THE EFFECTIVENESS OF SAFETY EDUCATION AT ALERTING CHILDREN TO DAILY RISKS

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Summary

307 children, aged 10-11 years (drawn from 19 different schools in Oxfordshire) were interviewed individually before and 4-6 weeks after making a Year 6 class visit to The Junior Citizens Trust at The Franklin-Vermeulen Safety Centre, Oxford or to The Injury Minimisation Scheme for Schools at The John Radcliffe Hospital, Oxford. Children's risk awareness was investigated by a 'Spot the danger' task and also by their assessing the danger, frequency and their own likelihood of encountering eight specific accidents.

On average out of 50 key risks children identified 14.7 risks prior to and 20.0 risks after safety education, which constitutes a 36% improvement on the pre-education score. The range of performance improvement was substantial: the top performing 29% of children improved on their pre-education score by 74% (recognising 13.6 risks pre-education and 23.7 risks post-education).

Risk recognition varied as a function of risk frequency (as measured by admissions to hospital via A & E for 10-14 year old children) and risk location/activity. The best performance was shown with regard to medium frequency risks (such as the possibility of a burn injury from a hot kettle, or noting the dangers of an open container of pills), where across 10 different risks children recognised 50% of risks prior to and 63% after safety education. Performance was less good with regard to high frequency risks (such as a pedestrian accident) where across 23 different risks children recognised only 22% of risks prior to and 32% after education. The same 50 key risks were also classified by location/activity – such as On the Road, At Home etc. The best level of performance was shown with regard to risks At Play (such as noting trip hazards or the possibility of falling off playground equipment) where across 15 different risks children recognised 40% prior to and 51% after education. The best proportional improvement was shown with regard to risks At Home (such as noting the hazard potential of hot fluids) where across 9 different risks children recognised only 23.5% of risks prior to education but 39.2% after education, which constitutes a 67% improvement on the initial score.

Children's perceptions of danger were systematically related to frequency with accidents such as drowning or being hit by lightning seen as among the most dangerous and most rare, whereas bike and trampoline accidents were seen as among the least dangerous and most common. The exception was the perception of a pedestrian road traffic accident which was seen as the most dangerous of accidents but was judged to be considerably less common than its real frequency merits.

Children were asked whether they thought each of the accidents would happen to them in the next year or so, and whether their own chances were less, the same, or more than others of their age. The prevailing view, in many but not all of the 8 accidents, was bias in the direction of absolute and relative optimism, often characterised by a claim for superior skill (e.g. in road crossing). For children whose views changed after education, in the case of bike and kettle/burn accidents more children moved away from 'unrealistic optimism' than moved towards it, and in the case of drowning and a lightning strike more children moved towards optimism than moved away from it.

It is concluded that children who had experienced safety education improved their recognition of a variety of risk hazards. However, improvement was not even and in particular a number of the On the Road hazards for pedestrians and for cyclists had low rates of initial recognition and, in absolute terms, did not improve by a great deal. The policy implications of the study, and its limitations, are discussed.

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BACKGROUND

Accidental injury is a major cause of mortality and morbidity, particularly among children and young people. This is the case in the UK and world-wide (1, 2, 3). The Miskin research group, formed following the report of the Accidental Injury Taskforce, suggest that in the UK in 2009, 225 children aged 14 and under died as a result of unintentional injury, and annually one child in five attends an Accident and Emergency department every year. Injury is not only costly to individuals and families in both the short and long term but places a burden on the state (4) (5).

Notwithstanding the roles of enforcement and environmental engineering, education has always been regarded as an important component of injury minimisation and prevention strategies. In the case of child safety education in the UK, LASER (Learning about Safety by Experiencing Risk) schemes have been viewed as examples of good practice as they utilise training methods which are interactive and experiential (6). The philosophy of the schemes is to teach skills and to give participants the confidence to use those skills. Many of the programmes are designed to educate Year 6 Primary School children. Typically, in a two-hour whole-class visit attendees go round 8-10 realistic sets – for example, a kitchen, a street, a building site – and confront a variety of potential risks. In line with good educational practice one adult interacts with a small group of 10-11 year old children, giving them the opportunity for discussion set by set (7). Most importantly, LASER programmes recognise that while knowledge is necessary it is not sufficient for the successful performance of safety skills. Thus children learn not just by demonstration and discussion but by "doing". For example the children open a door to a room which they discover to be 'on fire', show what they would do in such an emergency, and then learn to perform the correct escape routine.

In 2001 the Department of Health and the Health and Safety Executive commissioned an evaluation of the Bristol 'Lifeskills: Learning for Living' Year 6 LASER safety education programme. The quasi-experimental matched control group study, involving over 1800 participants, assessed knowledge pre-intervention and at three time points post-intervention to distinguish between immediate learning and longer term retention. Good acquisition and retention was shown in many although not in all domains (8, 9). While the evaluation of 'Lifeskills' indicated that its education package was very successful at imparting safety knowledge and skills to children the evaluation did not focus on risk appreciation.

An important barrier to the adoption of health promotion practice is a poor assessment of the probability of various risks. Research with adults has shown that people tend to be over concerned with rare and 'dreaded' hazards at the expense of the more mundane. For example, respondents have a tendency to over-estimate the frequency of death from rare causes, such as botulism or a tornado, while under-estimating the frequency of death from common causes such stroke and heart disease (10, 11). One explanation of this bias is that the frequency of rare risks are over-estimated as they are easily 'available' in people's minds due in part to dramatic media coverage (12). Another bias which has been demonstrated to lessen people's appreciation of risk is unrealistic optimism – i.e. the tendency for people to think that risks,

for example of disease or accident, apply more to other people than to themselves (13, 14, 15). There is some research which suggests that children too are susceptible to the underestimation of common risk bias (16) and to unrealistic optimism (17). One of the purposes of the current study will be to ascertain the extent of these biases in 10-11 year old children as these biases, if common, are likely to operate against the adoption of health and safety practices.

In summary, safety education needs to be evaluated not only in terms of its success at imparting knowledge, such as how to place someone in the recovery position, what to do in the event of a fire – already extensively studied in earlier research (8, 9, 18) – but also with regard to whether safety education enhances children's recognition of risk and their appreciation that accidents can happen.

METHOD

The purpose of the study was to assess 10-11 year old children's recognition and appreciation of hazards and risks before and after they have made a class visit to a safety education scheme – viz. The Junior Citizens Trust in Oxfordshire or The Injury Minimisation Programme for Schools, The John Radcliffe Hospital, Oxford. Both schemes are designed to alert children to hazards and risks, and to teach skills to avoid or deal with those risks. A guiding principle of both schemes is the concept "Safe as Necessary: not as Safe as Possible". http://www.juniorcitizenstrust.org.uk/cms/
http://www.impsweb.co.uk/, http://www.impsweb.co.uk/where-we-work/oxfordshire/

Instruments
A pictorial 'spot the hazard' instrument was developed in order to assess children's risk perceptions. A pictorial presentation in the context of a one-on-one interview was favoured as such a technique is likely to be familiar and engaging for 10-11 years olds and better suited than a written questionnaire for children of varying degrees of literacy.

A commercial artist with considerable experience of designing safety education packages for children was invited to construct a series of cartoons depicting 'One Day in the Life of a 10 year old child'. The day starts with the child waking up, proceeding to have breakfast, go to school and so on. In the course of the day the child encounters various potential hazards, chosen by the research team with reference to rates of accidental injury for 10-14 year olds in England, risks discussed in RoSPA publications, and visits to The Junior Citizens Scheme and I.M.P.S. Fifty hazards were chosen to represent high, medium and low frequency hazards (also classifiable by the RoSPA categories of At Play, In The Home, On the Road, in addition to Stranger Danger, Out and About, and Care of Others, see Table 1, p.6). The resulting cartoon is seen in Figure 1, p.7 (also see Figures 3a & 3b, pp.8-9). In addition 8 separate images were prepared to represent a sample of risks/hazards of varying frequencies (3 high, 2 medium and 3 low frequency accidents: see Figure 2, p.7). Using this visual material a series of questions designed to measure children's risk perceptions, knowledge and attitudes in a 10-15 minute one-to-one interview with a researcher was developed and piloted with 10 children aged 10-11 years. (See full script, Appendix pages 34-35)

Table 1: Number of Admissions to Hospital via A & E by Cause of Injury

HES statistics, England, 2012/13, Ages 10-14 only*

	ICD-10 code	N	Instances in "A Day in the Life" Pictures	ID	Individual picture cards
HIGH FREQUENCY RISKS			(23)		
Fall on same level, slip, trip stumble	W01	1632	7	A	
Pedal cyclist, injured in non-collision transport accident	V18	1327	6	B	1
Fall involving playground equipment	W09	1291	5	C	2
Pedestrian injured in collision with car, pick-up truck or van	V03	795	5	D	3
MEDIUM FREQUENCY RISKS			(10)		
Fall from, out of building or structure	W13	376	1	E	
Bitten or struck by dog	W54	323	1	F	4
Contact with sharp glass	W252	322	1	G	
Fall from tree	W14	259	1	H	
Accidental poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics	X40	215	1	I	
Contact with hot drinks, foods, fats and cooking oils	X10,11,12 X15, 19	150	3	J	5
Car occupant injured in collision with car, pick-up truck or van	V43	94	2	K	
LOW FREQUENCY RISKS			(12)		
Accidental poisoning and exposure to alcohol + evidence of alcohol involvement	X45 Y90, Y91	51	1	L	
Unspecified and Other Electrical Current	W86, 87	16	2	M	6
Discharge of firework	W39	10	1	N	
Controlled & Uncontrolled fire not in building	X01, 03	9	5	O	
Drowning in natural water	W69	4	1	P	7
Lightning strike	X33	1	2	Q	8
TOTAL			45**		

* Source: Hospital Episode Statistics, Public Health England

Total admissions via A&E, for this age group in 12/13 = 28,954.

