocieerd met onveilig gedrag van ouders?

De studies beschreven in **hoofdstuk 2** en **hoofdstuk 3** laten zien dat de leeftijd van het kind is geassocieerd met meer onveilig gedrag. Wanneer kinderen ouder zijn vertoonden ouders meer onveilig gedrag met betrekking tot vergiftigen en verdrinken.

Wanneer kinderen niet konden kruipen gedroegen ouders zich onveiliger, met name bij het installeren van een traphekje. Ze schatten het risico op een val van de trap laag in. Ouders beseffen mogelijk niet dat ze nooit precies kunnen weten wanneer hun kind zal gaan kruipen.

Het aantal kinderen was geassocieerd met verschillende veiligheidsgedragingen. We vonden dat voor de meeste veiligheidsgedragingen, ouders met één kind zich onveiliger gedroegen dan ouders met meerdere kinderen, behalve voor het alleen laten in bad. Wanneer ouders meer dan één kind hebben lieten ze hun kind vaker alleen in bad. Ouders met één kind gedroegen zich meer onveilig met betrekking tot vallen en vergiftigen.

Hoog opgeleide moeders rapporteerden meer onveilig gedrag dan laag opgeleide moeder met betrekking tot vallen en vergiftigen en ook etniciteit was geassocieerd met onveilig gedrag van ouders. Vaders van niet-Westerse etniciteit lieten hun kind minder vaak alleen in bad dan Westerse vaders en niet-Westerse moeder bewaarden schoonmaakmiddelen vaker onveilig.

In deze studies gebruikten we de Protectie Motivatie Theorie om psychosociale correlaten van onveilig gedrag te bestuderen. Ouders met een hogere eigen-effectiviteit gebruikten het traphekje vaker, bewaarden schoonmaakmiddelen en medicijnen veiliger en lieten hun kind minder vaak alleen in bad. Ouders met een hogere ervaren kwetsbaarheid, hadden minder vaak een traphekje geïnstalleerd en bewaarden schoonmaakmiddelen onveilig. Ouders met een hogere mate van ervaren ernst, hadden vaker een traphekje in huis geïnstalleerd en lieten hun jonge kind minder vaak alleen in bad.

Een literatuuronderzoek over determinanten van veiligheidsgedrag van ouders met betrekking tot de preventie van vallen, vergiftigen, verdrinken en verbranden laat zien dat verschillende correlaten geassocieerd zijn met veiligheidsgedrag van ouders (**hoofdstuk 4**). Er was geen consistente richting van de associaties tussen leeftijd van

de ouders, opleidingsniveau en werksituatie en veiligheidsgedrag. Een meerderheid van de studies vond een negatieve associatie tussen etniciteit en onveilig gedrag, waar blanke ouders minder onveilig gedrag lieten zien. In onderzoek waarin gekeken werd naar familiekenmerken vonden de meeste studies dat ouders met een laag inkomen en alleenstaande ouders zich onveiliger gedroegen met betrekking tot vallen, vergiftigen, verdrinken en verbranden. Bij andere familiekenmerken werd geen consistente richting van de associatie met onveilig gedrag gevonden. Ouders die weinig voordelen ervaren, meer barrières, minder kennis hebben, lage eigen-effectiviteit en lage ernst ervaren, gedroegen zich onveiliger.

Interventies welke zich richten op de preventie van vallen, vergiftigen, verdrinken en verbranden zouden gericht kunnen worden op specifieke risicogroepen en rekening kunnen houden met sociaaleconomische status, familie structuur en psychosociale correlaten.

Onderzoeksvraag 3: Hoe evalueren ouders en Jeugdgezondheidszorg professionals het gebruik van een online Advies-op-Maat programma om counseling te ondersteunen op het consultatiebureau?

