

Assessing psychosocial correlates of parental safety behaviour using Protection Motivation Theory: stair gate presence and use among parents of toddlers

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Abstract

Unintentional injury due to falls is one of the main reasons for hospitalization among children 0–4 years of age. The goal of this study was to assess the psychosocial correlates of parental safety behaviours to prevent falls from a staircase due to the lack of or the lack of adequate use of a stair gate. Data were collected from a cross-sectional survey using self-administered questionnaires mailed to a population sample of 2470 parents with toddlers. Associations between self-reported habits on the presence and use of stair gates and family and psychosocial factors were analysed, using descriptive statistics and multiple regression models, based on Protection Motivation Theory. The presence of stair gates was associated with family situation, perceived vulnerability, response efficacy, social norms and descriptive norms. The use of stair gates was associated with family situation, response efficacy, self-efficacy and perceived advantages of safe behaviour. The full model explained 32 and 24% of the variance in the presence of stair gates and the use of stair gates, respectively, indicating a large and medium effect size. Programmes promoting the presence and adequate use of stair gates should address the family situation, personal cognitive factors as well as social factors.

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Introduction

Falls are a major source of unintentional injuries among pre-school children [1, 2]. In the European Union, falls are the leading cause of hospital admissions and emergency visits among 0–4 year olds [3, 4]. In the US National Vital Statistics System, falling on or from steps or stairs was coded as the second leading cause of all home fall fatalities (17.4%) after unspecified fall (60.3%) [1, 2]. The main consequences of such falls are contusions, fractures and head injuries [4].

Fitting and using approved gates at the top and bottom of all staircases in the home in combination with adult supervision have been advocated by experts to reduce the number of falls [5–10]. Previous research showed a variation in characteristics between parents who do and do not own a stair gate and parents who do and do not use a stair gate adequately, including child's age, gender and ability to crawl or walk, the number of children in the family, mother's ethnicity and mother's educational level [11]. In order to develop effective intervention strategies to improve parental safety behaviour, more insight into the underlying psychosocial mechanisms and potential important and modifiable mediators is needed [12–15].

In this study, we used Protection Motivation Theory (PMT) to assess the influence of underlying psychosocial mechanisms on parental safety behaviour. PMT is a framework particularly suited for interventions of protective, precautionary behaviours [16, 17]. According to PMT, the probability of health protective behaviour or an 'adaptive response'—in this case having and using a stair gate—is increased by four beliefs: (i) the threat is

perceived as severe (severity); (ii) as of high personal relevance (vulnerability); (iii) the adaptive response is perceived as effective for warding off the threat (response efficacy) and (iv) the personal abilities and self-confidence to engage in the adaptive response is perceived as high (self-efficacy). According to PMT, the likelihood of engaging in an adaptive response (e.g. having and using a stair gate) is lower among those who perceive more rewards from not having or using stair gates and among those who perceive costs or barriers to having and using stair gates. Additionally, the likelihood of engaging in adaptive response behaviour such as having and using stair gates is increased among those who perceive advantages and also have a increased response efficacy for having and using stair gates [16, 17].

In addition to PMT constructs, we included three social environmental factors in the explanatory model in order to assess the influence of these additional constructs on the behaviours. Earlier studies have that suggested social environmental factors may also be important for safety behaviour [18, 19]. For example, one can be influenced by peers (verbally, actively or through modelling), and these types of influences can play a role in people's decision to behave in a certain manner [20–22]. In order to determine what kind of social influence might play a role in parental safety behaviour, the following social influence factors were assessed: perceived social support (or pressure), subjective norm and descriptive norm. Perceived social support can be considered as the direct perceived influence of significant others (e.g. by receiving mental support to perform the desired behaviour). Subjective norm is the perceived expectations of significant others (e.g. do friends expect me to have stair gates?). Descriptive norm refers to an individual's perception of how much and how often others perform the behaviour [20–22].

