The effectiveness of parents in promoting the development of road crossing skills in young children

J.A. Thomson* and K. Ampofo-Boateng
Department of Psychology, University of Strathclyde

D.N. Lee, R. Grieve and T.K. Pitcairn
Department of Psychology, University of Edinburgh

J.D. Demetre
Department of Psychology, University of Greenwich

Background. Young children show poor judgment when asked to select a safe place to cross the road, frequently considering dangerous sites to be safe. Correspondingly, child pedestrian accidents are over-represented at such locations. Increasing the child's ability to recognise such dangers is a central challenge for road safety education.

Aims. Practical training methods have proved effective in improving such judgments but are labour-intensive, time-consuming and therefore difficult to implement on a realistic scale. The study examined the possibility that volunteers from the local community might be capable of using such methods to promote children's pedestrian competence.

Sample. Sixty children from the Primary 1 (Reception) classes of three Glasgow schools took part. Volunteers were ordinary parents from the same areas. None had 'formal' experience of working with children other than through being parents.

Method. Volunteers received experience of training children at courses organised in each school. Children learned in small groups, receiving two sessions of roadside training followed by four on a table-top model. Pre- and post-tests allowed the effectiveness of training to be assessed.

Results. Significant improvements relative to controls were found in all children following training. Improvements proved robust and no deterioration was observed two months after the programme ended. Comparison with a previous study in which training was undertaken by highly qualified staff showed that the volunteers were as effective as 'expert' trainers.

Conclusions. Parent volunteers can significantly increase the pedestrian competence of children as young as five years. They constitute a most valuable 'resource' in road safety education. The opportunities afforded by involving the local community in educational interventions should be further explored.

In recent years, the vulnerability of children to pedestrian accidents has been highlighted by numerous writers and considerable concern expressed as to the best ways forward in reducing this vulnerability (Roberts, Smith & Bryce, 1996; Scottish Development Department, 1989; Thomson, 1991; Towner, Dowswell & Jarvis, 1993). Educational approaches have come under particular scrutiny, to the point that the UK government recently felt the need to commission a comprehensive review of educational strategies with the aim of identifying the most promising approaches as well as the basic research required to make educational intervention more effective (Thomson, Tolmie, Foot & McLaren, 1996). Traditional educational approaches, focused on the child's *knowledge* and *attitudes*, have come under particular criticism. Such interventions undoubtedly work in the sense that the child is more likely to give the 'correct' answer to questions posed by adults. However, these changes have seldom given rise to corresponding changes in children's *behaviour*, either in real traffic or in tests where the measure of performance is behavioural rather than verbal (for reviews of this literature, see Rothengatter, 1981; Thomson, 1991). The assumption that there is a direct link between knowledge, attitudes and behaviour has also come under serious criticism in other areas of health education such as smoking, drinking and substance abuse, and in adults as well as children (e.g., Davies & Coggans, 1991).

Practical approaches to road safety education

By contrast to knowledge enhancement approaches, studies aimed at modifying children's behaviour directly, usually through practical training programmes set up in real or simulated traffic environments, have proved far more fruitful. Examples of pedestrian skills that have been improved in this way include crossing at parked cars and intersections (Rothengatter, 1981, 1984; Thomson & Whelan, 1997); roadside visual timing judgments (Demetre, Lee, Grieve, Pitcairn, Ampofo-Boateng & Thomson, 1993; Lee, Young & McLaughlin, 1984; van Schagen, 1988; Young & Lee, 1987); developing safe route planning strategies (Thomson, Ampofo-Boateng, Pitcairn, Grieve, Lee & Demetre, 1992; Thomson & Whelan, 1997); and even reducing roadside impulsivity (Gerber, Huber & Limbourg, 1977). In all these cases, practical training methods led to substantial and relatively robust changes in the behaviour of children as young as five years of age. Such changes have seldom, if ever, been reported following more traditional education. There are, in fact, sound psychological reasons why practical approaches should be more successful than knowledge-based approaches, especially among younger children. We have recently analysed these factors in some detail (Thomson *et al.*, 1996).

Whilst practical training methods work well, implementing them on a realistic scale is no easy matter because the approach is inherently labour intensive and time-

consuming. Even though sizeable improvements in children's judgments have been observed following as few as four 30-minute sessions at the roadside, this still represents a substantial input given current resourcing in most countries. It is certainly hard to see how any of the main professional groups involved in road safety education could be expected to devote the time necessary to such roadside exercises. In order to capitalise on the benefits of the practical approach, some means must be found of making it viable. This represents a substantial challenge to road safety education at the present time.

