

Children's risk perception and parents' views on levels of risk that children attach to outdoor activities

Hamid Soori, PhD.

ABSTRACT

Objective: Higher rates of outdoor injuries are found in older children, boys and children from more deprived areas. Some of the causes of these variations have been studied in some age groups and in different situations. To study children's perception of safety and danger and parents' views on the level of risk that their children attach to outdoor activities comparing age groups, boys and girls, and the less economically well off with the better off in order to understand outdoor accidental injuries.

Methods: A cross-sectional study, obtained information from children aged 7 and 9 (n=471) and their parents (n=416) were living in Newcastle upon Tyne by self-completed questionnaires. Nine schools in different socio-economic areas were selected. Children were asked to paste different stickers on to the pictures in the classrooms. The parents' questionnaires were delivered by children and then returned to school after completion. The deprivation of an individual was accessed by Z-score of the households.

Results: Older children compared to younger ones, boys versus girls and more economically deprived children

compared to less deprived children had less perception of the dangers of outdoor activities. For example, older children compared to younger ones were more likely to perceive crossing a busy road with their friends (38.0% vs. 26.4%, $P=0.007$) as being safe. Boys compared to girls were more likely to perceive climbing wall (31.5% vs. 13.2%, $P<0.001$) as being safe. More economically deprived children were more likely to perceive cycling without a helmet (25.8% vs. 11.2%, $P<0.001$) as being safe than less economically deprived children.

Conclusion: These findings may partly explain the higher rate of accidental injuries among older children, boys and more deprived children. The results may inform how education of primary schoolchildren about dealing with activities such as crossing a busy road, climbing walls and playing in street and how parents should be conscious of their children's outdoor activities.

Keywords: Perception, risk, injury, children, parents.

Saudi Medical Journal 2000; Vol. 21 (5): 455-460

Perception of risk, like all perceptions, is a typical process of interpretation, a process of making sense of a complex world in order to plan, choose and act in that world.¹ It is generally accepted that a lack of perception contributes to unexpected systematic failures, and it is assumed that if more information were available then accidents would be avoided through rational action.² Individuals perceive risks in relation to their wider beliefs about

risk and the more general implications that these have in their lives. For instance, children's beliefs about a risk issue such as crossing a busy road alone may include assessment of both immediate and longer-term consequences of accepting or not accepting the risk. What to an adult might be seen as a simple procedure and easy to execute, for example, crossing a road, for a child can be a very difficult and

From the Department of Community Medicine, The Medical School, Ahwaz University of Medical Sciences, Ahwaz, Iran.

Received 9th September 1999. Accepted for publication in final form 27th February 2000.

Address correspondence and reprint request to: Dr. Hamid Soori, Department of Community Medicine, The Medical School, Ahwaz University of Medical Sciences, Ahwaz, Iran. Tel. 0098 611 363312 Fax. 0098 611 361544.

complex task.³ If a child is unable to distinguish safe activities/places from dangerous ones, he or she may often put him or herself at risk, even in safe areas.⁴ Higher rates of outdoor injuries are found in older children, boys and children from more deprived areas.⁵⁻⁷ Some of the causes of these variations have been studied in some age groups and in different situations. However, children's perception of safety and danger and parents' views on the level of risk that their children attach to outdoor activities has not been studied. This requires finding out: how well children can differentiate between safe and dangerous outdoor activities; how these activities vary with age, sex and socio-economic status trends characterize these abilities; whether educational programs can increase children's perception of risks; and to what extent there is a mismatch between children's perceptions and parents' expectations.