In the present study, we assessed the psychosocial correlates of parental safety behaviours concerning two behaviours, having stair gates and using stair gates, among parents of toddlers aged 11–18 months. A model based on PMT with the inclusion of additional social influence variables was applied.

Methods

Participants and recruitment

Participants were recruited in 2004 from a convenience sample of six preventive youth health care providers in both urban and rural areas of the Netherlands. Parents were contacted in writing by their preventive health care provider to participate in the study. All parents ($n = 2470$) with at least one child aged 11–18 months who were registered with these providers were invited to complete a mailed questionnaire. These six providers were selected because of their ongoing collaboration with the Erasmus University Medical Center in Rotterdam. The parents were informed that the study was about home safety issues aiming to improve the safety information provided by preventive youth health care providers. Up to two reminders were sent, no financial incentives were offered, parents were assured of confidentiality and the results were processed anonymously. One parent was asked to respond for each family to avoid dependent data. The Medical Ethics Committee of Erasmus MC approved the study.

Safety behaviour

Respondents were asked in what type of house they lived in (e.g. a two-story house), how many indoor staircases they had and whether they had stair gates at these staircases.

In residences with two (or more) floors, the staircase between the floor with the living room and a separate floor with the bedrooms was designated as the 'main' staircase in the house. Presence of a stair gate at the top or bottom of this main staircase was assessed by self-report. Self-reported frequency of closing the stair gate of the main staircase was measured on a five-point scale ('never' to 'every time'); adequate use was defined as 'closing the gate every time after using the staircase'.

Potential correlates

Potential correlates of having and/or using stair gates were measured within the domain of PMT factors (perceived vulnerability and severity of the potential accident, response efficacy of safety

preventive behaviours, general self-efficacy to perform safety preventive behaviours and perceived advantages and disadvantages of safe behaviour), social factors (social support, subjective norm and descriptive norm), and demographic variables. The demographic variables included in this study were chosen based on earlier studies indicating the influence of these variables on safety behaviour concerning stair gates [11] (i.e. age and walking ability of the child, number of children in the family, ethnicity and employment status and educational level of the mother and educational level of the father).

PMT constructs

All items related to PMT and other psychosocial constructs were measured on bipolar five-point scales. For constructs that were assessed with multiple items, the mean score was calculated after sufficient internal consistency was established.

Perceived vulnerability was measured by asking respondents their perception of their child's risk of falling from the staircase (-2 = low risk; $+2$ = high risk). Perceived severity was measured with one item asking how seriously they perceived the consequences of such an event (-2 not serious; $+2$ very serious). Response efficacy was measured with six items (Cronbach's α 0.79) by asking parents if they thought that having and using a stair gate could help to prevent possible accidents, if they thought a stair gate was necessary and if they thought having a stair gate was important (-2 = not very helpful, not very necessary, not very important; $+2$ = very helpful, very necessary, very important).

Self-efficacy was assessed using three items (Cronbach's α 0.71), which referred to the respondents' perception of their ability to install and always use a stair gate (-2 = very difficult; $+2$ = very easy). Perceived advantages of the safe behaviour were assessed and measured with two questions (Spearman ρ 0.78). Perceived disadvantages of the safe behaviour were also assessed on a two-sided five-point scale and measured with eight questions (Cronbach's α 0.82).

Social influence

Social support was measured by asking respondents if they received support from significant others to

have stair gates (-2 = no support; $+2$ = many support). Subjective norm was assessed by asking if they perceived that their significant others thought having a stair gate was necessary, ranging from 'certainly not' (-2) to 'certainly yes' ($+2$). Descriptive norm was measured by asking respondents to assess how many other parents of young children in the same age category they perceived in their direct social environment to have a stair gate (-2 = nobody; $+2$ = everybody).