Een pilotstudie van de evaluatie van een online Advies-op-Maat veiligheidsinterventie (E-health4Uth veiligheid) liet zien dat ouders de interventie makkelijk in het gebruik, prettig, betrouwbaar, relevant en bruikbaar vinden (**hoofdstuk 5**). In deze studie werd ook het gebruik van de E-health4Uth interventie tijdens het bezoek aan het consultatiebureau geëvalueerd. Na het bezoek werden geen significante verschillen gevonden tussen ouders die Advies-op-Maat gecombineerd met persoonlijke counseling kregen en ouders die een generieke veiligheidsinformatiekaart bespraken met hun jeugdgezondheidszorg professional met betrekking tot de tevredenheid over de informatie die zij ontvingen. Jeugdgezondheidszorg professionals evalueerden het Advies-op-Maat als adequaat en bruikbaar. Deze studie liet zien dat ouders en jeugdgezondheidszorg professionals geen specifieke voorkeur hadden voor een methode van het geven van veiligheidsvoorlichting. Om te kunnen beslissen welke methode gebruikt kan worden in de dagelijkse zorg is informatie nodig over het effect van de interventie op veiligheidsgedrag van ouders, zoals is onderzocht in **hoofdstuk 7** en **hoofdstuk 8**.

Onderzoeksvraag 4: Wat is het effect van online, Advies-op-Maat veiligheid gecombineerd met persoonlijke counseling op psychosociale factoren van veiligheidsgedrag van ouders?

Veiligheidsgedrag van ouders wordt direct beïnvloed door omgevings- en persoonlijke factoren. We gebruikten de Protectie Motivatie Theorie om de invloed van psychosociale factoren geassocieerd met veiligheidsgedrag te bestuderen. Een gerandomiseerde trial

over het effect van online, Advies-op-Maat veiligheid gecombineerd met persoonlijke counseling op de Protectie Motivatie constructen liet zien dat de interventie beperkte effecten had op de Protectie Motivatie Theorie constructen (**hoofdstuk 7**).

Bij 37 van 43 gemeten constructen werd geen significant verschil gevonden tussen ouders in de interventiegroep en ouders in de controle groep. Ouders, die de E-health4Uth veiligheidsinterventie kregen, hadden een kleine, doch significante, hogere score bij zes van 43 Protectie Motivatie Theorie constructen vergeleken met ouders in de controle groep. Tijdens follow-up hadden ouders in de interventie groep een significant hogere eigen-effectiviteit om hun kind nooit alleen te laten in bad en het kind uit de keuken houden tijdens het koken. Ouders in de interventie conditie hadden een hogere response-effectiviteit met betrekking tot het gebruiken van een traphekje en nooit hete dranken drinken met een kind op schoot vergeleken met de controle groep.

Alle Protectie Motivatie Theorie constructen waren al relatief hoog op baseline, behalve ervaren kwetsbaarheid, waardoor er weinig ruimte voor verbetering was. Ervaren kwetsbaarheid bleef laag op alle items, wat betekent dat ouders het risico op een ongeval laag inschatten. Dit kan verklaren waarom ouders nog niet voldoende voorzorgsmaatregelen nemen in hun huis om hun kind te beschermen.

Onderzoeksvraag 5: Wat is het effect van online, Advies-op-Maat veiligheid gecombineerd met persoonlijke counseling op veiligheidsgedrag van ouders?

De gerandomiseerde trial van het effect van online Advies-op-Maat veiligheid gecombineerd met persoonlijke counseling op veiligheidsgedrag van ouders liet zien dat vergeleken met counseling met generieke veiligheidsinformatie, de E-health4Uth veiligheidsinterventie effectief was in het verbeteren van diverse veiligheidsgedragingen van ouders (**hoofdstuk 8**). In de preventie van vallen gedroegen ouders in de interventiegroep zich significant minder onveilig tijdens follow-up met betrekking tot veiligheid boven aan de trap (24% vs. 32%), beneden aan de trap (63% vs. 72%) en veiligheid boven en beneden aan de trap(69% vs. 78%) vergeleken met ouders in de controlegroep. In de preventie van vergiftiging gedroegen ouders in de interventiegroep zich significant minder onveilig tijdens follow-up met betrekking tot het bewaren van schoonmaakmiddelen vergeleken met ouders in de controle groep (30% vs. 40%). In de preventie van verdrinken gedroegen ouders in de interventiegroep zich significant minder onveilig met betrekking tot het in bad doen van hun kind vergeleken met de controlegroep (24% vs. 32%). En in de preventie van verbranden gedroegen ouders zich significant minder onveilig met betrekking tot het drinken van hete dranken met hun kind op schoot (35% vs. 42%) en het gebruiken van de achterste pitten op het fornuis (79% vs. 85%) vergeleken met ouders in de controlegroep. Er waren geen significante verschillen met