Methods. This cross-sectional survey of children and their parents was designed to explore differences in socio-economically deprived and not so deprived areas of the city. The measure of deprivation was the rank position based on Townsend scale,⁵ of the local government area (ward) in which the school was located. The method and rationale behind this score have been published, and it is widely used.⁵ The score is based on ward level census data on the proportion of the economically active population unemployed, not living in private households, living in a household lacking a car, and living in a home with more than one person per room. The weighted

and standardized scores are known as Z-scores and these range from -8 to +8, with the mean being zero. The lower the score the greater the socio-economic deprivation. The 678 wards in the area of the ex-Northern Regional Health Authority have been ranked.⁴ The target groups for the study were children studying in primary school years three and five (children aged approximately seven and nine year old) in Newcastle upon Tyne, and their parents. Our target sample size, based on sample size calculations derived from a pilot study, was 450 pupils. First, in consultation with school police liaison officers, 15 suitable schools were identified in more and less socio economically deprived areas. From this list, using random numbers, five primary schools in less deprived areas (deprivation rank of 240, 267, 288, 357, 611) and four schools in more deprived areas (deprivation ranks of 3, 5, 42, 67) were selected. One extra school was chosen in a less deprived area because the pilot study showed that more children travel to schools in the affluent areas that vice versa. The nine chosen schools were located across the city. Where a school had more than one class in a year the class with the number of pupils closest to 25 was chosen. On average there were 26 pupils in each class, giving a sample of 476 individuals.

The deprivation of an individual was assessed by Townsend Score⁵ of the households based on family household's postcode as recorded in the parent's questionnaires, or when this was missing, as in the school records. Households with a Z-score less than the median of our sample (+ 0.85) were considered

Table 1 - Children's perception of safe and dangerous outdoor activities by age, sex and deprivation (% of safe response).

Activities	Age 7	Age 9	Boys	Girls	Less deprived	More deprived	Total
Cycling on the pavements	82.6	87.3	83.7	86.4	90.1	79.4	400 (84.9)
Cycling in their street	74.4	88.6	84.1	78.2	85.0	77.3	383 (81.3)
Cycling two on a bike	26.9	22.7	31.5	17.3	20.6	29.2	117 (24.8)
Cycling without a helmet	21.1	17.0	23.9	13.6	11.2	25.8	90 (19.1)
Cycling on busy roads	2.1	4.4	4.4	1.8	3.4	2.6	15 (3.2)
Crossing busy roads with friends	26.4	38.0	35.1	28.6	30.9	32.2	151 (32.1)
Crossing between parked cars on the road	21.5	16.2	22.7	14.5	21.5	15.9	89 (18.9)
Crossing busy roads alone	7.4	7.4	10.0	4.5	4.7	9.4	35 (7.4)
Crossing busy roads without using the traffic lights	6.6	7.9	9.6	4.5	6.0	8.2	34 (7.2)
Running on roads	5.8	2.6	5.2	3.2	1.7	6.0	20 (4.2)
Playing in their street	79.3	87.3	83.3	83.2	82.8	83.7	392 (83.2)
Playing near old derelict buildings	19.4	16.2	19.9	15.5	16.3	18.9	84 (17.8)
Playing on building sites	10.3	7.4	9.2	8.6	6.9	10.3	42 (8.9)
Playing near the railway	3.3	4.8	5.2	2.7	5.2	2.6	19 (4.0)
Playing on busy roads	4.1	3.5	5.2	2.3	2.6	4.7	18 (3.8)
Roller skating in the park or playground	74.8	83.0	80.5	76.8	81.1	76.4	371 (78.8)
Roller skating in their street	67.4	84.3	72.1	79.5	77.3	73.4	356 (75.6)
Roller skating on a busy road	3.3	4.4	4.4	3.2	3.4	3.9	18 (3.8)
Climbing trees	35.1	35.4	47.0	21.8	36.5	32.6	166 (35.2)
Climbing walls	24.8	21.0	31.5	13.2	18.5	26.6	108 (22.9)
Climbing buildings	5.8	4.4	7.6	2.3	3.0	6.9	24 (5.1)
Total	242	229	251	220	233*	233*	471

*Socio-economic status was assessed for 466 subjects

Table 2 - Parents' views about level of risk that their children perceive from after-school outdoor activities.