Demographics and child's crawling and walking ability

Employment status of the parents was defined as having either a part-time or full-time job. The educational level of the father and mother was divided into low and high (intermediate secondary education or less versus at least higher secondary education). Parents reported whether they were of Dutch or non-Dutch ethnicity. 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'. The child's walking ability was measured by asking whether the child could 'walk independently, at least 2–3 steps'. Self-reported medically attended injury was defined as having an injury for which the child was taken to a general practitioner or the emergency department of a hospital.

Analyses

Categorical data were described using frequencies and percentages (Table I). Differences in the proportions and means of all potential correlates in the model were tested by chi-square for the dichotomous demographic variables and Mann–Whitney U test for the PMT and social factors (Table II). To determine significant correlates of having stair gates and using stair gates, multiple hierarchical logistic regression analyses were performed, with safe behaviour as the dependent variable (no/yes) and the various factors (demographic, PMT and social) as independent variables (Table III). Two sets of multiple logistic regression analyses were conducted, first for respondents indicating having a stair gate and second the sub-group of respondents

Table I. Frequency of family, child and housing characteristics ($n = 1622$ respondents)

	Frequency in study population (%) (unless otherwise specified)
Family characteristics	
Mean age of respondent in years	32.0 (SD 4.9) range 16–60
Mother is respondent	1457 (90.4)
Education level of mother is low ^a	970 (60.6)
Education level of father is low ^a	982 (62.1)
Mother is not employed	486 (30.6)
Father is not employed	53 (3.3)
Mother is of non-Dutch ethnicity	84 (5.2)
Father is of non-Dutch ethnicity	76 (4.8)
Single parent	27 (1.7)
One child	676 (41.8)
Child characteristics	
Mean age of child in months	13.5 (SD 1.4) range 11–18
Boy	857 (53.0)
Child can crawl	1573 (97.3)
Child can walk independently	760 (47.1)
Lifetime prevalence of medically attended unintentional injury	117 (7.2)
Housing characteristics	
Median number of staircases in the home	2.0 (range 0–3)

^aLow educational level: intermediate secondary education or less.

who both had and used a stair gate adequately. In both models, demographic variables were entered as a first block since these variables were considered to be the more distal, non-modifiable potential correlates. Subsequently, blocks including PMT (block 2) and social factors (block 3) were entered in the models. Explained variance was calculated with Nagelkerke R^2 . Effect sizes were used as indicator of the explanatory value of the model. All statistical analyses were performed using SPSS, Version 11.0.

Results

Participant characteristics

The response rate to the mailed questionnaire was 70.1% ($n = 1722$). Nine questionnaires (0.5%)

were excluded from the analyses because they had been incorrectly completed ($n = 4$) or because the questionnaire was not completed for the selected child but for an older sibling ($n = 5$). Furthermore, 100 questionnaires were excluded because of the lack of a main staircase in the home of these respondents, leaving 1622 questionnaires for inclusion in the analyses.

The mean age of the respondents was 32.0 years (range 16–60; standard deviation (SD) 4.9) and 90.4% were mothers. In this study, 97.8% of the families included two parents; 41.8% had one child (the child selected for the study). The age of the children ranged from 11 to 18 months (mean 13.5; SD 1.4) and 53.0% were boys (Table I).

Stair gate presence and use

Eighty-three per cent ($n = 1345$) of parents reported having at least one stair gate installed at their main staircase, and 50% of these parents reported closing the gate every time after using it. Forty-eight per cent of parents reported having only a stair gate at the top of the main staircase, 3.7% only at the bottom and 30.8% at the top as well as at the bottom.

Differences between ‘safe’ and ‘unsafe’ staircase

Respondents who had at least one stair gate installed at their main staircase had a significantly lower perceived vulnerability, lower perceived disadvantages, higher perceived severity, response efficacy, self-efficacy and advantages of the safe behaviour and more positive subjective norms and descriptive norms compared with the sub-group who did not have a stair gate (Table II).