** 50 risks pictured

45 + 5 more: Stranger Danger (N = 4, ID R), Baby unattended (1 extra in Care of Others, ID S)

Figure 1: Cartoon used in Interview (real size A1 – 85cm x 60cm)

Figure 2: 8 further images used in interview

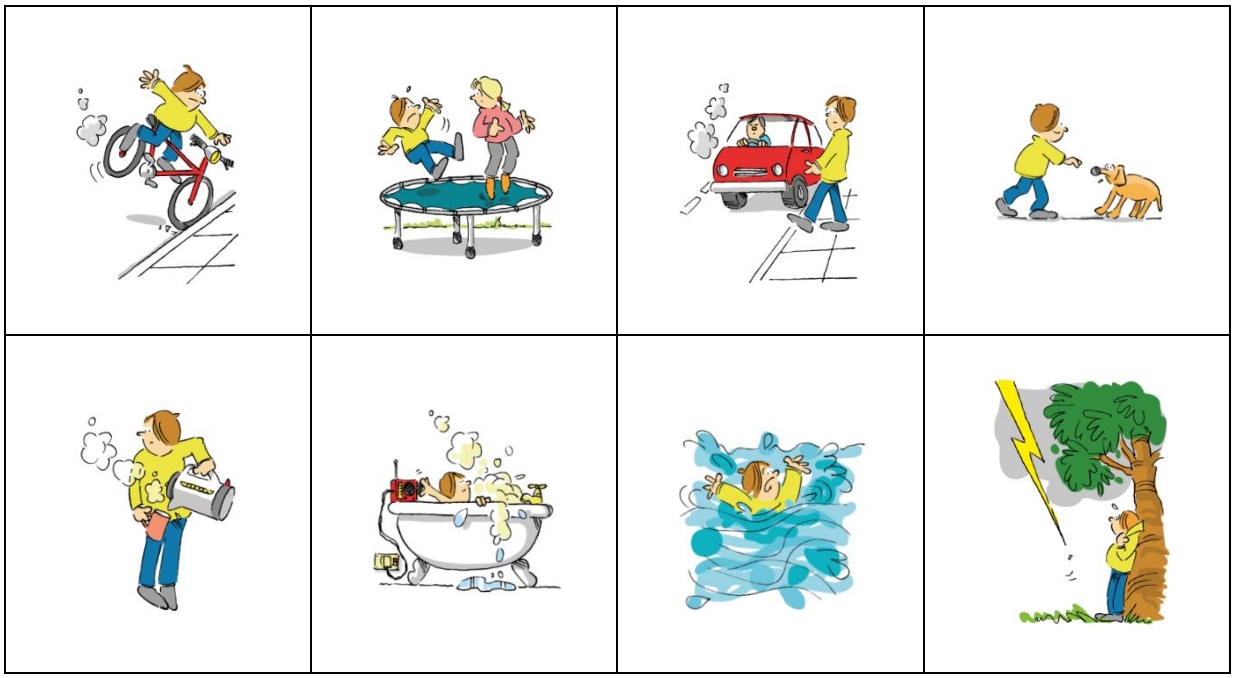


Figure 3a: RoSPA areas

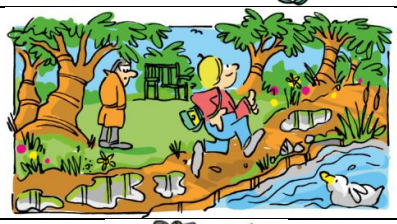
RoSPA category	RoSPA sub-category	Example
At Play	Play	
	Water and leisure	
	Fireworks	
In the home	Scalding	
	Medicines/cleaners	
	Electrical equipment	
On the road	Children in cars	
	Children around cars	
	Cycling	

Figure 3b: Additional categories
Informed by visits to Junior Citizens Trust and I.M.P.S.:
Stranger Danger, Out and About, Care of Others

Additional categories	Example	
Stranger danger	Alone at dusk	
Out and about	Dog bite	
Care of others	Causing injury to those around you	

Sample
All primary schools in Oxfordshire with Year 6 visits booked to attend Junior Citizens Trust (41) or IMPS (11) between January and July 2014 were contacted and invited to take part in the research which would involve each child being interviewed individually a few weeks before the class safety education visit, and again 4-6 weeks after the visit. Parental permission was sought for all Year 6 children in the 19 schools that agreed to take part and was given in the case of 73% of children. (See invitation letters, pages 37–41.)

341 children were interviewed but due to school absence some children were only interviewed once. Thus the analysis is based on the 307 children (143 boys and 164 girls) who were interviewed both before and after their class safety education visit.

RESULTS

Risk recognition

Table 2 (p.12) shows that prior to safety education children recognised on average 14.71 (SD = 4.13; range 5 – 35) out of the 50 key risks. After safety education children recognised on average 20.04 (SD = 4.77; range 10 – 35) out of the 50 key risks. The improvement of an average of 5 risks may seem modest but it represents a 36.23% improvement on the 'before' score, statistically significant, and of large effect size.

Table 3 (p.13) shows a similar pattern of results in an analysis of risk recognition over all risks. Prior to safety education children recognised on average 18.71 risks (SD = 6.58; range 5 – 64), and after education this rose to recognising on average 25.46 risks (SD = 8.15; range 11 – 65).[1] This constitutes a 36.08% improvement on the 'before' score, and as with the scores out of 50 is statistically significant and of large effect size. [2]

The average figures presented above conceal a wide range of performance. In the case of the 50 key risks, 29% of children improved their performance by an average of 10 or more risks, and in the case of the unlimited set of risks, 27% of children improved their performance by an average of 15 or more risks. Interestingly, as shown in Table 4 (p.14), the 12% of children who either did worse or showed no improvement on the 50 key risks performed better prior to education than did other children – i.e. the zero improvers started by recognising 17.64 risks (SD 5.09) whereas the improvers (88% of the sample) started by recognising only 14.32 risks (SD 3.84).[3] This better level of performance pre-education by those who did not improve post-education is also apparent in the unlimited set of risks data.[4]

With regard to the 50 key risks, children's performance before safety education did not differ by the proportion of children in their school year who were eligible for Free School Meals (often used as an index of economic disadvantage) [5]. However, children in schools where a higher proportion are eligible for Free School Meals showed a small but statistically significant greater improvement than did children in schools where a lower proportion are eligible for Free School Meals.[6] Overall children started by recognising 14.7 out of 50 key risks. In the case of children at schools where a higher proportion of Year 6 children were

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[1] At the very high scoring end it was apparent that some children saw the task as an opportunity or even challenge to excel, and identified very unusual 'risks, such as noting that a drawing pin might fall off a notice board and hurt someone.

[2] Each of the 19 schools showed improvement in recognising risks – whether measured according to the 50 key risks or the unlimited number of risks.

[3] $t = 4.68$, df 1/305, $p<.001$

[4] for zero improvers at Time 2: Risks (unlimited) spotted at Time 1 - 22.98, sd 9.44;
for improvers at Time 2: Risks (unlimited) spotted at Time 1 - 17.98, sd 5.66. $t = 4.89$, df 1/305, $p <.001$

[5] Although Free School Meal eligibility is commonly used as a proxy for economic disadvantage, it is increasingly under scrutiny for being a blunt and possibly unstable measure (19, 20).

[6] Using OFSTED data base at http://dashboard.ofsted.gov.uk/index.php: In this sample, 3/19 schools (89/307 children) were characterised as having a 'High' % (24%, 29% and 46%) of Year 6 children eligible for FSM. The remaining 15 schools had a 'Low' % of Year 6 children eligible for FSM (ranging from 0% - 20%, average 6.7%).

eligible for Free School Meals risk perception rose to 20.81 risks (a 41.28% improvement). However, in the case of children at schools where a lower proportion of Year 6 children were eligible for Free School Meals risk perception rose to the slightly lower figure of 19.73 (a 34.22% improvement). Also with regard to the 50 key risks, there was a small but statistically significant gender difference as both before and after education girls recognised more risks than did boys. Both genders, however, showed the same amount of improvement: Girls' scores rose from 15.31 to 20.61, a 34.62% improvement; Boys' scores rose from 14.02 to 19.39, a 38.30% improvement. The pattern of greater improvement by children in schools where a higher proportion of pupils were eligible for Free School Meals and an overall superior performance by girls is also shown in the unlimited risk recognition but in this case did not quite achieve statistical significance.

Risk recognition by High / Medium / Low frequency risk

How well children recognised risk was influenced by risk frequency. Among the 50 key risks, prior to safety education children recognised 50% of the Medium frequency risks, 31% of the Low frequency risks, and only 22% of the High frequency risks. Improvement was shown for all types of risk. The increase in the recognition of Medium frequency risks was slightly (but statistically significantly) higher than the increase in the recognition of Low and High frequency risks. Table 5 (p.16) shows the extent of the improvement expressed in percentage point improvement – 12.2% for Medium frequency risks, and 10.0% and 8.9% for High and Low frequency risks respectively. As shown in the lower graph in Table 5 the recognition of High frequency risks shows the greatest proportional improvement – in the sense that children improved their performance by 45% - but this was from a very low base and remained at an absolute low point even post-education.

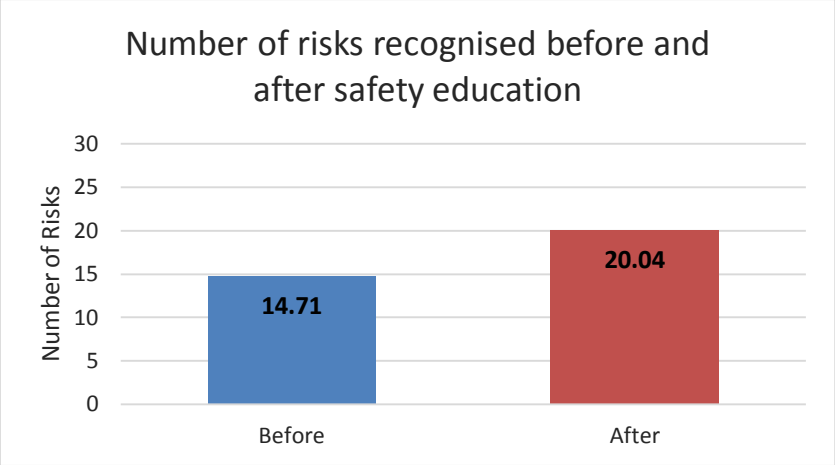
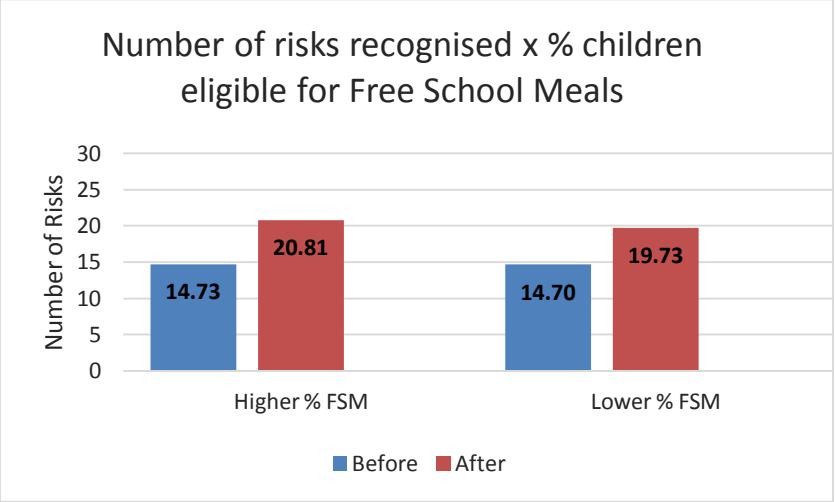
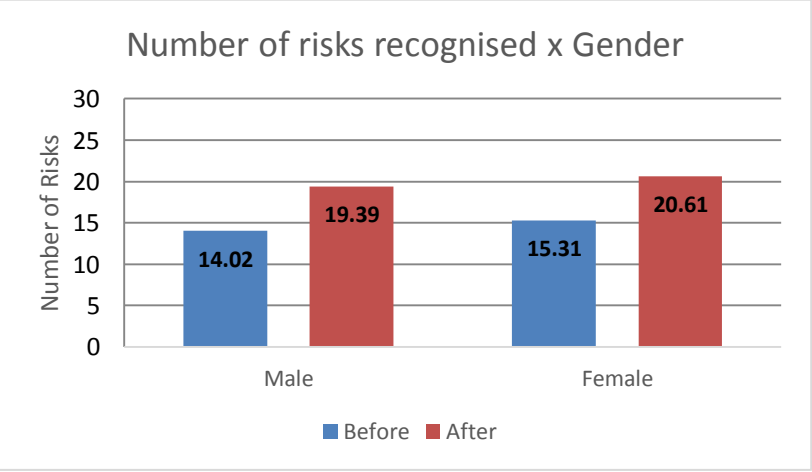
The gender difference in risk recognition already referred to is moderated by type of risk as shown in Table 6 (p.17). Girls outperformed boys before and after safety education on High frequency risks,[7] but performance on Low frequency risks did not vary by gender.[8] The position regarding Medium frequency risks is more complex. Girls recognised more Medium frequency risks than boys before safety education, and both genders improved after safety education. However boys improved more than girls and thus matched the girls' performance on Medium frequency risks post-education.[9]

[7] Risks (out of 23) recognised in High Frequency category
Girls: Before 5.38 (sd 2.42), After 7.66 (sd 2.82); Boys: Before 4.85 (sd 2.22), After 7.13 (sd 2.64)
Statistical tests reported in Table 6, p.17.