Activities	High risk (%)	Low risk (%)	No idea (%)
Cycling on busy roads	349 (83.9)	34 (8.2)	33 (7.9)
Cycling without a helmet	221 (53.1)	173 (41.6)	22 (5.3)
Cycling two on a bike	215 (51.7)	141 (33.9)	60 (14.4)
Running on roads	317 (76.2)	73 (17.5)	26 (6.3)
Crossing busy roads alone	314 (75.5)	82 (19.7)	20 (4.8)
Playing on busy roads	351 (84.4)	33 (7.9)	32 (7.7)
Playing near the railway	301 (72.4)	35 (8.4)	80 (19.2)
Playing on building sites	293 (70.4)	54 (13.0)	69 (16.6)
Playing near derelict old buildings	232 (55.8)	109 (26.2)	75 (18.0)
Roller skating on a busy road	324 (77.9)	34 (8.2)	58 (13.9)
Roller skating in their street	74 (17.8)	285 (68.5)	57 (13.7)
Climbing trees	161 (38.7)	221 (53.1)	34 (8.2)
Climbing walls	161 (38.7)	219 (52.6)	36 (8.7)
Total	416		

socio economically deprived, while those with Z-score above the median were considered not socio-economically deprived.

The questionnaire was developed in consultation with parents and teachers and piloted on 30 children. The children's questionnaire was self completed. In total there were 22 questions. To make it appealing and easy to answer it included some cartoons, drawings and simple questions, for example, in some questions children were asked to paste different (yes/no) stickers onto the pictures. Although it was a self-completion questionnaire, adult classroom supervision (teacher, school police liaison officer, or research assistant) was available to clarify the questions and ensure that children did not confer over the answers. Children took a letter from the head teacher and the parent's self completed questionnaire from school to home and brought back-completed questionnaires to the school. Reminders were also sent via the children. The parent's questionnaire had the same identifying number as their child's

questionnaire.

These age groups were chosen because earlier studies showed that they engage in the most in-street activities⁶ and are more at risk of after-school accidents compared to pre-school or secondary school children.⁷ In addition, children up to age nine are physically and mentally vulnerable when playing outside the home alone.⁸

The data were analyzed with SPSS for Windows version 6.0. Chi-square tests assessed the associations between categorical data and unpaired t-tests differences between continuous and normally distributed data.⁹

Results. Children's accident risk perceptions of outdoor activities: Table 1 shows children's perception of safe and dangerous outdoor activities in relation to their age, sex and socio-economic deprivation. The top three dangerous activities were cycling (96.8%), and playing (96.2%) or roller

Table 3 - Proportion of occasions when parents agreed with children's assessment of their perception of risky activities by age, sex and deprivation.

Activities	Age 7	Age 9	Boys	Girls	Less deprived	More deprived	Total
Cycling on busy roads	90.5	88.0	90.8	87.9	91.0	87.4	89.3 (n=383)
Playing on busy roads	80.1	90.2	89.3	88.8	93.4	84.5	89.1 (n=384)
Roller skating on a busy road	88.3	87.1	88.3	87.1	86.9	88.6	87.7 (n=358)
Playing near the railway	86.3	88.2	90.4	84.1	88.6	85.9	87.2 (n=336)
Playing on building sites	80.1	78.4	77.6	82.5	82.9	77.2	80.1 (n=347)
Running on roads	77.9	81.7	82.3	77.5	81.1	78.3	79.7 (n=390)
Crossing busy roads alone	80.6	75.3	83.5	75.5	82.7	73.2	78.0 (n=396)
Roller skating in the street	63.0	80.0	75.0	67.6	77.5	65.0	71.3 (n=359)
Playing near old derelict buildings	66.7	65.2	71.2	61.2	69.8	62.2	66.0 (n=341)
Cycling without a helmet	55.4	41.1	60.6	53.9	59.9	54.2	57.1 (n=394)
Cycling two on a bike	51.1	60.5	65.8	54.4	54.4	56.9	55.6 (n=365)
Climbing trees	50.7	53.0	50.0	53.6	53.6	50.0	51.8 (n=382)
Climbing walls	45.5	53.3	51.7	47.0	44.4	53.9	49.2 (n=380)

skating (96.2%) on a busy road. Older children compared to younger children were more likely to perceive cycling in their street, crossing busy roads with friends, playing in their street, roller skating in the park or playground, and roller skating in their street ($P<0.01$) as being safe. Boys compared to girls were more likely to perceive cycling two on a bike, cycling without a helmet, crossing busy roads without using the traffic lights, crossing busy roads alone, crossing between parked cars on the road, climbing trees, climbing walls, and climbing buildings ($P<0.01$) as being safe.