Parents as providers of road safety education

One group which has long been advocated as a 'resource' in road safety education is parents. The argument is that parents have many more opportunities to train their children than anyone else and securing their participation would greatly expand the experience available to the child. There is also a widespread belief among professional groups (including teachers, road safety officers and the police) that the primary responsibility for road safety education rests in the first instance with parents – a view apparently shared by parents themselves (Sadler, 1972). Whether or not it is appropriate to view parents as the primary providers of road safety education, it would certainly seem foolish to ignore so valuable a 'resource', especially when considering how to expand the use of practical training methods.

The use of parents in road safety education was pioneered in the 1960s by the Scandinavian Traffic Clubs, which sent materials to parents on a regular basis and attempted to maintain an ongoing commitment from them. Evaluation showed casualty rates to be significantly lower among club members than non-members (Schioldborg, 1976), leading traffic clubs to be promoted with some enthusiasm. The idea of a national traffic club has recently been piloted in the Eastern Region of England, with reasonably encouraging results (West, Sammons & West, 1993; Bryan-Brown, 1995). However, this club has so far focused on elementary road safety education among very young children.

The traffic club idea seems a good one, but two problems are associated with it. Firstly, only a proportion of eligible parents typically enrol their children, with membership tending to be biased towards higher socio-economic groups. However, it is known that accidents are markedly over-represented among lower socio-economic groups (e.g., Roberts, 1996; Sharples, Storey, Aynsley Green & Eyre, 1990; Townsend & Davidson, 1982). This means that the children most in need of training may be the very ones least likely to get it. Secondly, whilst traffic clubs ensure that parents receive materials and are therefore better informed about what to do with their children, there is no support or feedback as parents try to work their way through the programme. Once the materials have been received, parents are very much on their own. This is likely to pose particular problems to parents who lack confidence in themselves as teachers.

An approach that might at least partially overcome some of these problem has been reported by Rothengatter (1981) and van der Molen (1983). This group produced videos illustrating training procedures for teaching children how to deal with several traffic situations. These were shown to parents at evening meetings organised in local schools, with parents being encouraged to train their children in the illustrated manner.

In addition to demonstrating the methods, these sessions offered opportunities for parents to raise questions about the training and what it entailed.

This represents an improvement over the 'distance learning' approach taken by traditional traffic clubs because it offers more tangible support to parents, at least in the initial stages. On the negative side, several problems persist. First, the approach remains relatively passive because parents simply watched good teaching practice: they did not receive any guided experience of carrying out the training. Secondly, since not all parents attended the evening meetings it follows that only a proportion of the targeted children would receive training. Finally, it was difficult to determine how assiduously parents followed the programme or to assess how robust the procedures were to variations in parental skill. Nevertheless, pre- and post-tests showed that children's traffic competence undoubtedly improved relative to that of control children whose parents had not seen the videos, and unobtrusive observation showed some generalisation to children's unsupervised traffic behaviour (van der Molen, 1983).

The present study

The present study aimed to develop the approach described above whilst introducing several new features aimed at overcoming the problems associated with it. The key aspects of our approach were as follows:

- Instead of asking parents to train their *own* children, we recruited volunteers from among parents in the schools to assist in training *other people's* children. The aim was to ensure that all children in the targeted age groups would benefit, not just those whose own parents felt capable of making the required commitment. This approach would eliminate some of the participation biases referred to earlier.
- Because volunteers were required to come into the schools at designated times to take children to the roadside, it was possible to monitor precisely how much training children actually received. This represents a significant advance over previous traffic club studies where such monitoring has not been possible.
- Volunteers themselves received practical experience of working with children under the guidance of project staff. Thus, volunteers not only observed and read about good teaching practice, they were required to try to emulate it under supervised conditions. It was strongly felt that such a 'hands-on' approach would be particularly beneficial to those parents who lacked confidence in themselves as trainers. It was also felt that parents who had confidence in themselves would be much more likely to persevere with the programme.
- Finally, notwithstanding that parental participation in road safety education has long been advocated, relatively few studies have attempted to determine how competent parents actually are as teachers of road safety. Many road safety skills are extremely challenging for children. If parents are exhorted to teach their children, it must be demonstrated that they are, in fact, able to do so effectively. The present study addressed this by assessing the progress made by children under parental tutelage.

The traffic skill to be investigated

The skill chosen for study concerns the child's ability to find safe crossing sites and to construct routes through the traffic environment that would link safe sites whilst avoiding dangerous ones (Ampofo-Boateng & Thomson, 1991). Young children (under nine years) show remarkably little ability to differentiate between safe and dangerous sites, frequently arguing that dangerous sites are safe ones. They fail to recognise the danger posed by locations where their view of the road is restricted (e.g., at parked vehicles, a sharp bend or the brow of a hill), nor do they show insight into the difficulties posed when crossing at complex road structures such as intersections. They also tend to favour the most direct route to a destination as safest, often choosing to cross the road diagonally even though this increases exposure to risk. Such a route may even be chosen at crossroads, where they would be exposed to traffic from several directions. In general, children tend to be reluctant to take detours that remove them from their immediate goal.