betrekking tot ander specifieke gedragingen tussen de twee studiegroepen. Tijdens follow-up hadden ouders in de interventiegroep een significant lagere totale risico score [mean 13.6 (SD 6.1); range 1-33] vergeleken met ouders in de controle groep [mean 15.3 (SD 6.1); range 0-37]. De prevalentie van onveilig gedrag bleef echter wel hoog.

Ten slotte wordt in **hoofdstuk 9** een samenvatting gegeven van de gevonden resultaten en worden deze bediscussieerd. Implicaties voor toekomstig onderzoek en de praktijk worden besproken. Eén van de belangrijkste conclusies is dat socio-demografische, familie en psychosociale correlaten geassocieerd zijn met veiligheidsgedrag van ouders. Interventie welke zich richten op de preventie van vallen, vergiftigen, verdrinken en verbranden kunnen zich richten op specifieke risico groepen en kunnen rekening houden met de sociaaleconomische positie, familie samenstelling en psychosociale kenmerken van ouders. Verder is, ondanks het succesvolle gebruik van het huidige generieke veiligheids-voorlichtingsmateriaal in de jeugdgezondheidszorg, het onveilige gedrag van ouders met betrekking tot de preventie van ongevallen hoog. Dit kan leiden tot een onnodige blootstelling aan gevaar van jonge kinderen. De E-health4Uth interventie met Advies-op-Maat gecombineerd met persoonlijke counseling is effectief in het verbeteren van veiligheidsgedrag van ouders. Ouders en jeugdgezondheidszorg professionals zijn tevreden met het gebruik van de interventie in de dagelijkse praktijk. Deze nieuwe aanpak moet verder worden ontwikkeld en geëvalueerd om verdere gedragsverbetering en een afname van het aantal kinderongevallen te bereiken.