The sub-group respondents who used their stair gate adequately had a significantly lower perceived vulnerability, lower perceived disadvantages, higher perceived response efficacy, self-efficacy and advantages of the safe behaviour compared with the sub-group who did not use their gate adequately.

Correlates of presence and use of stair gates

The results of the multiple logistic regression analyses are shown in Table III. Adding each block

Table II. Differences between having and not having a stair gate and using and not using a gate adequately

	Having a stair gate (n = 1345)	Not having a stair gate (n = 274)	Using a stair gate adequately (n = 677)	Not using a stair gate adequately (n = 666)
Demographic variables				
Age of child is 11–13 months	50.5%	58.7%*	46.9%	54.1%**
Child is a boy	54.1%	47.6%*	54.7%	53.5%
Child cannot crawl	1.9%	6.6%***	2.1%	1.8%
Child cannot walk	52.3%	55.8%	47.6%	57.0%***
One child in family	38.4%	58.3%***	35.5%	41.4%*
Non-Dutch mother	4.1%	11.0%***	5.2%	2.9%*
Mother had lower education ^a	60.6%	60.6%	65.9%	55.0%***
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
PMT constructs				
Vulnerability (–2, +2)	–0.63 (1.41)	–0.14 (1.34)***	–0.70 (1.46)	–0.55 (1.36)**
Severity (–2, +2)	1.54 (0.76)	1.39 (0.86)**	1.54 (0.80)	1.54 (0.70)
Response efficacy (–2, +2)	1.40 (0.67)	0.96 (1.03)***	1.51 (0.64)	1.30 (0.68)***
Self-efficacy (–2, +2)	1.12 (0.69)	0.79 (0.75)***	1.32 (0.62)	0.90 (0.70)***
Advantages of safe behaviour (–2, +2)	1.68 (0.68)	1.51 (0.80)***	1.88 (0.37)	1.47 (0.85)***
Disadvantages of safe behaviour (–2, +2)	–0.69 (0.67)	–0.38 (0.76)***	–0.82 (0.65)	–0.56 (0.68)***
Social factors				
Social support (–2, +2)	0.02 (1.57)	0.01 (0.76)	–0.04 (1.63)	0.08 (1.51)
Subjective norm (–2, +2)	1.61 (0.79)	1.03 (1.18)***	1.64 (0.80)	1.29 (0.85)
Descriptive norm (–2, +2)	1.28 (0.89)	0.57 (1.16)***	1.26 (0.92)	1.58 (0.78)

^aLow educational level: intermediate level of secondary education or less.

Differences in mean scores in having and not having a gate and using and not using a gate adequately were evaluated by chi-square test and by Mann–Whitney *U* test.

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

resulted in significant increases in percentage of explained variance, except for the third step in the ‘using stair gate’ analyses.

Having a stair gate

In the first step, the child’s gender, ability to crawl, number of children in the home and mothers ethnicity were significant variables, but these explained only 8% (Nagelkerke R^2) of the variance of the ‘having a gate’ behaviour. For example, more than one child living in the home increased the likelihood that a gate was present. In the second step when PMT factors were entered, perceived vulnerability, response efficacy, self-efficacy and disadvantages of the safe behaviour were significantly associated with having a gate and the proportion of variance explained increased to 22%.

Parents with a stair gate had a significantly lower perceived vulnerability and perceived fewer disadvantages of the safe behaviour compared with parents without a gate. Furthermore, parents with a gate had a higher response efficacy and self-efficacy compared with parents without a gate. In the third step, when social factors were included, social support, subjective norm and descriptive norm proved to be additional significant correlates and the explained variance increased to 32%, indicating a large effect size.