[8] Risks (out of 12) recognised in Low Frequency category
Girls: Before 3.75 (sd 1.32), After 4.85 (sd 1.29); Boys: Before 3.67 (sd 1.39), After 4.69 (sd 1.53

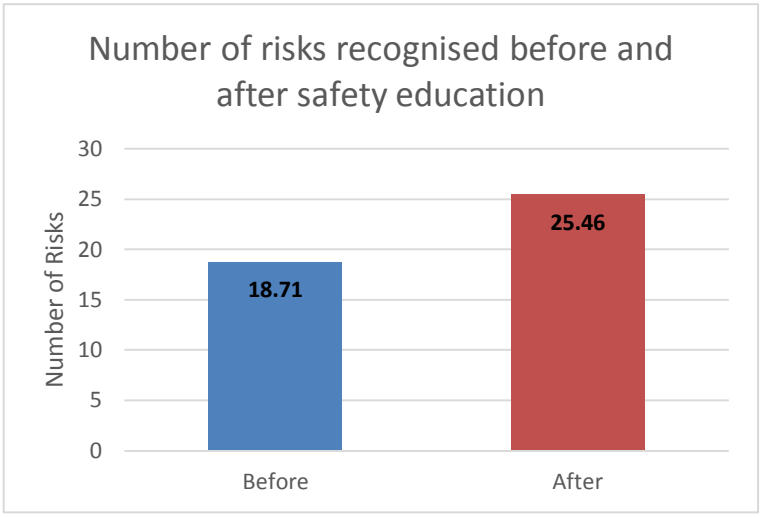
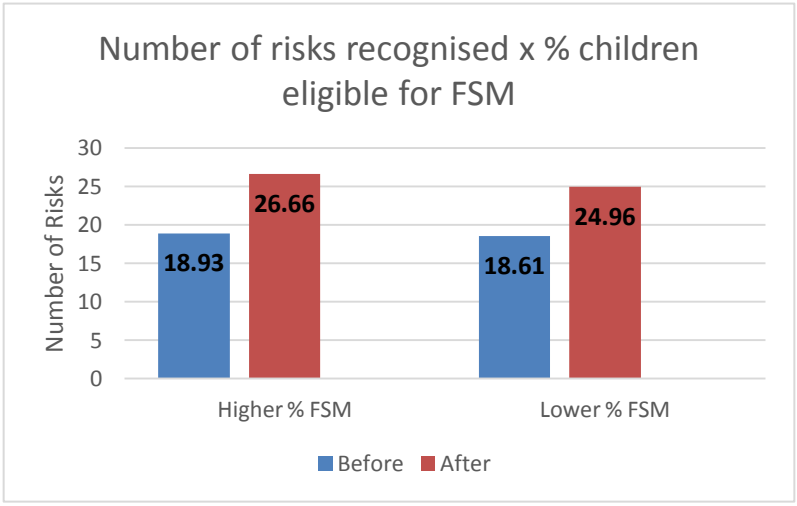
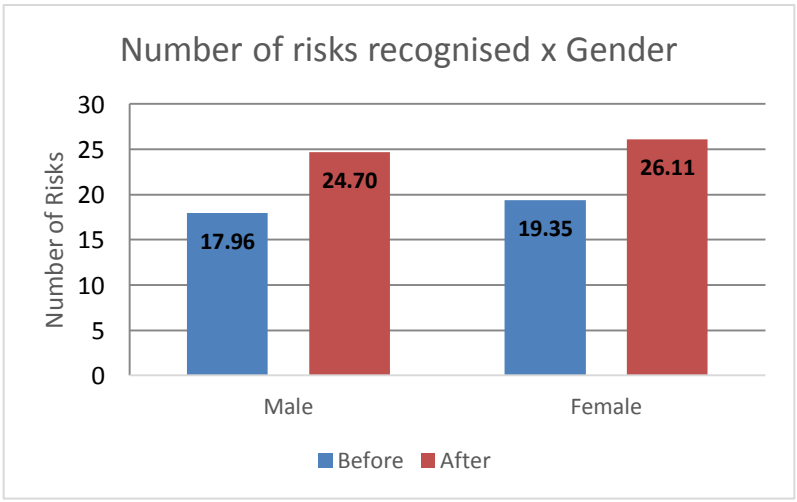
[9] Risks (out of 10) recognised in Medium Frequency category
Girls: Before 5.32 (sd 1.38), After 6.40 (sd 1.31); Boys: Before 4.67 (sd 1.63), After 6.08 (sd 1.49)

Table 2: Risk recognition, 50 key risks: before and after safety education

Risks/out of 50	Before/After comparison:	
Average number of risks children recognise before and after safety education	Across whole sample: More risks recognised after safety education	
% children per school in Year 6 eligible for Free School Meals*	Children in schools with higher % FSM improve more than children in schools with lower % eligible for FSM	
Gender	Girls do better than boys, before and after education, but both genders show the same amount of improvement	

Repeated measures Analysis of Variance on Number of Risks out of 50
Before/After : F = 487.41, df 1/307, p <.001, ηp^2 = .617
Gender:F = 6.16, df 1/303, p = .014, ηp^2 = .020
FSchoolMeals x Before/After: F = 4.17, p = .042, ηp^2 = .014
* Using OFSTED data base at http://dashboard.ofsted.gov.uk/index.php, 2013/14

Table 3: Risk recognition, all risks: before and after safety education

Risks/ unlimited number	Before/After comparison:	
Average number of risks recognised before and after safety education	Across whole sample: More risks recognised after safety education	
% children per school in Year 6 eligible for Free School Meals	Trend for children in schools with higher % FSM to improve more than children in schools with lower % eligible for FSM	
Gender	Trend for girls to do better than boys, before and after education	

Repeated measures Analysis of Variance on Unlimited Number of Risks
Before/After : F = 284.71, df 1/303, p <.001, ηp^2 =.484
Gender:F = 2.18, df 1/303, p = .141; FSchoolMeals x Before/After: F = 3.14, df 1/303, p = .077

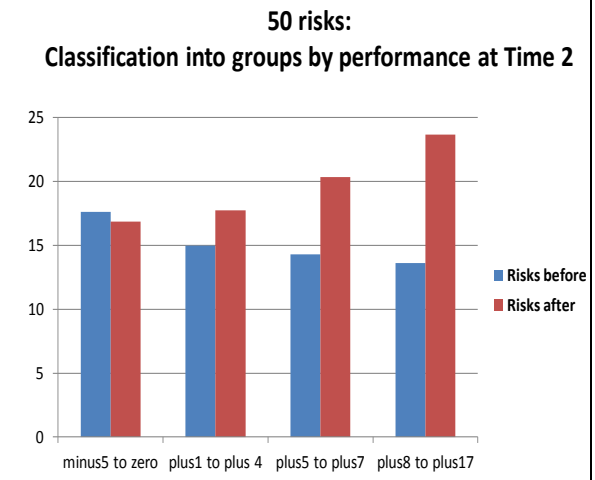
Table 4: Risk recognition: comparison of risk knowledge before and after education contrasting those whose performance worsened or did not improve with those whose performance improved (categorised into 3 approximately equal sized groups).

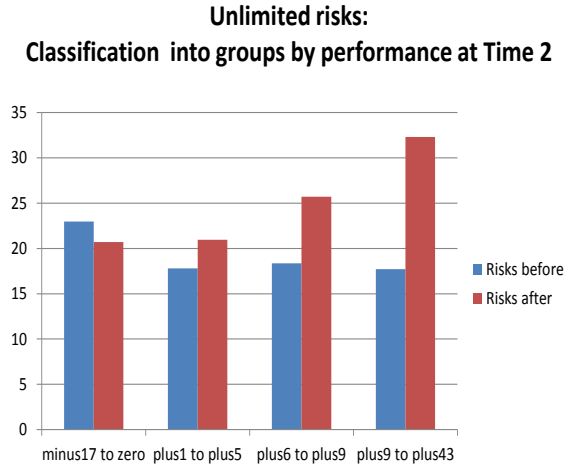
	Risks recognised (Average out of 50 risks)			
Before education	17.63	14.96	14.31	13.60
After education	16.86	17.73	20.33	23.69
Average decrease/increase in risks recognised out of 50	Minus 1	+3	+6	+10
Range: Before and After difference	Minus 5 - 0	1 - 4	5 - 7	8 – 17
% of children in each group (N = 307)	12%	32%	27%	29%

* shared colour in row indicates no significant difference between values

	Risks recognised (Average across unlimited number of risks)			
Before education	22.98	17.80	18.35	17.72
After education	20.71	20.95	25.71	32.31
Average decrease/increase in risks recognised	Minus 2	+3	+7	+15
Range: Before and After difference	Minus 5 - 0	1 - 5	6 - 9	10 – 43
% of children in each group (N = 307)	15%	27%	31%	27%

* shared colour in row indicates no significant difference between values





Risk recognition by type of risk

Children's recognition of risk was also influenced by type of risk reclassified into six groups by location, activity and other characteristics (see Table 7, p.18). Prior to safety education children's recognition of risks in the At Play environment was best (40%), followed by On the Road, Out and About, and Stranger Danger (averaging at 30%), followed by At home (24%) and Care of Others (10%). After safety education risk perception improved in all areas, with recognition of risks At Play rising to 51%; On the Road, At Home, Out and About and Stranger Danger rising on average to 38%; and Care of Others rising to 19%.

In terms of percentage points, the greatest improvement was shown in the At Home area (16%), followed by At Play, Stranger Danger, and Care of Others (averaging at 11%), followed by On the Road and Out and About (averaging at 6.6%). As indicated in the lower graph in Table 7, in terms of percentage improvement not in points but as a proportional improvement on base, the recognition of risks involving the Care of Others showed the greatest improvement as children improved their performance by over 100%. But this was from a very low base and remained at a low point even post-education. The second largest proportional improvement was shown in the At Home area where a rise of 16% constituted a 67% improvement on base.[10]

Examining gender differences among the six activities/locations, girls recognised more risks than boys did both before and after education in the At Play category[11], and marginally so in the At Home category[12]. But girls did not perform any better than boys in the On the Road category. This reveals that girls' superiority on the high frequency risk category was not evident across all its components.

