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Factors associated with Iranian children's perception of danger on the road

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The aim of the current study was to explore the association of parental and child factors with pedestrian skills of Iranian children. The question was whether parental factors such as verbal instructions given to children on road safety, parent's safe practices in real traffic situations while accompanying their children, and parents' educational level, or child factors such as age, gender, birth-order and number of siblings are related to the skill of children in identifying safe/dangerous road crossing sites. The pedestrian skills of 127 children at ages 7, 9 and 11 years were assessed by a pedestrian task involving 10 pictures of different crossing sites. The frequency of verbal instructions parents give to their children on road safety and safe road behaviour of parents as pedestrian with their children was assessed by a self-report questionnaire. Results indicated that the most significant predictor was age. Young children were less able to perform the pedestrian task, and measured parental factors did not have any association with children's safety skill. It seems that Iranian children have to outgrow the limitations set by their developmental level. The measured parental factors did not have any role in doing so. The study suggests that a culture of road safety should be raised in Iran. Children need parents to aware them of road dangers in general and to train them specific skill of identifying safe/dangerous road crossing sites. Therefore, the role of parents as proper pedestrian models should be considered when developing road safety educational programmes for children in Iran.

Keywords: Iranian children, perception of danger, parental factors, road safety

Road traffic injuries (RTI) are estimated to be the second leading cause of death, disability and hospitalization for children aged 5 to 14 years globally (WHO, 2008). In Iran, children are among the most vulnerable groups when negotiating traffic (Zargar, Roudsari, Shadman, Kaviani, Tarighi, 2003). The most frequently occurring RTIs for children aged 12

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years or younger are for pedestrians, followed by car passengers, motorcycle users and cycle users (Karbakhsh, Zargar, Zarei, Khaji, 2008; Roudsari, Shadman, Ghodsi, 2006). Thus, children are most vulnerable when trying to cross roads.

Road crossing is a complex task requiring a wide range of perceptual and cognitive competencies. One such requirement is the ability to find safe places to cross the road which involves knowing the factors that make a crossing place dangerous; factors, such as obstruction of view, speeding traffic, complexity, and width of the road and so on. Developmental studies of pedestrian skills show a consistent developmental trend with younger children possessing poor pedestrian skills and older children approaching adult ability (Ampofo-Boateng and Thomson, 1991, Pfeffer, 2005). In judging whether a crossing site is dangerous, young children rely most on the presence or absence of cars on the road. Older ones consider dangerous features intrinsic in the road construction (Ampofo-Boateng and Thomson, 1991, Pfeffer, 2005). The question of why young children are less able to identify crossing sites has been investigated from different approaches. One approach most often used to interpret this developmental trend is the Piagetian approach. This emphasizes cognitive skills such as the inability to decenter, perceptual thinking, egocentrism, as reasons why children fail to identify and choose a safe place to cross roads. The illogical thinking of children at age 2-7 years causes them to focus on one aspect of the perceptual field, when making a judgment (Piaget, 1929). Demetre (1997) demonstrated that 6- to 8-year-olds do not realize the danger of attempting to cross a road between parked cars because of a lack of perspective-taking skill. Others (Dunbar, Lewis, & Hill, 1999, Tabibi & Pfeffer, 2003) used an information processing approach to explain why children fail to identify safe and dangerous places to cross. Attentional incapability, cognitive capacity shortage and distractibility have been much of interest. According to this approach, the complexity of traffic situations makes children vulnerable in negotiating traffic systems, and processing road features are beyond the cognitive processes of children. Both these approaches

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commonly have taken the view that it is maturational factors (cognition) that preclude the child to act safely on the road.

Other approaches have taken an environmental or socialization perspective to explain the development of children's road crossing skills. Examples include studies on the role of adult supervision, the accuracy of adults' perceptions of children's road crossing skills, adults' own pedestrian behavior as a model for children, parent-child interaction, and children's traffic experience (Demetre and Gaffin, 1994; Dunbar, Lewis and Hill, 2002; Hill, Lewis and Dunbar, 2000; Islam and Pfeffer, 1999; Pfeffer, 2005; Van Der Molen, Van Den Herik and Van Der Klaauw, 1983). The prominent role of road safety education especially when carried out by parents is reported in many studies. Thomson, Ampofo-Boateng, Lee, Grieve, Pitcairn, and Demetre (1998) developed a training program at the roadside to promote safe route-taking among children aged 5 years. The training program was undertaken by volunteer parents. The study showed that volunteers were as effective as "expert" trainers. In the study carried out by Dunbar, et al. (2002) parental education was a significant predictor for greater control of children when crossing roads. Further, they found "parents scored as providing a better road-crossing model tend to participate in short conversations. In this study, "younger children, girls, children with a more educated parent, and those participating in shorter conversations tended to show greater dependence on the adult when crossing the road" (p.615).