Dankwoord
About the author
Publications
PhD Portfolio

DANKWOORD

Nu alles af is, wordt het tijd om de mensen te bedanken die op wat voor manier dan ook hebben bijgedragen aan de totstandkoming van dit proefschrift. Als eerste mijn promotor Hein Raat. Hein, bedankt dat je mij de mogelijkheid hebt gegeven om dit project om te zetten in een proefschrift. Ik waardeer je persoonlijke betrokkenheid in zowel de begeleiding tijdens het gehele project als daarbuiten. Mijn copromotor, Tinneke Beirens. Tinneke, bedankt voor je hulp, steun en begeleiding tijdens dit traject. Ik vond het fijn dat ik altijd even bij je binnen kon lopen. Door jouw ervaring in het doen van veiligheidsonderzoek heb ik veel van je kunnen leren. Mijn tweede copromotor Ed van Beeck. Ed, ik wil je hartelijk bedanken voor de waardevolle samenwerking en je begeleiding gedurende het traject naar deze dag toe. Ik heb enorm veel aan je expertise gehad. Ik vond het bijzonder leuk om als afsluiting nog samen aan een mooi project te werken. De leden van de kleine commissie, Prof.dr. A.J. van der Heijden, Prof.dr. F.J.M. Feron en Prof.dr. J.J. van Busschbach en de grote commissie, wil ik graag bedanken voor de aandacht die ze aan mijn proefschrift hebben besteed. Het enthousiasme van de Jeugdgezondheidszorgorganisaties is erg belangrijk geweest in het goede verloop van het onderzoek, bedankt voor jullie deelname. Ik wil speciaal alle ouders bedanken voor hun deelname aan het BeSAFE onderzoek. Ik wil alle andere co-auteurs bedanken voor hun bijdrage aan de artikelen. Mijn paranimfen Mirjam en Mariëlle. Mirjam, van het begin tot het eind heb je dit traject meegemaakt, zowel op het werk als daarbuiten. Beginnend bij mijn sollicitatie voor deze functie, als kamergenootje, als afsluiting, mijn promotie en alles daar tussenin. Mariëlle, als kamergenootje kon ik lief en leed met je delen. Ik kon de kunst mooi van je afkijken. Ik ben blij en trots dat jullie als paranimfen naast me staan op deze bijzondere dag. Dagmar, je was een gezellige kamergenoot. Bedankt voor het luisteren naar mijn Word-doet-niet-wat-ik-wil taferelen. Amy, we gingen mooi gelijk op en ronden het gehele traject ongeveer tegelijk af. Bedankt voor het sparren en mee denken en de gezellige uitjes buiten het werk. Vivian en Ingrid, bedankt voor de koffie en de gezellige uitjes. Nu jullie nog! Marieke, bedankt voor je gezelligheid en hulp bij het opzetten en ondersteunen van mijn onderzoeksproject. Alle (oud-)collega's, Lenneke, Rick, Ilse, Nicolien, Suzan, Else-Mariëtte, Jitske, Tessa, Angela, Suzanne, Rienke, Teun, Anne W., Anne R., Karen, Selma, Esther, Elise, Lidy, Ilke, Luuk, Robine, Vicki, Ineke, Rianne, Farsia, bedankt voor de koffie- en bijklets momentjes, gezelligheid en samenwerking. Sanne, Yvonne, Anja, Caspar, Ton en mensen van de ICT wil ik bedanken voor de hulp en ondersteuning. Paul den Hertog, Mieke Cotterink, Ine Buuron, Lize Adriaenssen, Judith Kuiper en alle andere betrokkenen bij VeiligheidNL, bedankt voor jullie waardevolle expertise en input tijdens het hele traject. ~~Sebas en~~ Madelon, super gezellig dat we inmiddels ook verhuisd zijn naar Den Haag en kunnen genieten van vele heerlijke etentjes samen. Wouter en Casper, bedankt voor jullie gezelligheid. Mijn

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Mirjam

ABOUT THE AUTHOR

Mirjam Scholing – van Beelen was born on March 31, 1981 in Amsterdam, the Netherlands. In 1998, she finished her secondary education and she completed her bachelor degree in nursing in 2002. In 2004, she specialized in paediatric nursing while working at a paediatric ward at the VU Medical Centre. She obtained her Master's Degree in 'Evidence Based Practice' at the UVA (Amsterdam, the Netherlands). In May 2009, she started as a junior researcher at the Department of Public Health of the Erasmus Medical Center in Rotterdam, the Netherlands. She performed the BeSAFE-study as described in this thesis. From May, 2013 she also worked on a study of safe car transportation of young children. From August, 2013 she works as a nursing lecturer at the The Hague University of applied sciences.

OVER DE AUTEUR

Mirjam Scholing - van Beelen is geboren op 31 maart 1981 in Amsterdam. Ze behaalde in 1998 haar HAVO diploma, waarna ze HBO-verpleegkunde ging studeren in Leiden en afstudeerde in 2002. In 2004 specialiseerde zij zich als kinderverpleegkundige en ging werken op een kinderafdeling in het VU Medisch Centrum in Amsterdam. Vervolgens behaalde zij haar universitaire master studie 'Evidence Based Practice' aan de UVA (Amsterdam). In mei 2009 begon zij als junior onderzoeker op de afdeling Maatschappelijke Gezondheidszorg van het Erasmus Medisch centrum Rotterdam. Hier verrichte zij het BeSAFE-onderzoek als beschreven in dit proefschrift. Vanaf mei 2013 heeft zij daarnaast een onderzoek uitgevoerd op dezelfde afdeling naar het veilig vervoeren van jonge kinderen in de auto. Sinds augustus 2013 werkt zij als docent verpleegkunde op de Haagse Hogeschool.