This skill was chosen for two reasons. Firstly, we now have a considerable amount of data about children's performance at different ages, as well as their responsiveness to different forms of training (Ampofo-Boateng & Thomson, 1991; Ampofo-Boateng, Thomson, Grieve, Pitcairn, Lee & Demetre, 1993; Davies, Guy & Murray, 1993; Thomson *et al.*, 1992) which would inform the results of a volunteer-led intervention. Secondly, safe place finding is a conceptually demanding skill for young children and competence cannot be attained through the memorising of rules, even though this type of teaching would probably be relatively easy for parents to master. Instead, the trainer must adopt an *indirect* approach aimed at helping the children discover the principles governing what makes a site safe or dangerous through their *own* reasoning rather than through that of the trainer (Thomson *et al.*, 1992). If volunteers were to attain a degree of competence in such relatively demanding teaching, it would seem realistic to assume that they would be capable of making a similar contribution in other areas of traffic education. While carefully constructed programmes of practical training certainly improve safe place finding in children as young as five years when the training is undertaken by experienced staff, to what extent would ordinary parents with no special qualifications or experience achieve comparable results? The study set out to answer this question.

Method

Sample

Children from the Primary 1 (Reception) class of three Glasgow schools took part in the study. Two of the schools were located in large, peripheral housing schemes associated with social and economic deprivation. The third was an inner-city school serving children of mixed ethnic background. The schools were selected on the basis that they were located in high risk accident areas of the sort that would likely be targeted by interventions of the type investigated. It was therefore judged important to assess the effectiveness of the approach within such areas.

The sample consisted of 60 five-year-old children whose parents had agreed to their participation in the study. They were assigned to either a trained or control group each comprising 30 children. The groups were balanced for gender and, as far as possible, for

school. Otherwise, allocation was randomised. Mean ages were: Trained Group – 5 years 6 months; Control Group – 5 years 7 months.

Setting

Children in the trained group received two sessions of training at the roadside followed by four sessions on a specially constructed table-top model on which comparable traffic scenarios could be contrived. Both methods have previously been shown to be effective in improving the judgments of five-year-olds (Ampofo-Boateng *et al.*, 1993; Davies *et al.*, 1993; Thomson *et al.*, 1992). The model was identical to that used previously and comprised a large base (120 × 100cms.) constructed from hardboard on to which a road layout had been painted. A selection of buildings, trees, hedges, cars, doll figures and other paraphernalia was used to create a range of road crossing problems similar to those that the child might encounter in the real world. The model was set up on a large table chosen to suit the children's stature, allowing them to view the model from approximately waist height. The perspective offered from this height had proved satisfactory in previous training studies, leading to improved judgments that transferred to the roadside (Ampofo-Boateng *et al.*, 1993; Thomson *et al.*, 1992).

The roadside training took place at a series of pre-selected sites in the streets near the children's schools. Care was taken to ensure that the sites and situations were similar to those devised on the model, though they were not intended to be identical. In both cases, the children were asked to cross as 'safely as possible' near intersections, bends, parked vehicles and other places where visibility was obscured.

General design

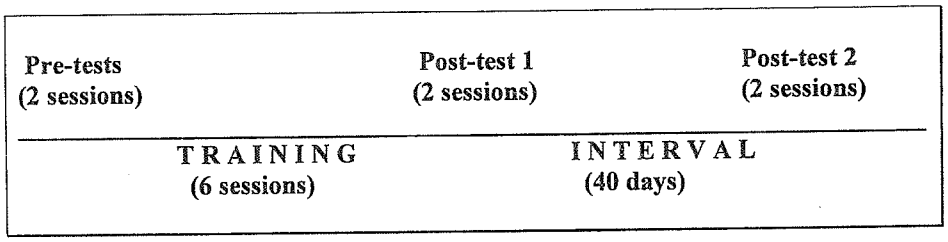
The overall design of the study is shown in Figure 1. Before training began, all children were individually pre-tested at a set of roadside locations on two separate occasions to establish baseline levels of skill. These tests were repeated immediately after training ended (post-test 1). A further test took place approximately 40 days after the end of post-test 1 to assess the longer-term effects of training (post-test 2). Control children undertook the same programme of pre- and post-testing but did not receive any training. The sites used for testing purposes were quite separate from those used during the training programme and were in a different part of the neighbourhood. All testing was undertaken by the same experimenter, who was unaware of the group to which the children had been assigned.

Training consisted of six sessions, each lasting approximately 30 minutes, held at a rate of roughly two per week. The first two sessions were conducted at the roadside and the remaining four on the table-top model in school. The roadside sessions were held first because it was felt this would help establish a conceptual framework which children could then bring to the exercises on the model. Children were trained in groups of three and all training was undertaken by parent volunteers.