The aim of the current study was to explore the role of family variables on the specific skill of identifying safe/dangerous road crossing sites of children in Iran. Child factors such as his/her birth-order, age, gender and number of his/her sisters and brothers in the family as well as parental factors such as parents' level of education, the amount of child-directed speech about road safety by parents (verbal education) and the amount of parent's road safety practices while accompanying their children (parental safe modeling) are examined in relation to children's ability to identify safe/dangerous road crossing sites. Although there have been studies demonstrating the prominent role of parental factors on children's road

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behavior, few have demonstrated the influence of parents on the specific road skill of finding a safe place to cross. Also, most studies have been carried out in 'developed' countries where formal traffic education for children and parents has been carried out for many years. In Iran, a developing country, there are no sufficient, age appropriate formal education programmes either for parents or for children for this specific skill of crossing roads. Pedestrian crossing facilities are scarce, and those that have been constructed are not used regularly or appropriately.

The question of the current study was that whether child factors (age, gender, birth-order and number of siblings) or parental factors (parents' level of education, the amount of parent verbal education, and the amount of parental safe modeling) could predict Iranian children's perceptions of danger on the road.

Method

Participants

Child sample

Participants were 127 children, (70 boys and 57 girls). Forty one children were from Year 2 (7 to 8 years), 37 children were from Year 4 (9 to 10 years) and 49 children were from Year 5 (11 to 12 years). Year 2 and 4 children were from one boy and one girl schools located in area 6 of educational district, and Year 5 children were from one boy and one girl schools located in area 7 of educational district in the city of Mashhad. These two educational districts are close to each other.

Parent sample

Eighty seven out of 127 (49 parents of boys and 38 parents of girls) parents, a percentage of 68.5 per cent responses, participated in the study. Twenty-nine of them were parents of Year 2 children, 32 were parents of Year 4 children and 26 were parents of Year 5 children. The majority of respondents were mothers (63 mums, 13 dads and one non-indicated).

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Materials

Pedestrian task: A total of 10 colored pictures depicting 4 safe and 6 dangerous road-crossing sites were extracted from those used in Tabibi and Pfeffer's (2003) study, which were designed based on previous research on pedestrian skills (e.g., Vinje, 1981; Ampofo-Boateng and Thomson, 1991). The pictures were modified to be more suitable to the traffic situation in Iran. The dangerous road crossing sites were a blind-bend, a complex junction, a roundabout, a free-way, the brow of a road-bridge and a straight road with parked cars. Designated safe crossing sites were a zebra crossing, a traffic light on red, a pedestrian footbridge and a pedestrian underway. A straight road with clear view and no vehicles present was used for the practice trial. The task was piloted with 30 children and 10 adults. As a result of the pilot study some minor changes to the drawings of the pictures and the procedure were made.

Questionnaire: a questionnaire was provided for parents aiming to assess the amount of verbal education they may give to their children and the amount of safe practices they show while in front of their children. The questionnaire began with two general questions from parents about how frequently they read books on or talk about road safety with their children. The next questions were designed to specifically point to the skills that are assessed by the pedestrian task. For example, for assessing verbal education for dangerous sites parents were asked "Do you advise your child not to cross a road at round about?" and for safe sites "Do you advise your child to cross a road at zebra crossing locations?" Also, for safe modeling parents were asked "When you are with your child, do you use foot-bridge for crossing a road, where possible?" for safe sites and "Do you avoid crossing at roundabout when you are with your child?" for dangerous sites. The questionnaire was comprised of 15 questions (including the two general questions), 6 items related to child-directed speech (3 safe and 3 dangerous) and 7 items were related to parents road safety practices (4 safe and 3 dangerous). Each question was followed by three options of "never", "sometimes" and "mostly" ranging 0 to 2. Thus, scores ranged from 0 to

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30. A reliability score of α = .83 for the 15 items questionnaire was obtained by Cronbach" alpha.

Also, at this questionnaire father and mother's level of education, the child birth-order, number of children and child's birth date were asked.