Children's judgement of danger and frequency of different kinds of accident

Children were invited to rank 8 'accidents about to happen' by danger and by frequency (see Figure 2, p.7; Table 8, p.19; Table 9, p.20). With the exception of pedestrian accidents, the more dangerous accidents were judged to be less frequent. Thus lightning, drowning and electrocution were seen as high on danger and low on frequency, whereas - for example - a trampoline accident was seen as relatively low on danger and relatively high on frequency. The exception to the high danger/low frequency perception was 'pedestrian accident' which was seen as the most dangerous of all accidents, but ranked as of only middle frequency.

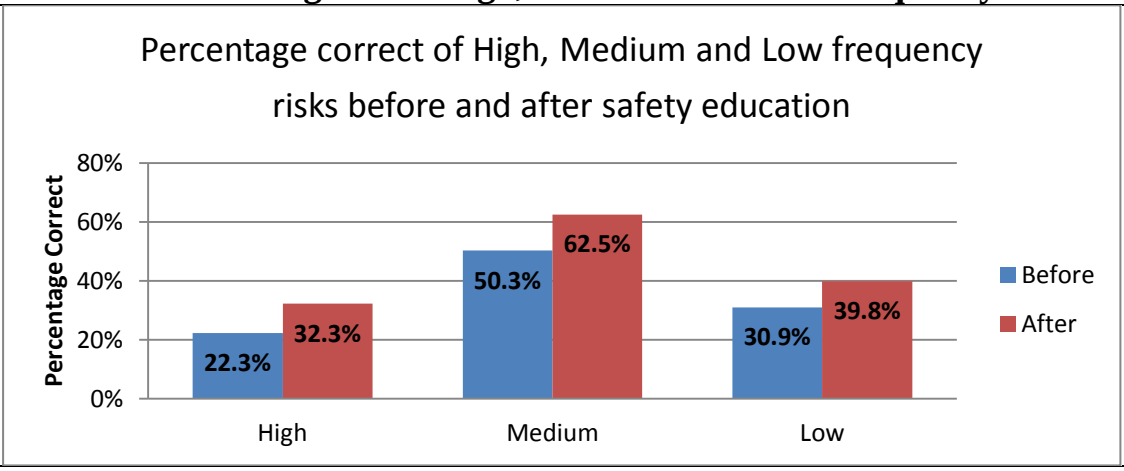
text continued on page 19

[10] The percentage improvement on base for the other categories was:
At Play (28%); On the Road (22%); Out and About (21%); Stranger Danger (41%).

[11] Risks (out of 15) recognised in At Play category, $F = 8.41$, $p = .004$, $\eta p^2 = .027$
Girls: Before 6.16 (sd 1.79), After 7.85 (sd 1.77);
Boys: Before 5.65 (sd 1.87), After 7.31 (sd 1.90).

[12] Risks (out of 9) recognised in At Home category, $F = 3.42$, $p = .073$, $\eta p^2 = .011$
Girls: Before 2.26 (sd 1.32), After 3.62 (sd 1.47);
Boys: Before 1.95 (sd 1.26), After 3.42 (sd 1.59).

Table 5: Risk recognition: High, Medium and Low Frequency Risks



Risk Frequency		Number risks spotted				Difference		
		Before		After		Between mean scores		% points
N = 307	N items	M (sd)	% correct	M (sd)	% correct	t	p	
High	23	5.13 (2.34)	22.3%	7.42 (2.74)	32.3%	16.57	<.001	10.0%
Medium	10	5.03 (1.59)	50.3%	6.25 (1.41)	62.5%	15.91	<.001	12.2%
Low	12	3.71 (1.35)	30.9%	4.78 (1.40)	39.8%	12.61	<.001	8.9%

*shared colour within in a column indicates no difference between percentages
(Due to multiple comparisons, Bonferroni corrections have been applied)

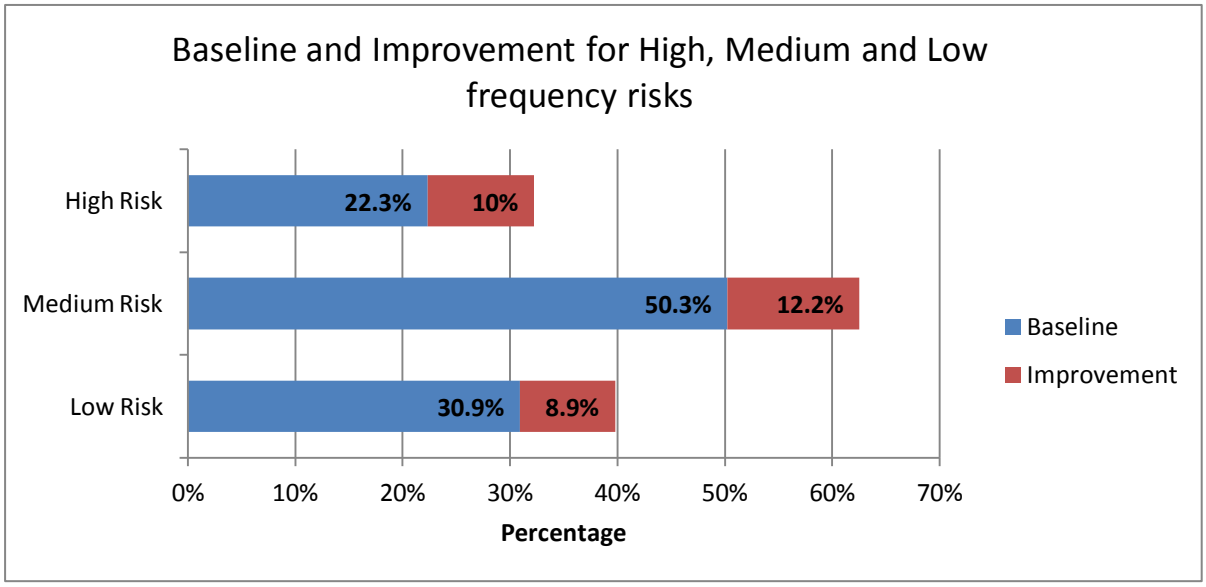
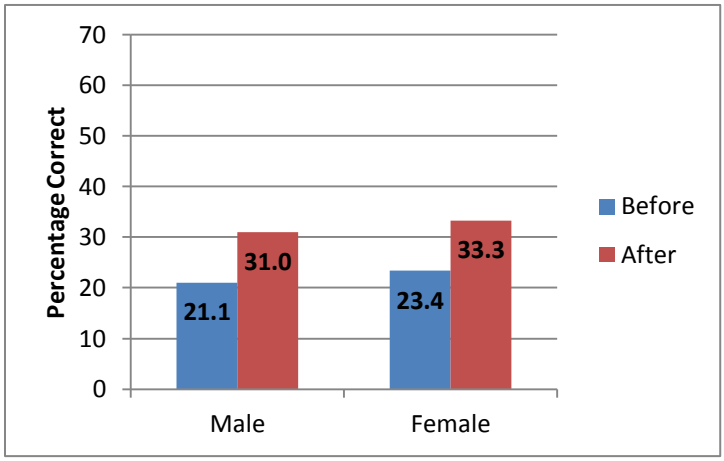
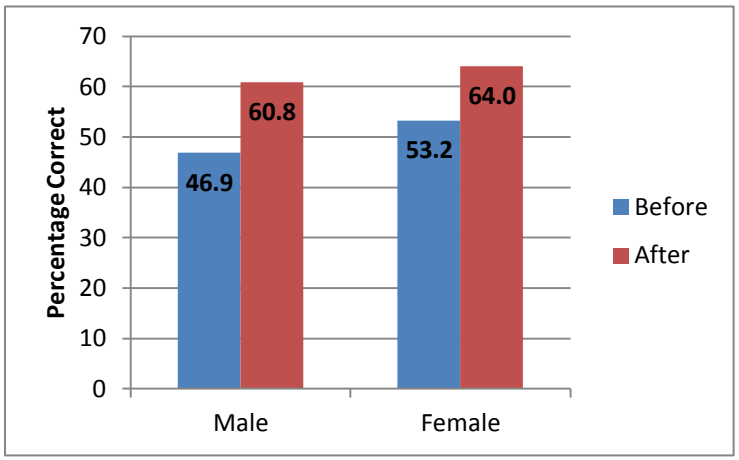
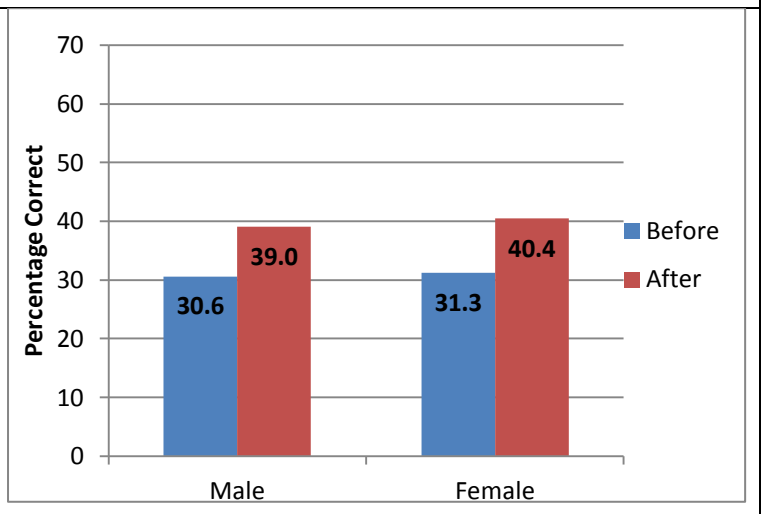
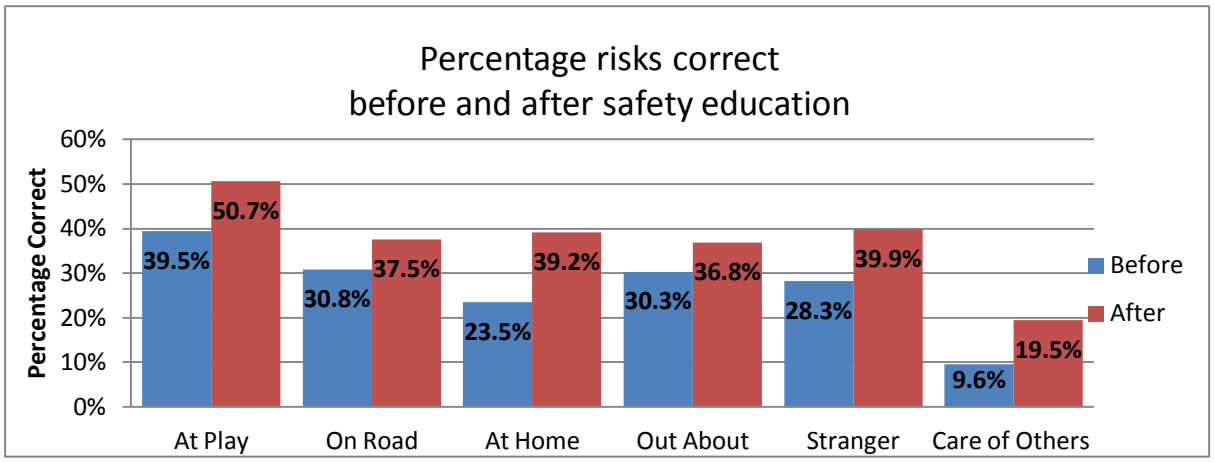


