

# Why young Dutch in-line skaters do (not) use protection equipment

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**Background:** In-line skate injuries are highly preventable by the use of protective gear. We investigated how young Dutch skaters protect themselves and what factors predict the use of protective gear in order to develop campaigns to increase their safety behaviour. **Methods:** A survey was conducted to study protection behaviour of 872 Dutch skaters and factors influencing the use of protective gear. Written questionnaires were used, measuring behaviour and social psychological determinants towards the use of protective behaviour. **Results:** Protective gear was not often used: 36% used wrist guards, 28% used kneepads, 14% used elbow pads and 5% used helmets. The use of protective gear was influenced by social influences, self-efficacy expectations and intention ( $R^2=54\%$ ). **Conclusions:** The present study shows that young Dutch skaters should improve their safety behaviour in order to prevent skate injuries. Furthermore, the study provides clear recommendations for developing prevention programmes.

**Keywords:** behaviour, protective gear, skaters, social psychological determinants

In-line skating has become the fastest growing recreational fitness activity during recent decades in the United States and in European countries.<sup>1,2</sup> The quality and affordability of the equipment, the potential for physical fitness, and the use of in-line skates for both recreational and transportation purposes make this sport very popular among the public. The term in-line skates include inline skates as well as skeelers and rollerblades. In the Netherlands, about 2 million people are in-line skaters, most of whom are children and adolescents, using skates outside the house or on a playground.<sup>3</sup>

Despite the recognized value of skating for physical fitness and fun, the sport is not without risk. In the year 2000, 7600 skaters were treated at the Emergency Departments in hospitals in the Netherlands,<sup>4</sup> mostly for fractures. Young children (5–14 years) are particularly at high risk of injuries. Most victims of skate injuries are male skaters and children between 10 and 14,<sup>1</sup> which is similar to studies conducted in the United States.<sup>5,6</sup> The wrist is the most injured part of the body.<sup>1,7–9</sup> In the Netherlands, 36% of all injuries are a wrist injuries, 13% hand injuries, 12% lower arm injuries, 8% elbow injuries and 5% knee injuries.<sup>1</sup> Other injuries, including severe head injuries, totalled 28%.

Skate injuries can be prevented by means of protection equipment, such as helmets, elbow pads, kneepads and wrist guards. In a case-control study by Schriber and Branche-Dorsey,<sup>9</sup> the effectiveness of safety gear has been shown. They found that wrist injuries could be reduced by 87% by wearing wrist guards, elbow injuries could be reduced by 82% by wearing elbow pads and knee injuries could be reduced by 32% by wearing knee pads. The authors could not provide information on head injuries since too few of the skaters had a head injury. However, they suggest that the effectiveness of helmets in head injury prevention is similar to the effectiveness of helmets in bicycle-related head injuries, since cyclists and skaters use the same physical environment and very often the same kind of helmet is used. Attewell and colleagues<sup>10</sup> provide evidence that bicycle helmets are of high

protective value, preventing cyclists from serious head injuries and even death. Despite the effectiveness of protective gear, extremely low rates of using knee and elbow pads, wrist guards and helmets were reported among young skaters in several observational studies from the United States.<sup>6,11</sup> Warda and colleagues<sup>6</sup> observed that of 43 children (8 to 15 years old) one wore a helmet, one wore wrist guards, one wore kneepads and two wore elbow pads. In a study among 317 children younger than 15 years old,<sup>11</sup> slightly higher protection rates were found: 19% wore a helmet, 13% wore wrist guards, 9% wore elbow pads and 6% wore kneepads. Although wearing protective gear does not prevent all in-line skate injuries, the frequency and severity of the injuries can be reduced. Therefore, it is recognized that efforts should be made to promote the use of protective equipment, since injuries related to in-line skating are highly preventable through the use of protection gear.<sup>12</sup>