Procedure

According to the local education authority guidelines in Iran, researching with children requires the permission of the authority. Therefore for this study, the education authorities' permission as well as that of four schools was obtained. The pedestrian task was administered individually and presentations of pictures were in random order. Participants started with the practice picture and were instructed as follows: "*You will see pictures of some road crossing sites. Someone wants to cross a road to get to school. Look carefully at each picture and say whether the road is safe to cross or not"*. Then they were asked to give a reason for their response. Scoring of pictures was based on the scoring procedure used by Ampofo-Boateng and Thomson (1991) and Pfeffer (2005). One point was given for a correct response in identifying safe and dangerous crossing sites. For reasoning responses a score of one point was given if the element of danger was noted. For example, for crossing at a blind bend with obstructed view, responses such as "not being seen" or "the driver can't see" or "sudden coming of a car from behind", a score of one point was given. Therefore, scores ranged from zero to 20. For reliability of reasoning scores, the responses were scored by the research assistant and researcher. In case of disagreement, a third person was consulted. After administration of the pedestrian task children were given a copy of the questionnaire to take home to their parents with an introductory letter informing them of the research aims, the anonymity of their responses and their right to withdraw from the research. A follow-up letter with a new copy of the questionnaire was sent for those who did not respond.

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Results

The following tables show the frequency of parents in each level of education, frequency of children in each category of birth-order and number of children in the family.

Table 1
Frequency of parents in each level of education

	under Diploma/ Diploma		Under graduate		Post graduate and higher	
	mum	dad	mum	dad	mum	dad
7 years	10/20	12/17	10	9	0	1
9 years	16/16	11/18	5	6	0	0
11 years	13/24	7/15	11	23	0	2

As Table 1 shows most parents had at least diploma degree, that is, twelve years of compulsory education.

Table 2
Frequency of children in each category of child birth-order and number of children in the family

	1st child/ 1 child	2nd child/ 2 children	3rd child/ 3 children	4th child/ 4 children	>= 5th child/ >= 5 children
7 years	12/ 6	10/ 20	4/ 8	0/ 2	3/ 3
9 years	8/ 4	11/ 14	6/ 12	3/ 3	2/ 2
11 years	15/ 6	16/ 13	14/ 22	4/ 6	0/ 2
total	35/ 16	37/ 47	24/ 42	7/ 11	5/ 7

As Table 2 shows most families had 2 or 3 children, and most children were the first and second child at home.

Table 3 shows the mean and standard deviations of the scores gained for performing the pedestrian task for each age-group and gender. Scores are reported at three levels: scores for identifying the crossing sites (the first question), scores for reasons given for a site being safe or dangerous (the second question) and scores for perception of danger (sum of the scores gained from the first and second questions).

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Table 3
Mean correct response and (SD) for identifying the crossing sites, reasons given for a site being safe or dangerous and perception of danger by age and gender

		No.	Identifying Mean (SD)	Reasoning Mean (SD)	Danger Perception Mean (SD)
7 year-olds	All	41	7.39 (1.5)	3.63 (1.6)	11.02 (2.7)
	Boy	25	7.28 (1.5)	3.60 (1.7)	10.88 (2.7)
	Girl	16	7.56 (1.5)	3.69 (1.5)	11.25 (2.7)
9 year-olds	All	37	7.92 (1.9)	4.73 (1.3)	12.62 (2.9)
	Boy	21	7.67 (2.1)	4.67 (1.4)	12.33 (3.1)
	Girl	16	8.25 (1.5)	4.81 (1.3)	13.06 (2.6)
11 year-olds	All	49	8.96 (1.2)	6.14 (1.9)	15.1 (2.5)
	Boy	24	9.25 (0.8)	5.88 (1.7)	15.12 (1.9)
	Girl	25	8.68 (1.3)	6.40 (2.04)	15.08 (2.9)

Multivariate analysis was computed to examine age and gender difference in any of the scores. For scores of identifying crossing sites, reasons given and danger perception the difference between age groups were significant: $F_{(2/121)}$ =11.992, $p<0.001$, $F_{(2/121)}$ = 24.777 $p<0.001$ and $F_{(2/121)}$ = 25.017, $p<0.001$, respectively. No gender difference existed.

Post hoc analysis using Tukey showed the following results: for identifying crossing sites, 11 year-olds performed better than 9 ($p = 0.005$) and 7 year-olds ($p<0.001$). For reasons given 11 year-olds performed better than 9 and 7 (both $p<0.001$) year-olds. 9 year-olds did better than 7 year-olds ($p=0.01$). For perception 11 year-olds performed better than 9 and 7 (both $p<0.001$) year-olds, and 9 year-olds better than 7 year-olds ($p=0.02$).