Table 6: Gender and risk recognition

High frequency risks Girls do better than boys before and after safety education, but both genders improve to the same extent.	Before/After education F = 272.42, p<.001, ηp^2 = .472 Gender F = 4.34, p = .038, ηp^2 = .014 No interaction between Gender and Education	
Medium frequency risks Girls do better than boys before safety education, both genders improve after safety education, and boys improve more than girls.	Before/After education F = 259.04, p<.001, ηp^2 = .459 Gender F = 10.56, p = .001, ηp^2 = .033 Education x Gender F = 4.30, p = .039, ηp^2 = .014	
Low frequency risks Both genders improve equally after safety education.	Before/After education F = 157.01, p<.001, ηp^2 = .340	

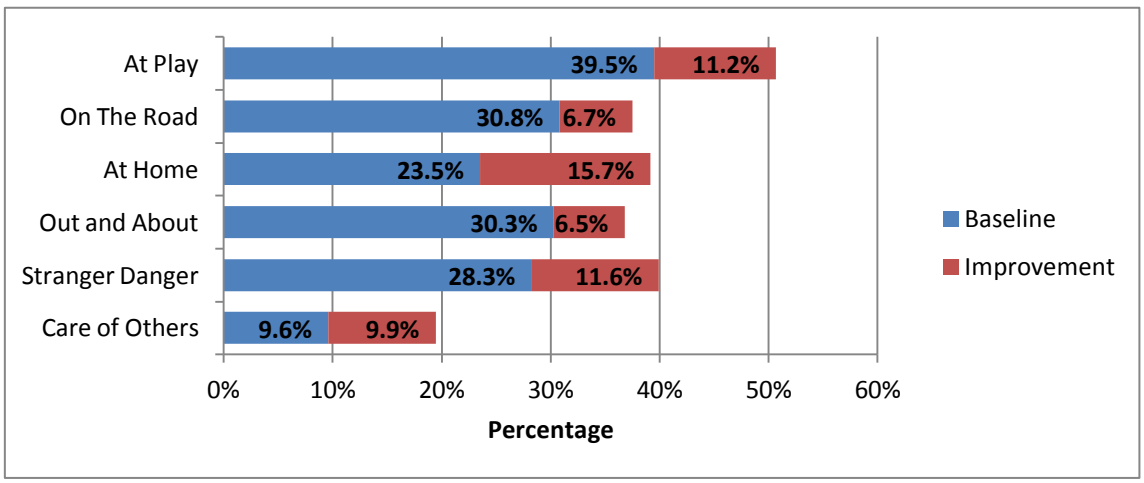
Repeated measures Analysis of Variance on each risk type was conducted on raw scores, but the graphs show the data in percentages to enable comparison between risk frequency types.

Table 7: Risk recognition in different locations



Risk type		Score before education		Score after education		Test of difference between mean scores		Difference in % points
N = 307	N items	M (sd)	% correct	M (sd)	% correct	t	p	
At Play	15	5.92 (1.84)	39.5%	7.60 (1.85)	50.7%	16.23	<0.001	11.2%
On the Road	11	3.39 (1.07)	30.8%	4.13 (1.13)	37.5%	10.76	<0.001	6.7%
At Home	9	2.12 (1.30)	23.5%	3.52 (1.52)	39.2%	17.82	<0.001	15.7%
Out and About	7	2.12 (0.95)	30.3%	2.58 (0.99)	36.8%	7.89	<0.001	6.5%
Stranger Danger	4	1.13 (0.82)	28.3%	1.60 (0.94)	39.9%	8.99	<0.001	11.6%
Care of Others	4	0.38 (0.67)	9.6%	0.78 (0.96)	19.5%	7.47	<0.001	9.9%

*shared colour in a column indicates no difference between percentages
(Due to multiple comparisons, Bonferroni corrections have been applied)



Children's judgement of danger and frequency of different kinds of accident *continued*
With the exception of pedestrian accident which children wrongly ranked as of equal frequency to being bitten by a dog and suffering from a burn injury, on average children's assessment of the rank ordering of accidents was approximately in line with the rank ordering of the real frequency of the same accidents as a cause of injury. However rank ordering items by frequency is a blunt measure as it does not enable a respondent to indicate any perceived distance between adjacent ranks. The 'If you were a doctor' task in which children were asked to indicate the expected number of admissions of children their age to hospital via Accident and Emergency attendance was designed to enable children to express absolute not just relative differences between ranks.[13]

Table 8 indicates that when allocating patients to type of injuries, children underestimated the frequency of the higher frequency risk injuries and overestimated the frequency of the medium and lower frequency risk injuries. As was the case when using ranks, children continued to judge injuries from pedestrian accidents to only be as frequent as dog bite and burn injuries – whereas as in fact, for this age group, admissions to hospital for pedestrian injuries are 2.5 times more common than admissions due to dog-bite injuries, and 5.7 times more common than admissions due to burn injuries.

Table 8: Risk perception – Danger and Frequency

Accident type	Admissions to hospital via A & E		As viewed by children N = 307					
			Frequency				Danger	
	N	As %*	By rank order	Average rank+		By % Hospital admissions	By rank order	Average rank++
Bike	1327	34%	1	2.25		19%	5.5	3.53
Trampoline	1291	33%	2	2.61		17%	7.5	2.42
Pedestrian	795	20%	5	4.15		14%	1	6.85
Dog bite	323	8%	5	3.96		13%	7.5	2.13
Burn/Kettle	140	4%	5	4.33		13%	5.5	3.35
Electrical	16	.41%	6.5	5.70		9%	4	5.40
Drowning	4	.10%	6.5	5.63		9%	2.5	6.12
Lightning	1	.03%	8	7.35		5%	2.5	6.19

Shared colour in a column indicates no significant difference between ranks/%

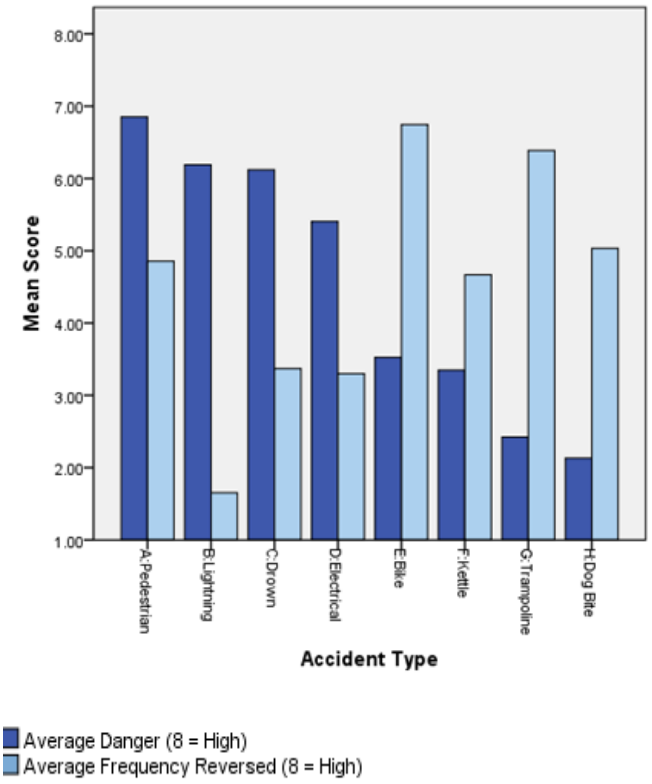
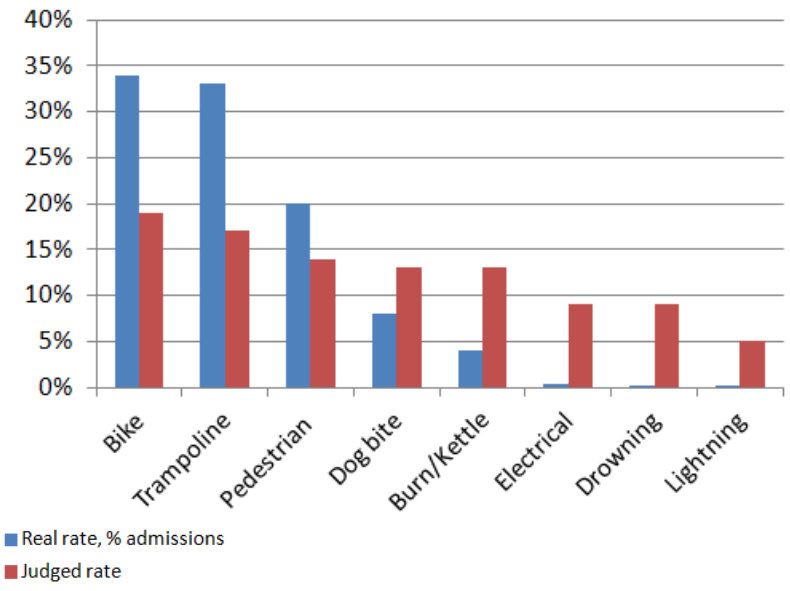
* as a % of those 8 accidents, as admitted to A&E, 2012/13, Aged 10-14 only (N = 3897)

\+ For Frequency average rank: 1 = high rank/most frequent, 8 = low rank/least frequent

++ For Danger average rank: 8 = high rank/most dangerous, 1 = low rank/least dangerous.

[13] Correlation between the two types of frequency rankings was very high; *rho*(7) = .97, p <.001.