Pre and post-testing procedure

The testing and scoring procedures were the same as those used by Thomson *et al.* (1992) and Ampofo-Boateng *et al.* (1993). Two weeks before training, all children were individually pre-tested on two separate occasions by the same experimenter. All pre- and post-tests were conducted at the roadside, on quiet streets radiating out from

Figure 1. General design of the study



busier roads with a speed limit of 30 m.p.h. (48 km/h). Four test sites were selected in such a way that they formed a 'traffic trail' leading away from the school and then back to it. Two of the sites consisted of locations where visibility was restricted and the other two were intersections where traffic might emerge from several directions. The sites were selected in accordance with previous findings that untrained children would fail to appreciate the dangers inherent in such locations (Ampofo-Boateng & Thomson, 1991).

At each site, the child was instructed to imagine s/he was alone and wanted to cross the road to a specified destination. Each destination was indicated by a red cone (32 cm high) of the type used by police for traffic control. The child's task was to select the safest way to get there. No feedback was given during the test sessions so that there would be no bias on subsequent training or testing.

Children indicated their preferred route simply by pointing and describing it to the experimenter. They were never asked to walk across the road. Each chosen route was recorded on a scale schematic drawing incorporating numerous landmarks and reference points. In the few cases where it was difficult to ascertain precisely what path the child would take, referring to these landmarks helped determine the child's chosen route. The diagram was updated at the beginning of each session to take account of changing conditions, such as the position of parked cars. Scoring was thus based on conditions prevailing at the time. If the setting was seriously distorted (for example, when a large refuse collection vehicle blocked the street), testing was postponed till a later date.

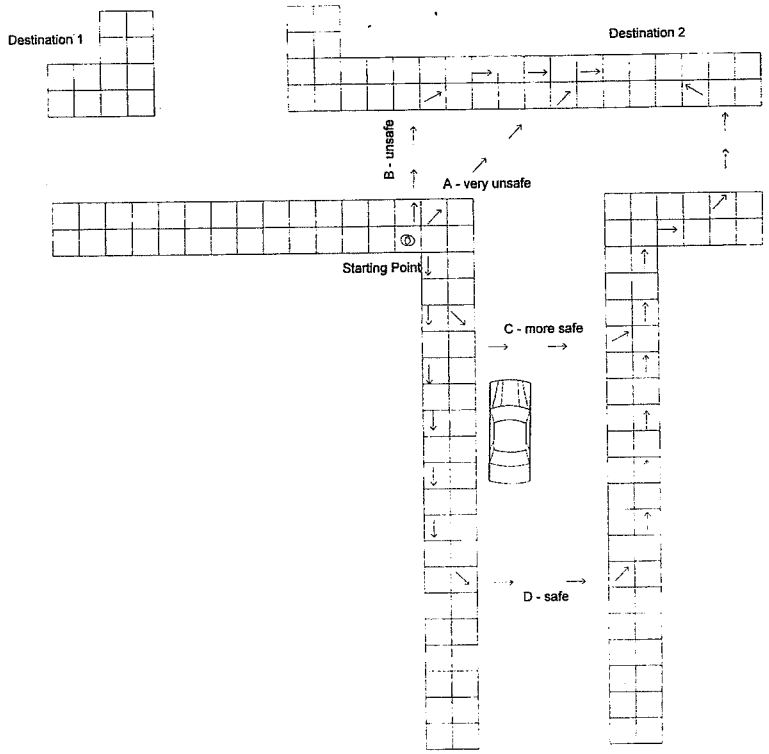
At each location there were two destinations and two starting points. Thus the child had to construct four separate routes at each of the four locations, making 16 routes per test session. Each child was tested on two separate days, yielding a total of 32 constructed routes per child. An example of one test site is illustrated in Figure 2.

Scoring

The routes chosen by the children were coded into four safety categories, depending on the degree to which dangerous road features were avoided in the chosen route. These categories were identical to those used in previous studies to ensure comparability. The four categories, running from minimum to maximum safety awareness were as follows:

(1) *Very unsafe*: a route leading directly to the destination (often involving a long,

Figure 2. One of the test sites, showing examples of routes



(1) = very unsafe; (2) = unsafe; (3) = more safe; (4) = safe

diagonal traverse of the road), that also ignored the dangerous road features at which the starting point was located (e.g., a parked car).

(2) *Unsafe*: a route leading straight across the road, not aimed directly at the destination, but which ignored dangerous road features. This was an improvement on (1) because it at least reduced the time spent on the road.

(3) *More safe*: a route avoiding some but not all dangerous road features. This usually occurred when the child made a detour away from a dangerous position (for example, moving down the road away from a parked car) but ended up at a new spot which might also be dangerous (for example, at a sharp bend).