The means and standard deviations for scores gained from parents' questionnaire are reported in Table 4. Scores were calculated for all questions in the questionnaire, for the subset of verbal education (8 questions including 3 safe, 3 dangerous and 2 general), subset of parental safe modeling (7 questions including 4 safe and 3 dangerous).

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Table 4
Mean (SD) responses from parent's questionnaire

		Verbal education (out of 16)	Parental safe modeling (out of 14)	Total (out of 30)
7 year-olds	Boy	11.20 (3.9)	11.53 (2.03)	22.73 (5.3)
	Girl	12.21 (2.5)	11.71 (2.01)	23.93 (3.9)
	All	11.7 (3.3)	11.6 (1.9)	23.3 (4.6)
9 year-olds	Boy	12.68 (2.4)	10.84 (2.8)	23.53 (4.6)
	Girl	11.77 (2.9)	11.00 (1.9)	22.77 (4.0)
	All	12.3 (2.6)	10.9 (2.4)	23.2 (4.3)
11 year-olds	Boy	11.67 (4.2)	11.40 (3.04)	23.1 (7.03)
	Girl	11.55 (3.5)	12.18 (1.2)	23.73 (3.9)
	All	11.6 (3.9)	11.7 (2.4)	23.4 (5.8)

No significant difference emerged between age-groups in each type of responses given by parents and none for gender. Comparing scores of verbal education with that of practical education for each age-group separately the following results were gained: for 7 and 11 year-olds the difference was significant (t= -2.8, df= 28, p = 0.007; t= -2.2, df= 25, p=0.004 respectively); parents of 7 and 11 year-olds exhibited more safe behaviour while accompanying their children than giving verbal instructions to them. For 9 years the difference was not significant[1].

Overall, the scores of questionnaire for all age groups were skewed towards the left. This suggests that parents tended to respond positively towards the questions. However, further analysis on the median of the questionnaire scores, combining all age groups, indicated that only 56.3, 64.4 and 52.9 percent of the respondents reported to give verbal instructions to their children, exhibit safe modeling in front of their

[1] The proportion of scores was used for the analysis in order to correct for inequality of maximum scores for verbal education and parental safe modeling.

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children and doing both "mostly" (median= 13, 12, 24 for verbal education, safe modeling and total score).

A series of spearman correlations were computed to examine the relationship between child variables (birth-order, number of siblings), parents variables (level of education, the amount of safe behavior modeling and verbal education) and indices of perception of danger (identifying, reason and perception) for each age group separately. For 7 and 11 year-olds none of the child and parents variables were related to indices of perception of danger. For 9 year-olds, scores in giving reasons for the pedestrian task was negatively related to the number of children in the family (n= 35, r= -.33, p= 0.050, two-tailed).

A linear regression was computed with perception of danger as criterion and age, birth-order, parent's level of education, parent's verbal education and parent's safe modeling as predictors for all age-groups combined. The results indicated that age was the significant predictor and none of the other variables could contribute to improve the perception of danger.

Discussion

The results with regard to child variables, indicated that, consistent with other studies in 'developed' countries, the ability of Iranian children to perceive danger on the road increase with age. Older children were more able to find safe/dangerous crossing-sites and to reason accurately as to why a crossing site is safe or dangerous. Analyses of data also suggested that children at age 9 years who lived with a number of sisters and brothers were less able to give correct reasons as to why a crossing site might be dangerous. Having a big family may limit the opportunity for the child to increase the related his/her knowledge.

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Table 5

Stepwise regression with perception of danger as criterion and age, birth-order, parent's level of education, parent's verbal education and parent's safe modeling as predictors for all age-groups combined

	Variables entered	B	SD	β	t	p
First step	Age	.076	.014	.57	5.319	<.001
	Birth-order	-.320	.253	-.120	-1.264	>.05
R= .51,	R^2= .26, Adjusted R^2= .24, F= 14.5, P <0.001					
Second step	Age					<.001
	Birth-order	-.308	.263	-.116	-1.172	>.05
	parent's level of education[1]	.248	.434	.058	.572	>.05
	parent's verbal education	-.149	.107	-.156	-1.392	>.05
	parent's safe modeling	.133	.149	.099	.896	>.05
R= .53, R^2= .28, Adjusted R^2= .24, F= 6.9, P <0.001						
R^2 Change= .02, F(3/79) = .7, p > 0.05						

With regard to parental factors, the study shows that none of the measured variables were significant for danger perception on the road for all age groups. Overall, children's perception of danger was related to neither to the amount of verbal instructions given by parents nor to safe practices parents have in the company of their children. Also, the education level of parents did not have any effect. Children of both much and less educated parents performed the pedestrian task equally. Vygotsky suggests that a child's learning originates within active social interactions with parents, teachers and the child's peer group. According to him, it was expected that parental variables would show some effect on the development of safety skills of children. If cognitive development depends on access to the social interaction opportunities then, cognition should develop in different ways in environments that differ in the provision of

[1] Note that since this variable is categorical and includes more than two categories, a regression was computed deleting this variable. The resulting analysis was the same.