There was no significant difference between boys' and girls' risk perception for other outdoor activities. Less deprived children were more likely to perceive cycling in their street, and cycling on the pavements ($P<0.01$) as being safe than more deprived children. Whereas, more deprived children compared to less deprived children were more likely to perceive cycling two on a bike, cycling without a helmet, crossing busy roads alone, running on roads, and climbing wall ($P<0.05$) as being safe. There were no other significant differences.

Parents' views on level of risk that their children attach to after-school outdoor activities: Table 2 shows parents' assessment of the level of risk that their children perceived from after-school outdoor activities. Overall, of 416 responses, between 4.8% and 19.2% of parents could not answer this question. Parents reported that their children perceived playing (84.4%), cycling (83.9%) and roller skating (77.9%) on busy roads as the top three most dangerous activities. They reported that most children perceived roller skating in their street (60.5%), climbing trees (53.1%) and climbing walls (52.6%) as a low risk activity.

Comparison between parents'; and children's responses on the level of risk their children attach to outdoor activities: Table 3 shows the proportion of occasions when parents agreed with their children's assessment of their accurate perception to risky activities by age, sex and deprivation. The level of agreement between parents and children for different activities was between 49.2% for climbing walls and 89.3% for cycling on busy roads. In general, parents had a lower estimation their

children's activities to perceive risk. Using McNemar tests showed that there were significant differences between parents' and children's responses relating to cycling on busy roads, playing on busy roads, roller skating on busy roads, playing near the railway, playing on building sites, running on roads, crossing busy roads alone, playing near old/derelict buildings, cycling without a helmet, cycling two on a bike, climbing trees, and climbing walls ($P<0.01$).

Children's overall ability to differentiate safe from dangerous outdoor activities: Table 4 shows distribution of children's overall ability to differentiate safe from dangerous outdoor activities (percentage of children who scored less than median) in relation to children's age, sex and deprivation. According to the aggregate score for those who scored less than median(16), there were no significant differences between 7 and 9 year old children (49.2% vs. 51.5%) or between less and more deprived children (54.1% vs. 47.6%) in their overall ability to differentiate safe from dangerous situations. However, girls were more likely to be able to differentiate safe from dangerous activities than boys (63.6% vs. 38.6%, $P<0.001$).

DISCUSSION. Many children perceived outdoor activities in their street as being safe. There were disagreements between parents' views of children's risk assessments and children's actual assessments for some risky activities. In this study although most children perceived crossing a busy road as being dangerous, however more than half of the children believed that they are good at crossing a busy road alone.

Children's perception the risk of doing activities on the busy roads was good. This might be because they are well informed about the hazards in some particular places such as the busy roads. More children perceived crossing a busy road with friends as a safer activity than crossing a busy road alone (32.1% vs. 7.4%). This finding was reinforced by Whalen et al.¹⁰ who found that children perceive their own risks as substantially lower than those of their peers do. However, children did not understand the risks involved in many hazardous activities. For

Table 4 - Children's overall ability to differentiate safe from dangerous outdoor activities by age, sex and deprivation (frequency and percent of children who scored less than median). n=471.