(4) *Safe*: a route which avoided all dangerous road configurations. This usually involved walking along the pavement and crossing at a site where the child's view of the road was clear.

Reliability of the rating procedure was assessed in an earlier study by randomly selecting a 25 per cent sample of the protocols and having these independently coded by a second rater (Ampofo-Boateng *et al.*, 1993). Inter-rater reliability was 0.89. Examples of the categories are shown in Figure 2.

Volunteer recruitment

Ten parent volunteers, one male and nine female, took part in the study. Recruitment was done with the assistance of head and class teachers and by means of the letters sent to parents requesting permission for their children to participate in the study. Volunteers were all interviewed prior to recruitment and evaluated during the Volunteer Training Course (see below). In practice, all the volunteers were considered capable of participating in the programme. None of the volunteers had any formal qualifications or experience of working with children, other than through being parents themselves.

Volunteer training course

Prior to training the children, all volunteers themselves took part in a one-day training course aimed at ensuring they understood the aims and objectives of the programme. It also provided them with guided practice of working with children. Separate courses were held in each of the participating schools. The course began with an introduction aimed at clarifying both the general and concrete objectives of the programme. Volunteers were also given guidance as to the type of language that would be appropriate with the age group concerned; of the kinds of question or response that children might make; and how to deal with these. They were then invited to observe an experienced trainer working with a group of naive children using the table-top model. Afterwards, they had the opportunity to discuss any points that arose before being invited to attempt the training procedure themselves whilst being observed by project staff and the other parents. During the afternoon session, the group moved to the roadside and the process was repeated.

At the end of the course, each parent received a short manual outlining the main features of the programme which they could refer to on a day-to-day basis. Once the programme had begun, a project staff member visited the trainers during sessions 2 and 4 to monitor progress and provide support if needed. In practice no trainer reported difficulties but the visits were nevertheless continued as a form of morale booster. Allocation of children to trainers was randomised.

Training objectives

Training concentrated on the two main types of error associated with the judgments of five-year-old children in previous studies. These were: (1) failing to recognise the danger posed by complex traffic layouts and visual obstructions; (2) selecting the most direct (often diagonal) route to the destination. Training tackled these problems by adopting a structured learning approach aimed at helping the children discover principles rather than merely execute instructions. We were especially concerned that the children should not just learn a drill or set of rules. Rather, the aim was to improve their underlying conceptual grasp of the problem so that they would be able to deal in a flexible fashion with a wide variety of situations, including ones that would be very different from those encountered during training. Questions, prompts and demonstrations were used to direct children's reasoning in appropriate directions. The method was emphatically non-didactic, involving no memorising of rules or other information, and the measure of success was always the child's ability to construct an appropriate behavioural solution in the correct traffic context.

Training procedure

During each session children and trainer proceeded from location to location, either on the model or at the roadside. At each location, a child was selected from the group and asked to decide where it would be safe to cross to the specified destination. The selection was systematic so that every child made as many judgments as every other. The other children acted as discussants and were encouraged to discuss among themselves what they thought of the proposed route and how it might be improved. At the roadside, children indicated their route by pointing it out; on the model, they walked the doll pedestrian along the chosen route to the destination.

The aim of training was to help children understand the danger posed by poor visibility, complex traffic layouts and lengthy excursions across the road. The trainer's task was to guide the child's reasoning so that they would discover the errors in their judgments through their own rather than through the trainer's reasoning. To do this, training proceeded as follows:

Choosing a safe site

Children aged 5–7 years frequently think that sites with poor visibility are safe crossing places. The children were encouraged to discover the error of these decisions by being taken through the following steps:

> *(1) Where a child chose to cross near obstacles such as a parked car, the other group members were asked to individually comment on the proposed route. This was intended to involve the whole group and give them the opportunity to comment on each other's behaviour. They were asked to decide whether they agreed with the chosen route and if so why. If a child in the group correctly identified the danger in the situation, the experimenter encouraged the child who committed the initial error to try again. If the child chose a new route, the above procedure was repeated either until the child eventually proposed a safe route or s/he ran out of alternatives. In that case, the group moved to a new problem.*

Where all the group members failed to detect the danger, they were taken through the following steps:

> *(2) First they were asked if they could see traffic approaching from the point where they were standing. They were also asked about other objects that the trainer knew were obscured from that position. This was intended to make the children realise that their vision was restricted from that position.*
>
> *(3) They were then asked why they could not see the approaching traffic or the object. Here, they were encouraged to realise that it was their current position that made it difficult to see.*
>
> *(4) The trainer then invited them individually to do something that might improve visibility. This introduced the idea that it might be necessary to move.*

In most cases children could be encouraged to reach this point through their own reasoning. However, if this failed the trainer intervened more directly as follows:

(5) The trainer explained that the approaching traffic could not be seen, for example because of parked cars or other obstructions limiting their view of the road. It was explained that it would be safer to find a place where a clear view could be obtained. The children were then invited to try and find such a spot.