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these opportunities. Therefore, if interactions between child and others (parents, teachers and peer groups) decrease, then cognition develops more slowly (Berk, 2000).

The current study finds that neither the rate and type of child-parent interactions reported by parents (verbal instructions and practicing safe behavior while in front of the child) nor the environment provided by parents with different educational levels had any role on the development of children's perception of danger. While, previous studies have found the significant role of child-directed speech by parents on road safety (Dunbar, et al. 2002), the current study did not find it as significant in the ability to find safe crossing sites.

The main question of the current study was that whether child factors (age, gender, birth-order and number of siblings) or parental factors (parents' level of education, the amount of parent verbal education, and the amount of parental safe modeling) could predict Iranian children's perceptions of danger on the road. The answer is that neither parental factors nor child factors were as significant predictors as the variable of age. It seems that danger perception of children in Iran is more dependent on maturational factors than to the measured family factors. That is because age was the significant predictor for danger perception on the road among all other parental and child factors. It could account for 24 percent of variance even when the variances of all other factors were accounted for. Consistent with Sandels suggestion in 1975, it seems that Iranian children by virtue of their age and psychological development become capable of acquiring the skills needed to cope with the traffic environment. This conclusion could be emphasized by the fact that parents of different educational levels and parents of children in different age-groups provided the same amount of social interaction opportunities for their children on subject of road safety. This might be due to the fact that in Iran there are no currently systematic, age-appropriate educational programs for safety of children that recognizes these skills to be taught.

There are wide evidence demonstrating that social factors play a prominent role on the rate of children's injuries in developed countries

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(Roberts, Smith and Bryce, 1995; Backett and Johnston, 1997) and Iran. For example, Hossayni (1379) examined the role of social and economical factors on Iranian children's death in general. They found that parental education especially that of mothers is a significant factor related to the death rate of children. He explained that mothers spend more time with children and have more than any one else a direct relation with their children. The study of Hadady, Soori, Mehrabi and Alamdar (1386) in Iran also showed that mothers' level of education could significantly differentiate between 6-9 year-olds who were admitted in a hospital due to traffic-related accidents and the control group. Furthermore, they noted that parents of traffic-related injured children let their children playing outside more than parents of control group.

Nevertheless, it should be noted that the non-significant role of parental verbal education and their safe practices in traffic situations on children's perception of danger on the road might be the result of the tool used for assessing theses measures. One of the weaknesses of questionnaire is that respondents may give socially desirable responses. A closer look at the questionnaire total scores (Table 4) may support this claim. Parents of all age-groups were giving responses little less than the maximum score. Contrary to the fact that in Iran the practice of crossing at designated pedestrian crossing sites is not enforced by law and they are scarcely used by people. Therefore, what parents have reported in the self-report questionnaire is substantially over-reported of what it is. In fact, further analysis of the data suggests that only 52% of the parents reported that they advise their children safety precautious and they themselves behave safely in front of their children "most of the times". This indicates that parents regardless of their educational level and their child's age do not consider road safety as an important issue as it deserves.

Furthermore, the significant effect of age and insignificant effect of parents in children's danger perception does not mean that young children are inherently incapable of acquiring the requisite skills until some biologically determined point is reached and educating them results in failure. This indicates that in the current situation these skills are neither

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recognized nor taught by current educational methods. Iranian children are in real danger when negotiating traffic situations as they themselves have to outgrow the limitations set by their psychological state.

The ability to find a safe place and to identify dangerous situations on the road where crossing should not be attempted or where special strategies are required is an essential precursor to the act of crossing. This is because, if children attempt to do so, for example on free-way, they will be in considerable danger. Children do need to learn how to deal safely with traffic. Therefore, setting a good example for children by parents is essential for children to behave properly on the road as a pedestrian. Educational programmes should be devised to teach children the specific ability of finding safe and dangerous crossing sites. In doing so, parents with any educational level should also be targeted and involved in child training.

This article ends with the suggestion for further research that other parental factors such as parent's perception of danger, parent's perception of their children's pedestrian skills and parental attitudes towards road safety should also be examined.

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