Table 9: Relation of the perception of risk frequency to the perception of risk danger, and to real risk

Perception of danger inversely correlated with frequency. Correlation between danger and frequency across 8 accidents: *rho*(7) = – .69, *p* = .06. If pedestrian accidents are excluded, the correlation between danger and frequency achieves significance: *rho*(6) = – .75, p = .05.	
In the 'Imagine you are a doctor task', on the whole children judge the rank order of risk frequency accurately. Correlation between children's rankings and actual incidence: *r*(7) = .96, p <.001. BUT children underestimate number involved in high frequency accidents – and overestimate numbers involved in medium and low frequency accidents	

Children's judgement of their own risk of being involved in an accident.
For each of the 8 accidents children were asked whether during the next year or so this was the kind of accident which would happen to them (No, Maybe or Yes).[14]

Averaging across all accidents 45% of children tested were optimistic stating that the accident would not happen to them, and 13% were pessimistic stating that the accident would happen to them – indicating that optimistic responses were over 3 times more common than pessimistic ones (see Table 10, p.22).[15] However, perceptions varied by type of accident and were in line with real risk – the lower the perceived frequency of the risk, the more the optimism that the accident would not happen.[16] Low frequency accidents had a very high rate of optimism – with 68% of children on average stating such accidents would not happen to them, and only 3% stating that they would happen to them. Thus with Low frequency accidents, optimistic responses were 23 times more common than pessimistic responses. Averaging responses across Medium frequency accidents, 30% stated such accidents would not happen to them, and 16% that they would happen to them – indicating that optimistic responses were twice as common as pessimistic ones. However this average figure conceals different rates for the two Medium frequency accidents – 39% stated they would not get bitten by a dog, whereas only 20% stated that they would not have a kettle/burn accident. Averaging responses across High frequency accidents, 31% stated that such accidents would not happen to them, and 21% stated that they would happen to them – indicating that optimistic responses were only 1.5 times more common that pessimistic responses. But averaging across the three High frequency risk accidents conceals that children's rate of optimism was much higher for pedestrian car accidents with as many as 46% stating such an accident would not happen to them (in comparison to only 20% stating that a bike accident and 28% stating that a trampoline accident would not happen to them).

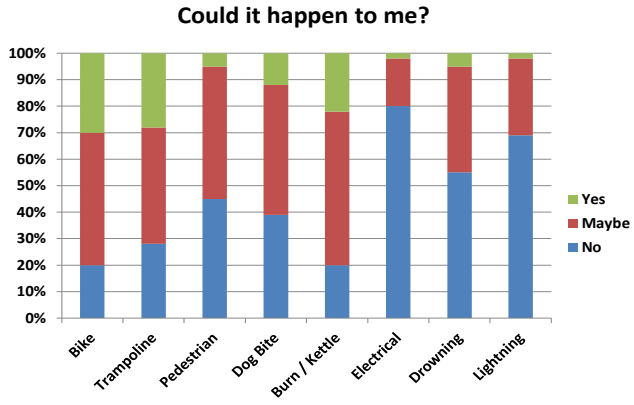
Across the whole sample the overall percentage of children stating for each of the accidents that it would not / might / or would happen did not change after safety education. However, within the sample some children did change their views, enabling a before-after comparison to be made of the extent to which change was characterised by a shift from optimism to 'realism'/pessimism or vice versa. Table 10 (p.22) shows that for three types of High and Medium frequency risk accidents (bike, trampoline and kettle burn), after safety education more children shifted from thinking the accident would not happen to thinking that it maybe or would happen than shifted from thinking that it might or would happen to thinking that it would not. In contrast among two of the three types of Low frequency accidents (electrical and lightning) the shift was in the opposite direction – that is, more children shifted from thinking that the accident maybe/would happen to thinking that it would not happen than shifted from thinking that it would not happen to thinking that it maybe/would happen.

[14] Averaging across all children, the proportion of optimistic/pessimistic responses did not vary between answers given before or after the safety education visit. Thus, in the upper graph and middle table in both Table 10, p.22 & Table 11, p.24, percentages have been averaged across the before/after answers.

[15] For the purpose of comparing the rate of optimistic to pessimistic responses – stating that the accident 'might' happen was classified as neither optimistic nor pessimistic.

[16] Correlation between Yes accident would happen and Real risk: rho (7) = 0.79, p = .021
between Yes/Maybe accident would happen and Real risk: rho (7) = 0.72, p = .045

Table 10: Perception of likelihood of accident



Accident		Ratio of optimistic responses to pessimistic responses			
	Risk frequency	Do you think this accident would happen to you during the next year or so?*			
		No	Maybe	Yes	Ratio No / Yes**, +
Bike	High	20%	50%	30%	0.66
Trampoline	High	28%	44%	28%	1.0++
Pedestrian	High	46%	50%	4%	11.5
Dog bite	Medium	39%	50%	11%	3.55
Burn/Kettle	Medium	20%	58%	22%	0.90++
Electrical	Low	79%	18%	3%	26.33
Drowning	Low	55%	40%	5%	11.0
Lightning	Low	69%	29%	2%	34.5
Average	All	45%	42%	13%	3.46

* Scoring No +1, Maybe 0, Yes – 1, in the case of 6 of the 8 accidents, bias in perception in significantly different from Zero (at p<.001).

\+ Number above 1.0 indicates optimistic responses more numerous than pessimistic responses
Number below 1.0 indicates pessimistic responses more numerous than optimistic responses

++ Indicates that score does not differ from zero, .ie. optimistic & pessimistic responses are equally prevalent

	Among those who change after safety education T1 Before education, T2 After education			Comparison of % change	
	Of Yes/Maybe at T1, what % → No at T2	Of No at T1, what % → Yes/Maybe at T2	% Difference	χ^2	P
Bike	17%	60%	+43%	44.68	<.001
Trampoline	30%	42%	+12%	10.22	<.001
Pedestrian	28%	35%		1.80	NS
Dog bite	27%	35%		2.65	NS
Burn/Kettle	11%	60%	+49%	70.40	<.001
Electrical	56%	15%	- 41%	45.53	<.001
Drowning	34%	30%		0.514	NS
Lightning	42%	17%	-25%	22.32	<.001

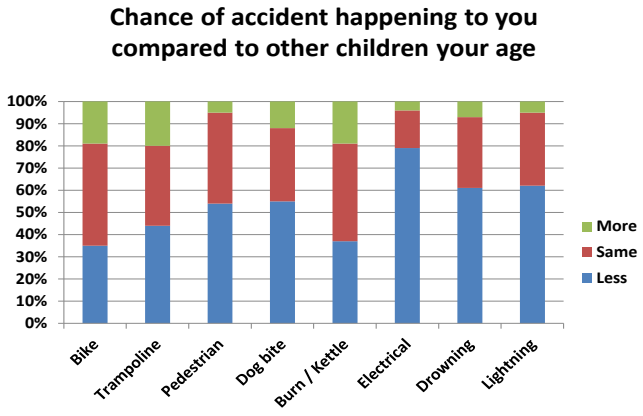
Children were also asked whether their own chance of having each of the 8 accidents was less than, the same as, or more than other children of their age. Averaging across all 8 accidents, 53% of children stated that the accident had less of a chance of happening to them than to other children their age, 36% stated that there was the same chance that the accident would happen to them than to other children their age, and only 11% stated that the accident had more of a chance of happening to them than to other children (see Table 11, p.24). Thus it can be seen that optimistic responses are nearly 5 times more common than pessimistic responses[17]. However, optimism differed according to accident.

Children show the greatest amount of optimism with respect rare accidents – electrical, drowning and being struck by lightning – where across those three accidents – on average 67% thought these accidents were less likely to happen to them than to their peers, and only 5% though their risk was higher than their peers. Thus among Low frequency risks optimistic responses are over 13 times more common than pessimistic responses. For Medium frequency risks being bitten by a dog or suffering a kettle burn injury, on average 46% thought these accidents were less likely to happen to them than to their peers, and 16% though their risk was higher than their peers. Thus among Medium frequency risks optimistic responses are nearly 3 times more common than pessimistic responses. For High frequency risks – bike, trampoline and pedestrian accidents - on average 44% thought these accidents were less likely to happen to them than to their peers, and 15% thought their risk was higher than their peers. Thus among High frequency risks optimistic responses are nearly 3 times more common than pessimistic responses. Of interest, however, is that among High frequency risk accidents there was a much higher rate of optimism regarding a pedestrian accident – where optimistic risk is over 10 times higher than pessimistic risk. In comparison the optimistic bias is only 1.8 for bike accident, and 2.2 for trampoline accident.

As with the 'Would this kind of accident happen to you?' question, across the whole sample the overall percentage of children stating for each of the accidents that the accident had less of a chance, same chance, or more of a chance of happening to them did not change after safety education. However, within the sample, among the children who did change, in the case of one of the High frequency accidents (bike) and one of the Middle frequency accidents (burn/kettle), more children changed from thinking it had less of a chance of happening to them to thinking that it had the same or more of a chance of happening to them than changed from thinking that it had the same or more of a chance of happening to them to thinking that it had less of a chance of happening to them. In the case of two of the Low frequency accidents (electrical, drowning) more children changed from thinking the accident had the same or more of a chance of happening to them to thinking that it had less of chance of happening to them than changed from thinking it had less of a chance of happening to them to thinking that it had the same or more of a chance of happening to them.

[17] For the purpose of comparing the rate of optimistic to pessimistic responses – rate of optimism was calculated by dividing the percentage of 'less chance' by 'more chance' answers.

Table 11: Perception of comparative chance of accident



Accident		Ratio of optimistic responses to pessimistic responses			
	Risk frequency	Compared to others of your age, what is the chance of this accident happening to you?*			
		Less chance	Same chance	More chance	Ratio Less chance / More chance +
Bike	High	35%	46%	19%	1.80
Trampoline	High	44%	36%	20%	2.20
Pedestrian/car	High	54%	41%	5%	10.03
Dog bite	Medium	55%	33%	12%	4.59
Kettle	Medium	37%	44%	19%	1.94
Electrical	Low	79%	17%	4%	19.75
Drowning	Low	61%	32%	7%	8.70
Lightning	Low	62%	33%	5%	12.40
Average	All	53%	36%	11%	4.82

* Scoring Less Chance +1, Same Chance 0, More Chance – 1, in the case of each of the 8 accidents, bias in perception is significantly different from Zero, in direction of positive optimism / less chance (at p<.001).

\+ Number above 1.0 indicates optimistic responses more numerous than pessimistic responses

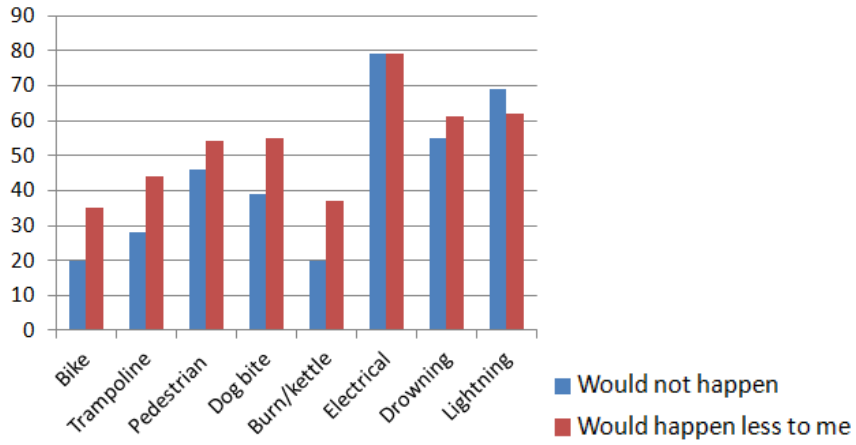
	Among those who change after safety education T1 Before education, T2 After education			Comparison % change	
	Of Same/More at T1, what % → Less at T2	Of Less at T1, what % → Same/More at T2	% Difference	χ^2	P
Bike	23%	44%	+21%	26.32	<.001
Trampoline	28%	28%		0.00	NS
Pedestrian	35%	33%		0.10	NS
Dog bite	35%	33%		0.22	NS
Burn/Kettle	17%	48%	+31%	26.74	<.001
Electrical	53%	14%	- 39%	37.00	<.001
Drowning	34%	28%		0.982	NS
Lightning	33%	22%	-11%	3.17	<.05

The tendency to give optimistic answers when being questioned about the likelihood of the 8 accidents was most pronounced for the less frequent accidents. Particularly in the case of the 'compared to others of your age' question, this pattern of data raises the question of whether children were simply answering in terms of absolute rather than comparative probability. Children who stated that an accident would not happen to them or that it had less of a chance of happening to them than to their peers were asked why this was so, and their answers suggest that they had understood the comparative nature of the question. The majority of reasons given related to the child's claim to be particularly skilful in the particular domain or to their view that they considered that, for a variety of reasons, in comparison to other children they themselves were not exposed to the particular risk. The type of explanation offered for not being at risk varied by accident (see Table 12, p.26). Among those stating that they were not at risk of a kettle burn or trampoline injury the predominant explanation was of lack of exposure to the risk. In contrast, among those stating that they were not at risk of a pedestrian or drowning accident, the predominant explanation was to attribute their lower level of risk to their own skill and knowledge.