(6) Where the children still failed to understand, the trainer demonstrated appropriate behaviour and encouraged them to do likewise at future locations.

Choosing a safe route

Children frequently take a diagonal route to their goal, often arguing that this is safe because they are going 'straight there'. Such routes increase the length of the road to be crossed and the time spent on it. The training procedure was as follows:

(1) Where a child in the group chose such a route, the others were invited individually to comment on it. Once again, this was intended to involve the whole group and give them all the opportunity to comment on each other's behaviour. If one of the children detected the danger and explained it correctly, the child who made the initial error was given a second opportunity to select a safe route.

If all the children failed to detect the danger, the trainer guided them as follows:

(2) The trainer explained that the diagonal route was a long way to go and asked why this might be dangerous. This encouraged the children to realise that traffic might come before they had finished crossing. They were then asked to suggest routes where they would not be on the road for so long.

(3) In some cases, the children grasped this and made better choices. Often, however, the explanation was not understood. Where this happened the trainer suggested a safer solution, such as walking straight across the road and then along the pavement to the target; or along the pavement until they were opposite or closer to the point they wanted to reach.

(4) Where the children failed to understand these steps, the trainer demonstrated appropriate behaviour to them. The children were then asked to choose a safe route to a new destination.

We also emphasised the importance of stopping at the kerb to look and listen for traffic once an appropriate site had been found. Of course, the process of finding a safe site intrinsically involves appreciating the possible whereabouts of nearby traffic. Training in this aspect of road crossing skill should therefore have spin-offs for other aspects – a highly desirable situation.

Results

Table 1 shows the mean proportion of routes falling into each of the four safety categories as a function of training and test phase. A breakdown based on gender is shown separately in Figure 3.

It can be seen that, prior to training, very few of the proposed routes could be

Table 1. Mean proportion of routes falling into each safety category as a function of training and test phase

		Pre test				Post test 1				Post test 2			
		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Trained	X	.43	.36	.07	.15	.08	.48	.02	.43	.11	.52	.01	.35
	SD	*.39*	*.34*	*.13*	*.14*	*.21*	*.34*	*.05*	*.31*	*.28*	*.33*	*.03*	*.29*
Control	X	.39	.40	.05	.16	.47	.40	.01	.13	.40	.41	.04	.16
	SD	*.35*	*.34*	*.09*	*.12*	*.43*	*.37*	*.03*	*.09*	*.46*	*.40*	*.09*	*.19*

(1) = very unsafe (2) = unsafe (3) = more safe (4) = safe

considered sufficiently safe to be adopted had the children actually been permitted to cross, with only 15 per cent falling into the 'safe' category. Even if the 'more safe' category is included (i.e., the category showing at least an element of conceptual grasp of the problem), this still leaves almost 80 per cent of routes in the unsafe categories. Moreover, of these the majority was of the 'very unsafe' kind – i.e., the most dangerous category of all. The pattern is consistent with that reported in previous studies for this age group (Thomson *et al.*, 1992; Ampofo-Boateng *et al.*, 1993).

Following training, however, the picture changed quite markedly, with the number of constructed 'safe' routes increasing from 15 per cent to 43 per cent whilst the number falling into the 'very unsafe' category fell from 43 per cent to 8 per cent. These improvements were also robust, with only a small decline in performance at post-test 2. In control children, by contrast, there was almost no improvement at all.

The trends were statistically analysed by means of a three-way analysis of variance (ANOVA) with training (trained, control), test-phase (pre-test, post-test 1, post-test 2) and gender as factors. The analysis is restricted to those responses scored as 'safe' in Table 1, as this is the only category where the routes would be adequately safe for crossing purposes had the children actually been allowed to cross. The analysis revealed a highly significant interaction between training and test phase (F [2, 112] = 13.80, $p < .001$). Table 1 shows that this is because the trained group showed far more improvement in post-tests 1 and 2 than the controls. The main effects of training and test-phase were also significant (F [1, 56] = 14.64, $p < .001$; and F [2, 112] = 9.14, $p < .001$ respectively). There was also a significant main effect of gender (F [1, 56] = 6.12, $p < .02$) but no interaction between this and either of the other factors. Figure 3 shows that the gender effect is due to the fact that, across the board, boys constructed more safe routes than the girls. However, this superiority did not translate into accelerated learning or more robust performance (although there was a non-significant tendency for girls' performance to fall away in the longer term).