In order to find out how to stimulate children to protect themselves, it is necessary to know what motives children have to wear or not to wear protective gear. Therefore, it is relevant to study the social-psychological determinants of wearing protective gear. The present study used the Attitude-Social influence-self Efficacy (ASE) model.<sup>13,14</sup> The model can be regarded as an elaboration of the Theory of Planned Behaviour<sup>15</sup> and has been used for the analysis of various different health behaviours.<sup>16</sup> The ASE model describes three major determinants influencing someone's motivation or intention to engage in a particular behaviour, namely attitudes, social influences and self-efficacy. The model assumes that distal factors, such as psychological, biological, social and cultural factors influence the behaviour through the central determinants, and this, in turn, influences behaviour. In the present study, the ASE model was applied to using protective gear among young skaters. The following research questions were answered:

- Do young Dutch skaters protect themselves?
- Do skaters who are well, average or poorly protected differ in their social-psychological determinants about the use of protective gear?
- What factors predict the use of protective gear?

## METHODS

### *Respondents and procedure*

The target group for our study consisted of Dutch children, aged 9–13 years, who were in the highest groups of primary schools and who had tried to skate at least five times. One hundred schools throughout the Netherlands were selected, of which the

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first 15 schools that were reached and willing to participate were included in the study. A written questionnaire was sent to the schools and filled in during school hours. For those children who did not meet the criteria of being a skater (i.e. at least five times) questions were included on their leisure time activities. A total number of 1200 questionnaires were sent out to the schools, of which 978 (82%) were returned.

*Questionnaire*

The questionnaire was based on the ASE-model. The following concepts were assessed:

Protection behaviours were assessed with four items on a one-sided five-point Likert scale, for instance 'How often do you wear protective equipment (helmets, wrist guards, elbow and knee pads)?' Answers varied from 'always' (5) to 'never' (1).

The intention to wear protective gear was assessed with one question. Answers were given on a two-sided five-point scale, ranging from 'certainly yes' (+2) to 'certainly not' (-2).

Attitudes toward wearing protective gear were assessed with four questions ( $\alpha=0.62$ ). For example 'Do you think wearing protective gear is very tough (+2) or very dull (-2)?' Other items referred to the importance of wearing protective gear, its comfortability and how much effort it required to put it on.

Social influences were assessed with the following concepts: *Modelling* of friends was assessed with four questions ( $\alpha=0.74$ ) on a one-sided five-point scale, for example 'How many of your friends wear knee pads?' Answers varied from 'almost all' (5) to 'almost none' (1). *Social norm* of friends and parents was assessed using two questions ( $r=0.41$ ) with answering options on a two-sided five-point scale, for example 'My friends think that I definitely should wear protective gear (+2) to definitely should not wear protective gear (-2)'. Social pressure from parents was asked with one question: 'Do your parents pay attention to you wearing protective gear?' Answers varied from 'always' (5) to 'never' (1).

Self-efficacy was assessed by two questions ( $r=0.56$ ), using a two-sided five-point answering scale. The items referred to the respondents' perception of their ability to wear protective gear when it is hot outside and when friends don't wear protective gear.

Demographics (sex, age, group) and questions referring to their skate experience, whether they own skates, what kind of skater they are (recreational or performance skater) were also asked.

*Statistical analysis*

Data analysis included a basic description of the respondents and their behaviour. T-tests and chi square tests were used to describe

differences between boys and girls. A protection behaviour index was computed by adding the four protection behaviour items. The index varied between 4 (no protection at all) to 20 (always or almost always knee, wrist, elbow and head protection). To test differences in ASE determinants between groups who differed in their protection behaviour, children were first divided into 'well protected' (protection score >12), 'on average' (protection score between 8 and 11), and 'poorly protected' (protection score <8). Consequently, analyses of variance were used with Tukey HSD for post-hoc analyses.

Multiple regression analysis (using 'enter' as method) was performed to assess the predictive value of the determinants of wearing protective gear. Demographic variables were entered in the first model. In the second model ASE variables were added. Intention was included in the third model, to test whether the ASE model could be used to explain wearing protective gear. The assumptions of linearity, normal distribution of residuals and consistent variance of residuals were tested and found to be satisfactory for the regression analysis. All analyses were done with SPSS 9.01 for Windows.