In summary, while the primary purpose of the study was to investigate risk recognition, the '8 card' section of the study also afforded the opportunity to assess children's assessment of risk frequency and their own vulnerability to the risks in question. The data suggest that, with the exception of pedestrian accident, children do grasp the relative frequency of various accidents. Futhermore, where there was a shift in comparative optimism, more children moved towards recognising that some High and Medium frequency accidents might happen than moved towards thinking that they will not happen.

Table 12: Children's explanations of optimism

% children showing optimism, on two questions

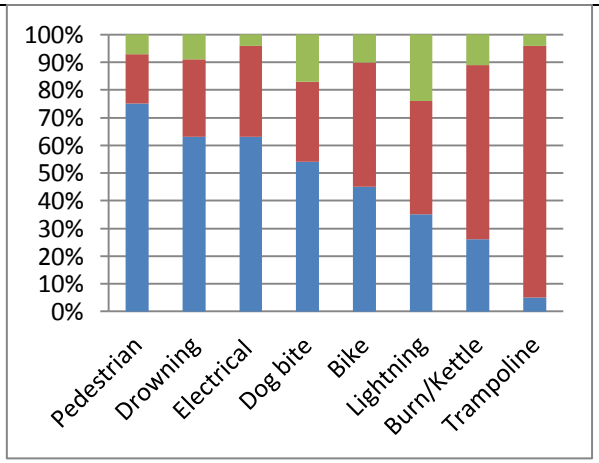


Accident	Examples of explanations	
	Skill	Exposure
Pedestrian/car	I know how to look properly	I only walk with an adult
Drowning	I am a very good swimmer	No water round here
Electrical	I know not to take electrics near water	No plug sockets in our bathroom
Dog bite	I can tell when a dog is angry	Not many dogs round here
Bike	I am a good rider	I rarely ride my bike
Lightning	I know not to go under a tree in a storm	I don't go out in storms
Kettle burn	I would only pour hot water if the kettle was on a table	I never make hot drinks
Trampoline	I am very careful	Our trampoline has a net

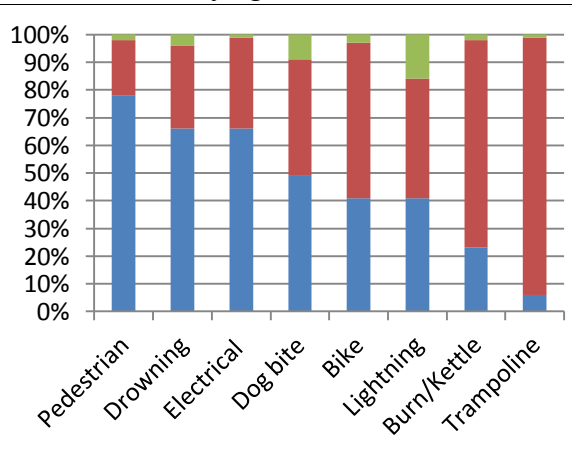
Explanation of why accident won't happen: due to

skill	exposure	other

'It won't happen to me in next year or so because'



'It won't happen to me compared to others of my age because'



DISCUSSION

Summary of main results and suggestions for further research

The data gathered in the current study suggests that attending a safety education centre, such as the Junior Citizens Programme or I.M.P.S., results in – on average - a 36% improvement in risk perception. A considerable proportion of children (29%) did much better than this, improving their performance by 74%.

Performance varied by frequency of risk and risk setting. The recognition of High frequency risks started at a very low level with just under a quarter of risks being recognised. This rose on average to a third of risks being recognised post-education. While this is a 45% improvement from base, the absolute level of the final performance in the area of High frequency risk perception was still low. The High frequency risk category was comprised of accidents in a variety of settings – with At Play and On the Road being the predominant categories. Within the high frequency risk category, potential accidents At Play were recognised both before and after education at a higher level than were potential On Road accidents. Thus it can be seen that it is primarily the relatively poor recognition of the On the Road risks that accounts for the poor recognition of High frequency risk accidents.[18]

There was also a high variability in absolute level between the components of a category. For example the fact that the child crossing the road towards the shop is not looking in the direction of the on-coming car was only noticed by 21% of children and the small rise to 24% post-education is not statistically significant. In contrast that the child crossing the road might be distracted by listening to music on headphones was noticed by 72% of children pre-education and this rose to 84% post-education.

Recognising that the cyclist was not wearing a helmet did significantly improve but only from 24% to 36%, and such a low – even if improved level – is disappointing. It should be pointed out, however, that spotting that the cyclist in the picture was not wearing a helmet is a cognitively harder task than, for example, spotting that the child in the car was not wearing a seat-belt. In the latter case an undone seat belt was in view, whereas in the case of the cycle helmet there was no helmet on view. In this sense the absence of the cue in the cycling picture was similar to the absence of a driver's seat-belt in the picture of the mother and child travelling in the car, which also showed only modest improvement from a low base (rising from 11% to 22%). However an item/risk being on view did not necessarily ensure a very high level of recognition – as in the case of the roller skate in the tea-time picture, which rose from 15% to only 38%.

The relatively weak performance on road risk can be view alongside children's judgements of danger and frequency in the 8 card task. Pedestrian accidents were seen as the most dangerous but their frequency was rated too low – i.e. as similar to dog-bite and burn/kettle injuries, when in reality pedestrian accidents are considerably more frequent as a cause of admission to hospital.

[18] Within high frequency risk accidents, percentage improvement from pre- to post-education is markedly higher with regard to At Play (17.7%, sd 10.1) in comparison to On the Road risks (6.1%, sd 6.1) ($t = 2.89$, $df 14$, $p = .012$).

The limitation of rank order data has already been alluded to in the Results section, but there are also problems with the 'Imagine you are a doctor task' which gives the children 50 patients whose admission to hospital must be allocated between the 8 accidents.
In terms of real accident frequency, the correct allocation would be 17 Bike, 16 Trampoline, 10 Pedestrian/car, 4 Dog bite, 2 Kettle/burn injury, Electrical 0.40, Drowning 0.10, and Lightning 0.02 – which with 50 counters to distribute is impossible to achieve. A minority of children did spontaneously ask whether it was alright to place no people on some of the categories, and were assured that this response was fine. Thirty children allocated no-one to the Lightning accident, 13 children allocated no-one to the Drowning accident, and 6 children allocated no-one to the Electrical accident.

Notwithstanding the above proviso, the data show that relative to their true incidence, children over-estimated the number of children their age who would be admitted to hospital for the rare accidents, and under-estimated the number of children who would be admitted for the common accidents. This type of 'error' in judgment has been commonly found among adults where, for example, rare and exotic diseases are thought to be more frequent than they are, and 'ordinary' diseases thought to be less frequent than they are. One explanation of this misjudgement is that rare diseases and statistically unusual accidents are given a great deal of colourful and dramatic press coverage (in comparison to more everyday diseases and accidents) and thus bias people's judgments by being uppermost and 'available' in people's minds (12).

Could a similar process be operating for children? In order to characterise children's imagery of the 8 accidents in this study each child was asked to pick an accident which they could feature in a thrilling and exciting story, and an accident which they could feature in a dull and boring story. 38% of children nominated a lightning accident, and 34% nominated a drowning accident as being the accident which would help make a story dramatic, which given that these were among the accidents children over-estimated, lends credence to the proposition that for children as well as for adults it is dramatic accidents which are over-estimated. The only other accident to be nominated by more than 10% of children as dramatic was the pedestrian accident, nominated by 16% of children. Interestingly the children who did nominate the pedestrian accident as dramatic were more likely than other children to place it higher in rank order frequency[19]. Further the children who had nominated pedestrian accident as dramatic also allocated more hospital admissions to this kind of accident than did other children, [20] and importantly saw it as similar in admission rate as those due to bike and trampoline accidents, and higher in admissions than those due to a burn/kettle injury.[21]

Overall, girls did marginally better than boys both before and after education, but their rate of improvement was no better or worse than boys – except in the case of Medium frequency risks where boys improved more than girls, and thus in this area achieved the same level as girls did post-safety education. Empirically girls in this age group do have fewer accidents than boys (21), and our data suggest girls are more risk conscious, although not by a very great deal. But girls were not uniformly better at recognising risk. Their superior performance was restricted to the High frequency risk area and within that area was not evident in the On the Road area. This supports Towner et al.'s (1) suggestion that gender differences in pedestrian accident rates relate to gender differences in exposure rather than to gender differences in attitude or behaviour. Indeed Towner at al. cite research suggesting that when

[19] F = 5.45, df 1/306, p = .020
[20] F = 7.09, df 1/306, p = .008
[21] Paired t= 3.414, df 72, p = .001

exposure is taken into account girls aged 10 to 15 are at higher risk per kilometre walked (22), and that boys may have better and faster reaction times than girls and thus be less at risk.(23)

The current study found that children at schools with a higher percent of Year 6 eligible for Free School Meals had a similar pre-education performance in comparison to children at schools with lower percent of Year 6 eligible for Free School Meals. However post-education, the children at the schools with a higher percent eligible for Free School Meals showed greater improvement – albeit by a small although statistically significant amount. We cannot rule out the possibility that these schools were different in respects other than Free School Meal eligibility. For example, teachers in these schools may (or may not) have devoted more lessons post-safety education to follow-up work on risk. The Junior Citizens Trust gives schools a follow-up pack to reinforce learning but we do not have data on whether or how much it was used, and any such data would be difficult to gather and quantify, and even if gathered might not be reliable. Nevertheless, further research should be conducted to ascertain the reliability or otherwise of this small but significantly greater improvement by the children in schools with a higher proportion of children eligible for Free School Meals. It must be pointed out that in the current study two of the three schools designated as having a relatively higher proportion of children being eligible for Free School Meals were not high in an absolute sense but in fact close to the national average, and in only one school were the Year 6 pupils in the national highest quintile for Free School Meal eligibility. Schools with a lower proportion of children eligible for Free School Meals were over represented in the study for three reasons. Oxfordshire itself is a a county where only 14% of pupils are eligible for Free School Meals (which is well under the national average for England of 21%) (24). Secondly, the study was conducted in the second half of the school year when by chance schools with a lower proportion of Free School Meal pupils were booked in to visit the two safety centres.[22] Thirdly, schools with a higher proportion of children eligible for Free School Meals had a lower rate of accepting to take part in the study.