To assess whether or not the slight decrement in performance at post-test 2 was significant, planned post-hoc comparisons were made between pre-test and post-test 1; post-test 1 and post-test 2; and pre-test and post-test 2 for the trained children. Table 2 shows that performance in both post-tests was significantly better than in the pre-test. The difference between post-tests 1 and 2 was not statistically reliable.

Figure 3. Mean proportion of safe routes constructed by trained children as a function of gender and test phase

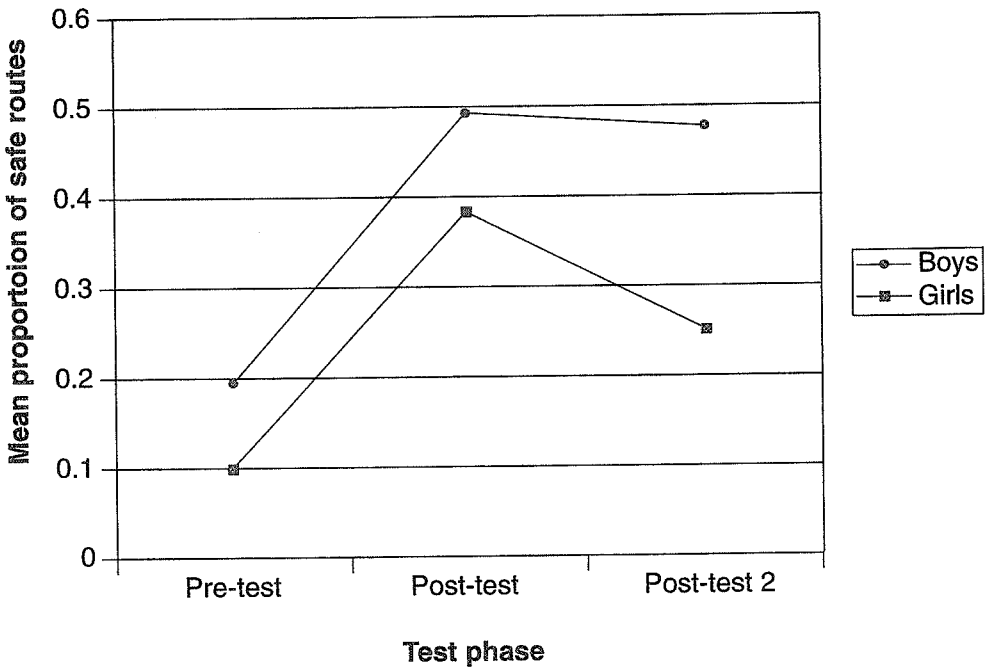


Table 2. Planned comparisons between each test phase for the trained children

	t-value	d.f.	*p*-value
Pre-test – post-test 1	−4.95	29	.001
Pre-test – post-test 2	−4.11	29	.001
Post-test 1 – post-test 2	.36	29	n.s.

Discussion

The results confirm those reported in earlier studies of safe place finding in young children (Thomson *et al.*, 1992; Ampofo-Boateng *et al.*, 1993). Although untrained five-year-olds typically show little insight into the factors that render traffic sites dangerous, a short programme amounting to six 30-minute sessions of practical training spread over a three-week period can improve these judgments. Moreover, the improvements were sufficiently robust to be preserved over a substantial period (approximately two months from the end of the programme). The findings are not consistent with the common view that maturational factors preclude acceleration of such skills in young children (Sandels, 1975). What appears to be crucial is the type of training and the manner in which it is carried out. We return to this below.

Contrary to our earlier studies of safe place finding where no gender differences were apparent (Ampofo-Boateng & Thomson, 1991; Ampofo-Boateng *et al.*, 1993; Thomson *et al.*, 1992), the boys in the present study performed better than girls. However, this difference emerged as a main effect: that is, the boys performed better than the girls across all conditions. There was no tendency for them to learn faster, nor was learning more robust than among the girls (although a non-significant trend in this direction is apparent in Figure 3). Nevertheless, the finding would imply that, by five years of age, boys are already outperforming girls in their ability to recognise roadside dangers and construct routes to avoid them. This might certainly be construed as consistent with the literature on sex differences, where a male advantage on tasks of spatial ability has frequently been reported (e.g., Halpern, 1986).

Such a conclusion should be treated with caution, however. In the first place, no gender difference of this kind was found in any of our previous studies on safe place finding with this age group or, indeed, with any age group investigated, nor have analogous differences been reported elsewhere (see Thomson, 1991, for a review of sex differences in traffic skill). Secondly, the direction of the difference is not easily reconciled with the pattern of child pedestrian accidents, since boys are more, not less, likely to become accident victims than girls at all levels of severity (O' Donoghue, 1988).