	Age 7	Age 9	Boys	Girls	Less deprived	More deprived	Total
Frequency	119	118	92	140	126	111	237
Percent	49.2	51.5	38.6	63.6	54.1	47.6	50.3

example, some children perceived cycling without a helmet, crossing busy roads with friends, crossing between parked cars or climbing walls as not being dangerous. This is similar to Peterson et al.¹¹ findings. They suggested that the majority of children have an inadequate appreciation of the value of safety equipment, such as a helmet. Sandels¹² found that children's ability to judge is extremely illusory and even 7-year-old children were very uncertain pedestrians. The 5 to 9 years old is daring and adventurous.^{13,14} "They are not abstract thinkers and fail to predict consequences accurately. Perceptual and attention-focusing abilities are still maturing into adolescence and for some components, beyond".⁸ Children in this age group are maturing rapidly, however, most do not have the perceptual-motor skills, judgement, and experience to manage, for example, a traffic environment.¹⁵

The finding that for some activities nine year old children had less perception of danger than younger children is interesting. This difference may be viewed as an error of perception. It may also be because nine year olds think they are old enough and may have more confidence in their own abilities, because of their behavior (such as, daring, adventurous behavior, etc.) or developmental characteristics (such as, rebellious or independence). Results of a study on the perception of hazards by children in 10 different scenes including street crossing¹⁶ showed that the ability to perceive hazards does not exist equally in all children, rather, it is a complex process influenced by a wide range of variables. Further studies are required to find out the precise reasons for this finding. The finding that boys have less perception of danger than girls is supported by other studies. Among adults, males and females had similar perceptions of risk from risky behaviors, but males perceive the behaviors as generally less serious and less likely to result in accidents.¹⁶ The pattern of hazard perception of females is different from that of males.^{17,18} Girls mature faster and earlier than boys.¹⁹ Peterson et al.¹¹ in a study on children's beliefs about preventing bicycle collision injuries, showed that girls are less willing to take risks and therefore sustain fewer injuries than boys. Girls may also feel less capable than boys of avoiding collisions, and this may produce less risky behavior in girls. Mazurek²⁰ accounts for the higher rate of accidents among boys compared to girls as being due to the different rate at which motor co-ordination and maturity develop in boys compared with girls. However, in spite of a very marked sex difference in children's risk perception, it seems it cannot easily be accounted for by level of skill or other such factors.

This study showed that less deprived children compared to more deprived children were more likely to perceive cycling in their street and cycling on the pavements as being safe. It may be because

they live in a less hazardous environment. However, for some other hazardous activities such as cycling without a helmet, crossing busy roads and climbing walls less deprived children were also more likely to differentiate safe from dangerous activities compared to more deprived children. This finding is reinforced by other studies. A self-reported study in Eastern England showed that children from non-manual socio-economic background did considerably better than those from manual background in terms of knowledge or road safety and were less likely to be left to play or ride bikes unsupervised in the streets.²¹ Avery and Jackson²² pointed out that children from higher socio-economic groups were more able to identify danger than those from lower groups. They presented no evidence to support this variation. These findings emphasize the importance of educational programmes particularly among more deprived children if accidents are to be prevented. Some studies suggested that parents have unrealistic expectation of their children's pedestrian skills.²³⁻²⁷ This study found similar results, so that the proportion of occasions when parents' views agreed with their children's actual assessment of the danger of risky activities was poor.

It has been shown that children up to age 9 do not understand the risks from traffic. Many children believe that the sign with walking children or school crossing means "children crossing".¹² Therefore, particularly nine years old children might have more confidence in their own ability and this "over self-confidence" might increase the risk of children's traffic accidents.

In conclusion, if we want to reduce the risk of accidents by improving children's risk perception, we may need to think of a variety of measures derived from the various situational aspects such as: children's awareness of hazards; their ability to cope with hazardous situations; the capability to understand educational programmes; etc. We need more information about how hazards are perceived by different groups of children, particularly those with a direct influence on children. After-school accidents can potentially be prevented through a range of techniques including educational programmes directed at the child or parents. The present results appear to suggest some ideas for how best to train primary schoolchildren to deal with risky activities such as crossing a busy road, climbing walls and playing in street and how make parents aware of their children's outdoor activities. Children usually experience risks, which are new for them.²⁸ An important question is whether the manner in which children perceive hazards influences their behavior so their risk of having accidents?

Acknowledgments. I wish to thank to the children and their parents for agreeing to take part in this study, to acknowledge the advice of Professor Raj Bhopal, Dr. Liz

Towner, Dr. Gillian Sanders and Ms. Denise Howel and thank School police officers, teachers and head teachers in the city of Newcastle upon Tyne for their assistance.