PUBLICATIONS

MEJ van Beelen, EF van Beeck, P den Hertog, TMJ Beirens, H Raat. Correlates of unsupervised bathing of infants: a cross-sectional study. *International Journal of Environmental Research and Public Health, 2013 Mar 4;10(3):856-66. doi: 10.3390/ijerph10030856.*

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SUBMITTED

MEJ van Beelen, TMJ Beirens, EF van Beeck, H Raat. Associations of socio-demographic, family and psychosocial correlates with parents' child safety behaviour: a systematic review.

MEJ van Beelen, EF van Beeck, P den Hertog, A van Grieken, TMJ Beirens, H Raat. Effectiveness of Web-based, tailored safety advice on psychosocial correlates associated with parents' child safety behaviours.

PHD PORTFOLIO

Summary of PhD training and teaching activities

Name:	Mirjam E.J. Scholing - van Beelen
PhD period:	2009 - 2013
Erasmus MC Department:	Public Health
Promotor:	Prof.dr. H. Raat
Copromotoren:	Dr. T.M.J. Beirens
	Dr. E.F. van Beeck

	Year	*Workload (hours/ECTS)*
1. PhD training		
General courses		
- BROK (Basiscursus Regelgeving Klinisch Onderzoek)	2010	1 ECTS
- Principles of research in medicine (ESP01)	2010	0.7 ECTS
- Basistraining didactiek (Teach-the-Teacher)	2010	16 hours
- Methodologie van Patiëntgebonden Onderzoek en Voorbereiding Subsidieaanvragen, Erasmus MC, Rotterdam, The Netherlands	2010	8 hours
- Regression analysis (ESP09)	2011	1.9 ECTS
- Biomedical English Writing and Communication (Erasmus MC)	2012	4 ECTS
- Workshop 'Vaardigheidsonderwijs geven'	2013	4 hours
Presentations/ Posters		
- European Union for School and University Health and Medicine (poster presentation); 23-25 September 2009, Leiden, The Netherlands	2009	1 ECTS
- First European Child Home Safety Conference (oral presentation); 2-3 November 2009, Stratford upon Avon, United Kingdom	2009	1 ECTS
- Jaarcongres Jeugdgezondheidszorg; 10 December 2009, Ede, The Netherlands	2009	1 ECTS
- Retraite van het Landelijk Netwerk Onderzoek Jeugd & Gezondheid, Soesterberg	2010	1 ECTS
- ISCAIP's Biennial Meeting (Poster presentation); 20 December 2010, Bristol, United Kingdom	2010	1 ECTS
- Safety 2010 conference (poster presentation); 21-24 September 2010, London, United Kingdom	2010	1 ECTS
- Presentation 'Maternal and Child Health (NIHES); E-Health in Youth health Care	2011	0.5 ECTS
Seminars/ Symposium		
- Department of Public health seminars, Rotterdam, The Netherlands	2009-2013	1 ECTS
- CEPHIR seminars, Rotterdam, The Netherlands	2009-2013	0.5 ECTS
- Symposium 'Successen van preventie 1910-2010-2010', Rotterdam, The Netherlands	2011	4 hours

2. Teaching activities			
Lecturing			
-	Lecturing medical students 'Vaardigheidsonderwijs leefstijladvisering/ advisering voedingsgewoonten'	2012-2013	10 hours
-	Lecturing medical students 'Vaardigheidsonderwijs primaire preventie'	2011-2012	10 hours
-	Supervising medical students 'Community projecten	2012-2013	40 hours
-	Lecturing nurses: 'How to make an abstract and scientific poster'.	2011	20 hours
-	Lecturing paediatric nurses 'Evidence Based Practice'	2011	12 hours
-	Supervising paediatric nurses in Evidence Based Practice literature review and implementation plan	2011	8 hours
3. Other activities			
-	Reviewer several international scientific journals (e.g. BMC Public Health and British Journal of Education, society & Behavioural Science	2013