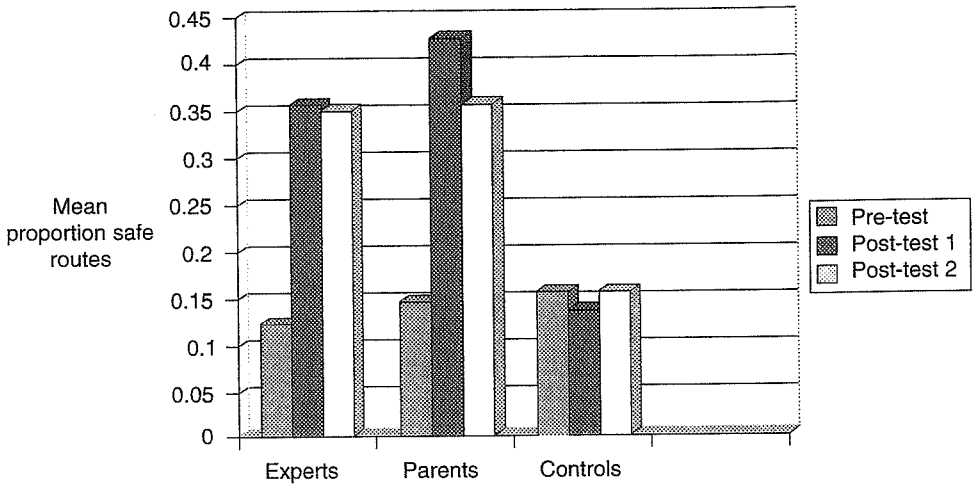
It is possible that the obtained gender difference is an artefact because casual conversation with teachers revealed that, in one school, the boys were much better at general school work than the girls. Since all children in this class took part in the study, it is possible that this introduced a bias echoing more general differences within the sample. On the other hand, no straightforward relationship between intellectual ability and traffic skill has ever been reported, so the finding should also not be dismissed too lightly. We propose to explore these gender differences more fully in a later study in which they will occupy a more central focus of the investigation.

The main aim of the study was to assess the extent to which ordinary parents, without any special qualifications or experience, might be capable of promoting the development of traffic skill in young children. Bearing in mind that traffic skills are demanding of young children, with adult levels of competence not normally being attained before 11 years of age (Thomson *et al.*, 1996), it is very much an empirical question whether or not the average parent has the ability to facilitate such development. This is particularly pertinent in the case of safe place finding where the problem is fundamentally *conceptual* in nature, and the trainer cannot proceed simply by modelling rules or procedures for the children to copy.

In fact, the results show that ordinary parents can achieve excellent results, even when teaching conceptually-demanding material to children as young as five years of age. Moreover, the volunteers did not work with children on a one-to-one basis, as would doubtless prove more familiar to them. Instead, they were required to find ways of involving a group of three children in productive activity and dialogue such that all of them would derive benefit. The results show that, when given clear instructions as to what they are supposed to be doing and why, parents translate this into action very well.

Indeed, the level of success achieved by parents in the present study is impressive even when compared to that achieved in similar programmes where training was

Figure 4. The effectiveness of parents versus 'experts' in promoting traffic competence in five-year-olds



carried out by highly qualified personnel. Figure 4 shows the data from the present study in comparison to data from an earlier study in which the training was undertaken by highly experienced staff (Thomson *et al.*, 1992). Although the 'experts' in the latter study were psychologists and qualified primary teachers with a considerable amount of teaching experience, it can be seen that this conferred no identifiable advantage over the parents. Indeed, parents marginally outperformed the 'experts' (although not significantly so). It is true that in the earlier study children were trained in groups of five whereas in the present study they were trained in threes. Nevertheless, the overlap in effectiveness is striking. It appears that parents from vulnerable communities are capable of making a fundamental contribution to children's road safety education, provided they themselves have been properly trained for the job and fully understand what they are trying to achieve.

In this context, it seems likely that the Volunteer Training Course played a critical role in preparing parents for the task. Indeed, the approach taken with the parents was similar to that taken with the children themselves. Through observation of good practice together with guided experience of working with the children, the aim was to give parents as clear a picture as possible of what the training involved as well as feedback about how effectively they carried it out. Although this approach might appear rather threatening, in fact volunteers greatly appreciated the experience gained in this way. In practice, whilst undoubtedly seeing room for improvement, the parents were all pleasantly surprised at how well they got on. After all, parents already have experience of working with children by virtue of being parents. We suggest that this kind of direct, 'hands-on' approach offers significant advantages over more passive approaches in which parents merely observe good practice (e.g., by watching videos) or, even less satisfactorily, simply read about what they should do. We believe the advantages are likely to be greater among parents who lack confidence in themselves, as is often the case among those from vulnerable communities. Courses aimed at

preparing parents in this way might go a long way towards eliminating the social class biases that continue to plague efforts at involving the family in road safety education.

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