Using a stair gate

In the first step, the child’s ability to walk, mother’s ethnicity and mother’s education level were significant but explained only 4% of the variance in using a stair gate. Mothers with a lower educational level

Table III. ORs, 95% CIs and explained variance (Nagelkerke R^2) from hierarchical multiple logistic regression analyses with reported stair gate ($no = 0$; $yes = 1$) and reported use of the stair gate ($no = 0$; $yes = 1$) as dependent variables and demographic (step 1), PMT variables (step 2) and additional factors (step 3) as independent factors ($n = 1622$)

	Having stair gate			Using stair gate		
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Demographic variables						
Age of child is 11–13 months	0.80 (0.59–1.10)	0.89 (0.63–1.24)	0.97 (0.68–1.38)	0.82 (0.64–1.05)	0.82 (0.62–1.08)	0.83 (0.63–1.09)
Child is a boy	1.40 (1.04–1.87)*	1.35 (0.99–1.84)	1.65 (1.18–2.29)**	1.04 (0.82–1.32)	0.98 (0.76–1.28)	0.98 (0.76–1.27)
Child cannot crawl	0.33 (0.16–0.66)**	0.30 (0.14–0.65)**	0.26 (0.12–0.59)**	1.45 (0.63–3.34)	1.89 (0.74–4.83)	1.86 (0.73–4.72)
Child cannot walk	0.98 (0.71–1.34)	1.02 (0.73–1.43)	0.95 (0.67–1.35)	0.73 (0.57–0.94)*	0.75 (0.57–0.99)*	0.75 (0.57–0.98)*
One child in family	0.41 (0.31–0.55)***	0.39 (0.28–0.53)***	0.33 (0.24–0.47)***	0.84 (0.65–1.07)	0.97 (0.74–1.27)	0.99 (0.76–1.30)
Non-Dutch mother	0.30 (0.17–0.53)***	0.37 (0.19–0.71)**	0.42 (0.21–0.84)*	2.74 (1.27–5.92)*	4.13 (1.68–10.16)**	4.18 (1.70–10.27)*
Mother had lower education	1.02 (0.76–1.38)	0.87 (0.63–1.20)	0.92 (0.66–1.29)	1.53 (1.20–1.95)**	1.30 (1.00–1.70)*	1.30 (0.99–1.69)
PMT determinants						
Vulnerability		0.78 (0.70–0.87)***	0.78 (0.70–0.88)***		0.95 (0.86–1.04)	0.95 (0.87–1.04)
Severity		1.10 (0.90–1.35)	1.06 (0.86–1.31)		0.86 (0.72–1.03)	0.87 (0.73–1.04)
Response efficacy		2.42 (1.96–3.00)***	2.49 (1.97–3.14)***		1.36 (1.09–1.68)*	1.37 (1.10–1.71)**
Self-efficacy		1.32 (1.01–1.72)*	1.30 (0.99–1.72)*		2.22 (1.74–2.84)***	2.18 (1.70–2.79)***
Advantages safe behaviour		0.79 (0.62–1.01)	0.74 (0.56–0.97)*		2.62 (1.96–3.50)***	2.65 (1.98–3.55)***
Disadvantages safe behaviour		0.67 (0.51–0.88)**	0.72 (0.54–0.96)*		1.12 (0.88–1.43)	1.09 (0.85–1.39)
Additional variables						
Social support			0.85 (0.76–0.95)*			0.93 (0.85–1.01)
Subjective norm			1.38 (1.15–1.67)**			1.00 (0.84–1.18)
Descriptive norm			1.94 (1.64–2.30)***			0.97 (0.83–1.13)
Nagelkerke R^2	0.08	0.22	0.32	0.04	0.23	0.24

OR odds ratios; CI, confidence intervals.

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

were more inclined to use the gates adequately. In the second step, response efficacy, self-efficacy and perceived advantages of the safe behaviour were also significantly associated with using a stair gate and together explained 23% of the variance, indicating a medium effect size. Parents who used the gate adequately had a higher response efficacy, self-efficacy and perceived more advantages of safe behaviour. In the third step, social factors were included, but adding these factors did not significantly increase the explained variance in use of stair gates.