**RESULTS**

*Respondents*

A total of 978 respondents returned the questionnaire, of which 872 (89%) were classified as skaters and were included in the analysis. The mean age of the respondents was 10.7 years (SD=1.02). About half of the study group were boys (48%). The distribution over the grades was 33% in grade 5, 39% in grade 6 and 29% in grade 7. One-fifth of the skaters were regular skaters, i.e. those who skate more than four times a week. One-third (32%) used their skates between one and three times a week and 47% skated less than once a week. The majority (92%) had their own skates and reported to use their skates for outdoor activities (80%) versus 20% who reported to mainly perform tricks. In *table 1* differences between boys and girls are presented. More boys reported to be trick skaters than girls. No differences in frequency and whether they own skates were found for sex.

*Protection behaviour*

Protective gear was not often used: kneepads and wrist guards were most common, 28 and 36% respectively said they wore this protection mostly or always. Only 118 respondents (14%) said they wore elbow pads and 46 respondents (5%) said they wore helmets. Girls reported more than boys that they used wrist guards (*table 1*). No other differences in the use of protective gear were found between boys and girls.

**Table 1** Differences in boys and girls; demographics, protective behaviour and determinants

Variables (range)	Boys n=421	Girls n=450	$\chi^2$ / T-test
Frequency (%)			
4-7 times per week	22.2	19.2	Ns
1-3 times per week	30.9	34.2	
1-3 times per month	26.3	28.8	
<1 time per month	20.6	17.9	
Own skates (%)	91.2	93.8	Ns
Skatetype			
Recreational skater (%)	68.8	90.8	$\chi^2=65,82$ ; $p<0.001$
Performance skater (%)	31.2	9.2	
Regular use of protective gear (mean)			
Kneepads (1/5)	2.53	2.62	Ns
Wrist guards (1/5)	2.62	2.86	T= -2.157; $p<0.05$
Elbow pads (1/5)	1.86	1.85	Ns
Helmets (1/5)	1.39	1.29	Ns

*Differences in behaviour groups*

To assess whether children who protect themselves well, on average and poorly differ in their opinions about protection behaviour, analysis of variance was performed (table 2). Significant differences were found for all behaviour groups. The more children used protective gear, the more favourable their attitudes toward wearing protective gear, the more they experienced wearing protective gear in their environment, the more they thought that their parents and friends think that they should wear protective gear and the more their parents paid attention to the fact that their children wore protective gear. Children who wore more protective gear had higher expectations that they were able to use protection even when it was hot and when their friends did not use protection. Moreover, children who protect themselves well had more positive intentions towards protection gear than children who used protection gear less frequently. All differences between groups were significant.

*Predicting the use of protective gear*

Multiple regression analysis (using 'enter' as method) was conducted to assess the predictive value of the various determinants toward the use of protective gear (table 3). In the first model, demographics including age, sex, type of skating activity (recreational or performance), frequency of participating in skating and whether the skater owned skates or not, were entered. Age and frequency were significant variables, but they explained only 5% of the variance in protection behaviour. The younger the skater and the more frequently he or she skated, the more likely it was

that protection gear was used. In the second model, the ASE determinants were entered. All determinants were significant predictors of protection behaviour, except the social norm. Together 48% of the variance was explained by these variables. Frequency remained a significant predictor, although less significant than in the first model. In the third model, the intention to wear protective gear was included and 54% of the variance in protective behaviour was explained. No demographic variables remained significant, but the ASE determinants did.

**DISCUSSION AND CONCLUSIONS**

The results of the present study show clearly that the use of protective gear is uncommon among young Dutch skaters. Furthermore, the social-psychological determinants discriminate between children who are well protected, averagely protected and poorly protected. Social influence (modelling and social pressure), self-efficacy and the intention towards wearing protective gear were strongly associated with the actual protection behaviour. From this study it can be concluded that the ASE model could be applied to predict the use of protection equipment for in-line skaters. This means that a large part of the protection behaviour is a reasoned action and that children think about the use of protective gear. Besides the social-psychological determinants, age and frequency proved to be significant predictors of the use of protection gear, which confirmed findings in other studies.<sup>5,11,17</sup>

The significant contribution of social influence in the prediction of protection behaviour, modelling of friends and social pressure