References

1. Warner F, Slater DH. The assessment and perception of risk. The Royal Society of London, 1981.
2. Ansell J, Wharton F. Risk-Analysis assessment and management. West Sussex: John Wiley & Sons Ltd, 1992.
3. Cliff KS. Accidents: Cause prevention and services. London: Croom Helm, 1984.
4. Ampofo-Boateng K, Thomson J. Children's perception of safety and danger on the road. *FJ of Psychology* 1991; 82: 487-505.
5. Townsend P, Phillimore P, Beattie A. Health and deprivation. Inequality and the North. London: Croom Helm, 1988.
6. Chapman AJ, Foot HC, Wade FM. Children at play. In: Osborne DJ, Levis JA, eds. Human factors in transport research. London: Academic Press, 1980; 380-387.
7. Tight MR. Accident involvement and exposure to risk for children as pedestrians on Urban roads. 1987, University College of London.
8. Wilson M, Baker S, Teret S, Shock S, Garbarino J. Saving children. A guide to injury prevention. New York: Oxford University Press, 1991.
9. Altman, DG. Practical statistics for medical research. London: Chapman and Hall, 1991.
10. Whalen CK, Henke B, O'Neil R, Hollingshead J, Holman A, Moore B. Optimism in children's judgements of health and environmental risks. *Health Psychology* 1994; 13: 319-325.
11. Peterson L, Gillies R, Cook SC, Schick B, Little T. Developmental patterns of expected consequences for simulated bicycle injury events. *Health Psychology* 1995; 13: 218-223.
12. Sandels S. Children in traffic. (Revised ed). London: Elek Books Ltd, 1975.
13. Older SJ, Grayson G. Perception and decision in the pedestrian task. London: Transport and Road Research Laboratory, 1974.
14. Greensher J. Prevention of childhood injuries. *Pediatrics* 1984; 74: 970-975.
15. Pick HL. ATVs and children: Perceptual-motor, cognitive, and social risk factors. New York: US Consumer Product Safety Commission, 1987.
16. Martin GL, Heimstra NW. The perception of hazard by children. *J of Safety Research* 1973; 5: 238-246.
17. DeJoy DM. An examination of gender differences in traffic accident risk perception. *Accident Analysis & Prevention* 1992; 24: 237-246.
18. Trankle U, Gelau C, Metker T. Risk perception and age-specific accidents of young drivers. *Accident Analysis & Prevention* 1990; 22: 119-125.
19. Rivara F, Bergman A, LoGerfo J, Weiss N. Epidemiology of childhood injuries, II sex differences in injury rates. *Am J Dis Child* 1982; 136: 502-506.
20. Mazurek AJ. Epidemiology of paediatric injury. *J of Accident and Emergency Medicine* 1994; 11: 9-16.
21. West R, Sammons P, West A. Effects of traffic club on road safety knowledge and self-reported behavior of young children and their parents. *Accid Anal and Prev* 1993; 25: 609-618.
22. Avery JG, Jackson RH. Children and their accidents. Arnold Edwar, London, 1993.
23. Chapman AJ, Sheehy NP, Foot HC, Wade FM. Child pedestrian behavior. In: Foot HC, eds. Road Safety, research and practice. Praeger, 1981; 135-142.
24. Thachray R, Dueker R. Child pedestrian supervision and guidance. Washington DC: National Highway Traffic Administration, 1983.
25. Rivara FP, Bergman AB, Drake C. Parental attitudes and practices toward children as pedestrians. *Pediatrics* 1989; 84: 1017-1021.
26. Dunne R, Asher K, Rivara F. Behavior and parental expectations of child pedestrians. *Pediatrics* 1992; 89: 486-490.
27. Rivara F. Epidemiology of childhood injuries. I. Review of current research and presentation. *Am J Dis Child* May 1982; 136: 399-405.
28. Lund J. The assessment of risks in childhood. National Institute of Public Health, Oslo, Norway: 1989.