Discussion

This study showed that perceived vulnerability, response efficacy, self-efficacy, perceived advantages and disadvantages of safe behaviour, social support, subjective norm, descriptive norm and several demographic variables were significantly associated with the presence of a stair gate in households with toddlers. The following variables were significantly associated with the adequate use of a gate: response efficacy, self-efficacy and the perceived advantages of the safe behaviour. Our study indicates that PMT model is applicable to predict the presence and use of stair gates.

The associations of some of the separate psychosocial correlates included in our study were similar to the results in previous studies. For example, among parents who do and do not take injury-preventive behaviours in general, differences in their perceptions of the vulnerability to an injury [18, 23, 24], beliefs about the response efficacy of taking preventive measures [23] and perceived social norms [18, 19] have been shown. Additionally, the explained variance in having or using a stair gate in the present study (24–32%) are consistent with Morrongiello and Kiriakou [18] who were able to explain 28% of the variance in safety behaviour related to prevention of falls in general. The demographic characteristics of the participants in our study (age, employment status and educational level) reflected those of the general Dutch population and compare well with the distribution of these

characteristics in a previous Dutch random sample of parents with pre-school children [25, 26].

Some limitations of this study need to be acknowledged. The presence and use of stair gates by parents were self-reported; therefore, misclassification might have occurred. For example, parents might have given socially desirable answers (overstating always closing the gate) [18, 27–29] which would overestimate the number of households in which gates are used adequately and may caused bias in the assessment of significant correlates.

The sub-group of parents who do not have a stair gate and the sub-group of parents who have a gate but do not use it every time had a higher perceived vulnerability than other parent. This suggests that parents probably recognize that their child has a higher risk of a possible fall from their staircase due to the lack of a stair gate. The direction of this finding is counter-intuitive as PMT proposes that lower perceived vulnerability leads to no or less action (no gates). However, in our study we found that parents who do perform the safe behaviour have a (probably justified) lower perceived vulnerability compared with parents who do not perform the safe behaviour. Further research utilizing a longitudinal study design and incorporating a measurement prior to the decision of parents to install a gate is needed to determine the direction of this association.

Furthermore, the parents who do not have a stair gate estimated the severity of a possible fall as being lower than parents who do have a stair gate. This lower estimation of the severity of a possible fall may explain why a sub-group of parents does not have a stair gate, although severity was not significantly associated in the model. Among parents who use the gate adequately, self-efficacy and advantages of the safe behaviour were the strongest correlates.

The significant contribution of social influence (descriptive norms), response efficacy and perceived vulnerability in the prediction of having a gate indicates that parents are influenced by what they (perceive to) observe in their environment, their perceptions of the effectiveness of the preventive action and how vulnerable their children are to

the possible danger. Different determinants are associated with the adequate use of a gate; self-efficacy and the advantages of the safe behaviour are important contributors in using the gate adequately.

Implication for prevention

To increase parents' safety behaviour, insight into potentially important and modifiable mediators is needed when developing effective strategies. Findings from the present study yield some recommendations for developing programmes to prevent falls from stairs due to the lack of stair gates or the lack of using the stair gates adequately. These findings indicate that different aspects should be focused on when promoting stair gate presence and then adequate use of stair gates. When developing interventions to encourage presence of stair gates, one should particularly focus on family situation, response efficacy and descriptive norm. For example, the focus of prevention in this case should be on the effectiveness of adequate use of the gates and explain that a gate should best be installed even before their child is able to walk. Further interventions should also incorporate the expectancy of others for them to use stair gates.

Response efficacy, parents' self-efficacy and their perception of the advantages of the safe behaviour should be addressed when focussing on the use of stair gates. In this case, the intervention should again explain how gates could prevent falls from staircases but could also give practical examples on adequate stair gate use. This might be done with the use of stories of peers explaining how they use the gates (focusing on self-efficacy) and explaining the advantages of the adequate use.

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Conflict of interest

None declared.

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