**Table 2** Differences in determinants between children who are poorly protected (P), averagely protected (A) and well protected (W)

Variables (range)	Poorly protected n=376	On average protected n=261	Well protected n=209	p<0.05
Attitude (-2/+2)	-0.38	0	0.33	P<A<W
Modelling (1/5)	1.61	1.96	2.55	P<A<W
Social norm (-2/+2)	2.10	2.68	3.39	P<A<W
Social pressure (1/5)	1.83	2.79	3.56	P<A<W
Self-efficacy (-2/+2)	-0.73	0	0.95	P<A<W
Intention (-2/+2)	-0.97	0.29	1.30	P<A<W

**Table 3** Multiple regression analysis (method enter); factors associated with protection behaviour

Variables	Model 1 $\beta^a$	Model 2 $\beta^a$	Model 3 $\beta^a$
Demographic variables			
Age	-0.163**	-0.076	-0.075
Sex	0.007	-0.020	-0.043
Group	0.012	0.006	0.024
Skate type (recreational vs performance skater)	-0.049	-0.006	0.000
Frequency	0.144***	0.057*	0.042
Own skates (yes or no)	-0.041	-0.023	-0.029
ASE determinants			
Attitude		0.153***	0.063
Modelling		0.193***	0.150***
Social norm		-0.044	0.011
Social pressure		0.264***	0.191***
Self-efficacy		0.241***	0.089*
Intention			0.409***
Explained variance ( $R^2$ )	5%	48%	54%

\* p&lt;0.05; \*\* p&lt;0.01; \*\*\* p&lt;0.001.

a: Standardized regression coefficients.

from parents, indicates that the age group of the participants in this study (9–13 years) is dominated by what they observe in their environment (modelling of friends) and what they are told by their parents (social pressure). These forms of social influence are what they explicitly perceive, while social norm is more implicit. The young age of the respondents is possibly an explanation for the lack of significance of the social norm.

In this study higher rates of the use of protective gear were found compared to the results of other studies.<sup>6,11</sup> This might be due to data collection by paper and pencil questionnaires and collecting data in class, which may have resulted in socially desirable answers. An attempt was made to minimize social desirability by stressing that the questionnaires were anonymous and that answers to questions were not right or wrong, but that they indicate one's behaviour, regardless of what that may be. However, to avoid social desirability, an observational study is required. For practical reasons this would be impossible to conduct. A second limitation was that the study only focused on the use of protective gear instead of skating skills. It is suggested that for novice skaters speed control, good balance, good ability to break and safe fall techniques are essential skills to learn to avoid skate injuries.<sup>2,18</sup> Therefore, it would be interesting to study the effectiveness of good skating skills in the prevention of injuries and subsequently, the barriers of participating in instructions for good skating skills.

The study findings certainly reveal recommendations for developing programmes to prevent injuries from in-line skating. Children should first become aware of the risks of in-line skating without full protective gear, and the benefits of using protective gear. Moreover, the use of protective gear when it is hot, and when friends do not use it, should be discussed with the target group in order to cope with these barriers. They should be furthermore encouraged to use protective gear automatically. This can be done for instance by means of forming implementation intentions, i.e. a plan of action that links particular responses to specific cues.<sup>19</sup> For instance, by keeping protective gear near the skates so that any time they put on their skates, they automatically put on their protective gear.

Also other strategies than educational programmes for the youth might be explored to increase the use of protective gear and decrease in-line skate injuries. For instance, parents could be stimulated to pay attention to their childrens' protective behaviour. Using protective gear can be obliged during competitions or organized skate tours, but also at playgrounds around schools. In addition, shops selling in-line skates should also sell and stimulate the purchase of protective gear together with the in-line skates. For instance, providing financial incentives or reduced prices when protective gear is sold together with a pair of in-line skates may encourage sales. Furthermore, the manufacturers of protection gear should develop comfortable and attractive helmets and other equipment.

The authors would like to thank Mieke van Vught for her contribution to this project and the Consumer Safety Institute for providing financial support.

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Received 17 January 2003, accepted 13 May 2003