Perhaps the finding that there was a difference in performance related to Free School Meal index should be posed in reverse – i.e. we should ask why the children in the schools of less economic disadvantage did slightly worse than the children in the schools of average economic disadvantage. Many of the schools in our sample were in rural areas, such as The Vale of the White Horse and South Oxfordshire, and it is possible that the relatively poor performance – for example - on perceiving road safety risks related to children, rightly or wrongly, regarding traffic as not being their problem. When explaining why an accident would not happen, many children commented that ‘the roads round here are very safe’. Further research should establish whether children recognise the particular dangers of their own environment, and whether for example children in rural localities recognise risks such as walking along the side of a road without pavements with their back to the oncoming traffic.[23]

Limitations of the current study.

In 17 of the 19 participating schools, children had made a class visit to the Junior Citizens Trust programme in Oxford and thus the data cannot be generalised to other safety programmes which may focus on different risk scenarios.

[22] http://www.oxford.gov.uk/Library/District%20Data/Chart%20June13%20GCSE%20trend2.pdf

[23] http://www.rospa.com/roadsafety/adviceandinformation/highway/rural_roads.aspx

The study did not incorporate a control group and thus we cannot estimate the extent to which the risk improvement seen might have resulted from taking the test itself several times. However a comparable study evaluating the 'Lifeskills - Learning-for-Living' programme at Bristol did incorporate a control group and the data showed no evidence of performance improvement being attributable to taking the test, or to the passage of time itself.[24]

The current study aimed to interview children within 4-6 weeks of their safety education visit, and 265 children (at 16 schools) were seen during that period. However due to SATS, school field trips and holidays 42 children (at 3 schools) were seen 7-10 weeks after their safety education visit. These children's risk recognition improvement was not different from that of the main sample of children.[25]

It is possible that the study may have underestimated children's recognition of risks and hazards as although clear instructions were given to indicate that some pictures contained more than one risk, some children gave the impression of thinking it was 'enough' to spot one risk or hazard per picture, and that they should move through the task as fast as possible.

Over and above a human tendency towards unrealistic optimism (13, 25), it is possible that the combination of being interviewed by an adult and in a school setting contributed to the large number of children giving what they perceived to be a socially desirable answer and claim that such accidents would not happen to them due to their skill – such as 'knowing how to cross a road'. It is also possible that the 'Compared to other children your age' question was a too complex cognitive task for some children of this age. However, the explanations which children gave – both in terms of the skills which they believed they had or the environment in which they operated (such as 'we don't have a trampoline at home, and I don't often go to other people's houses – so it this accident won't happen to me as much as it will happen to others') suggests that the majority of children did understand the question.

Policy implications

Safety centres are faced with the challenging task of alerting children to risk, yet not frightening them. This is why, depending on the risk in question, safety centres focus not only on the avoidance of risk but on teaching skills to recognise and manage risk in everyday life in order to keep safe and potentially help others who may be in difficulty.

At Oxfordshire Junior Citizens Trust – as in many such schemes – many risks and hazards are covered in different scenarios ranging from spotting dangers in the home to being safe on the roads, near railways, and near water. Children go from set to set in small groups, and frequently engage in interactive tasks, which are then discussed in terms of what you should do, and what you should not do in a given situation. In order for each group to visit each set during a whole class visit, the time spent on each set must be the same. Thus each category of risk is given equal instructional time – for example, time spent in the house-fire set, the river, the dark alley. This rotation also has the educational advantage of maintaining the children's interest and not over-burdening their attention span, but has the potential disadvantage of spending an equal amount of time on very rare hazards as on more common hazards.

[24] An Evaluation of the Lifeskills Learning for Living Programme http://www.hse.gov.uk/research/rrpdf/rr187apps.pdf

[25] Further in a multiple regression, improvement in risk perception score was not predicted by time since intervention, nor did time since intervention interact with Gender or Free School Meal percentage.

The data of the current study suggest that children need to be made more aware of the risk of pedestrian accidents. This is important as children of this age are on the brink of moving to secondary school, and being given more freedom to travel independently (26, 27), a transition that is accompanied by an increase in the rate of pedestrian (and cyclist) casualties (21). The children in this study regarded pedestrian accidents as very dangerous but underestimated their frequency. How is risk awareness to be raised without incapacitating children and rendering them fearful of being a pedestrian? The role of fear as a tool in health education has been much debated. At one time it was thought that to arouse too much fear would in fact lead recipients to reject the health message altogether (27). However, a recent literature review suggests that fear arousal – in the sense of alerting people to the reality of both the danger and likelihood of a threat – can be productive provided it is accompanied by feasible recommendations for action (28). It is clear from children's answers to a variety of questions in the study that they do recognise that a pedestrian road accident is dangerous, but the majority of them do not realise that as a reason to be admitted to hospital it is considerably more frequent than is a dog-bite or kettle burn injury.

Among all the accidents it is the pedestrian accident which is the one children are most likely to attribute the reason why an accident will not happen to them as being due to their own skill - usually voiced as "I always look right and left". We did not ask the children who thought the accident would happen to them or who thought it had a higher chance of it happening to them for the reasons, although these reasons were sometimes spontaneously offered. For bike and also trampoline accidents, the explanation was often that 'it has happened to me before'. For the children who said that a pedestrian accident might or even would happen to them, the most frequent explanation (if offered at all) was to do with a previous 'near miss'. This accords with a recent survey conducted by the road safety charity Brake in which 41% of primary school pupils aged 7 to 11 when commenting on the roads in their community said they had been struck by a vehicle or had a near miss.[26]

Safety education centres could consider incorporating discussion of near-misses and other hazards into their interactive teaching sessions. The data in this study show that children were already good at recognising the danger of listening to music on headphones while crossing roads, and this is improved even further by a visit to a safety education centre. This knowledge that children already have could be used by instructors as a springboard for discussing other distracters, such as talking on a mobile or chatting to friends while crossing the road, which might interfere with their using their normal road crossing skills.[27] In this way instruction would not be to re-teach the Green Cross Code but would instead focus on alerting children to circumstances in which they are likely to momentarily abandon safe behaviour. Focussing on the situational determinants of risky behaviour has parallels in drug and safe sex health education with adolescents where it has been found that in order for education to be successful it needs not only to impart knowledge but to also focus on the role of peer pressure and on imparting resistance skills.(29, 30)

[26] http://www.theguardian.com/uk-news/2014/nov/17/children-roads-dangerous-brake (retrieved 03/12/14)

[27] A 2003 evaluation indicated that one of the most successful skills imparted at the Bristol Learning-for-Living Lifeskills intervention is recognition of the distance it takes a car to stop in an emergency. Prior to safety education only 25% of children achieved a perfect score on this area – but this rose to 94% immediately post-education, and was maintained at 89% three months later. The comparable figures for a matched control group who had not yet attended Lifeskills were 27%, 24% and 23%. (8)

References

1. Towner, E., Dowswell, T., Errington, G., Burkes, M. & Towner, J. (2005). *Injuries in children aged 0-14 years and inequalities.* London: NHS/Health Development Agency.

2. Borse, N.N., Gilchrist, J., Dellinger, A.M., Rudd, R.A., Ballesteros, M.F. & Sleet, D.A. (2008). *CDC Childhood injury report: Patterns of unintentional injuries among 0-19 year olds in the United States, 2000-2006.* Atlanta, GA: U.S. Department of Health and Human Services.

3. WHO (2008). *World report on child injury prevention.* Geneva: WHO/Unicef.

4. Lyons, RA., Kendrick, D., Towner, E.M., Christie, N., Macey, S., Coupland, C. & Gabble, BJ. (2011). Measuring the population burden of injuries – implications for global and national estimates: A multi-centre prospective UK longitudinal study. *PLoS Medicine,* 8(12), e1001140.

5. Mann, C. (2014) Can accident prevention save the NHS? *2014 Allan St John Holt Memorial Lecture*, RoSPA/Royal Mail. https://www.dropbox.com/s/kmgpmvqseqdrreh/RoSPA%20lecture.pptx?dl=0

6. McWhirter, J. & Francis, C. (2012). Effective safety education revisited. http://www.rospa.com/schoolandcollegesafety/teachingsafety/info/ten-principles-revisited.pdf

7. Tolmie, A., Thomson, J.A, Foot H.C, et al. (2005). The effects of adult guidance on the development of children's representations: Evidence from the training of pedestrian skills. *British Journal of Psychology,* 96:181-304.

8. Cowburn, G., Joshi, M.S., Lamb, RM., & Matthews, A. (2003) *An Evaluation of the Lifeskills Learning for Living Programme*, (ISBN 0 7176 2794 2) HSE Books, available at www.hse.gov.uk/research/rrhtm/rr187.htm)

9. Lamb, R., Joshi, MS., Carter, W. et al. (2006). Children's acquisition and retention of safety skills: the Lifeskills program. *Injury Prevention*, 12: 161-165.

10. Slovic, P. (1987). Perception of risk. *Science,* 236: 280-285.

11. Sjoberg, L. (2000). Factors in risk perception. *Risk Analysis*, 20(1): 1-11.

12. Tversky, A. & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207-232.

13. Weinstein, N.D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology, 39,* 860-820.

14. McKenna, F., Warburton, D.M. & Winwood, M. (1993). Exploring the limits of optimism: the case of smokers' decision making. *British Journal of Psychology, 84(3),* 389-94.

15. Rutter, D.R., Quine, L., & Albery, I.P (1998). Perceptions of risk in motorcyclists: Unrealistic optimism, relative realism and predictions of behaviour. *British Journal of Psychology, 89,* 681-696.

16. Cohn, L.D., Macfarlane, S., Yanez, C., & Imai W.K. (1995). Risk-perception: Differences between adolescents and adults. *Health Psychology,* 14(3): 217-222.

17. Whalen, C.K., Henker, B., O'Neil, R.et al. (1994). Optimism in children's judgments of health and environmental risks. *Health Psychology, 13(4),* 319-325.

18. Joshi, M.S. & Lamb, R. (2012). Less is more: Possible ways to improve tuition of the recovery position. *Emergency Medicine Journal, 29,* 679 – 682.

19. Croxford, L. (2000). Is Free-Meal entitlement a valid measure of school intake characteristics? *Educational Research and Evaluation, 6(4),* 317-335.

20. Hobbs, G. & Vignoles, A. (2007). *Is Free School Meal status a valid proxy for socio-economic status (in schools research)?* Centre for the Economics of Education, London School of Economics.

21. Mason, J., Deacon, L., Perkins, C., & Bellis, M. (2013). *Child accidents and injuries in the North West.* North West Public Health Observatory, Liverpool John Moores University, Liverpool, UK.

22. Ward, H., Cave, J., Morrison, A. et al. (1994). *Pedestrian activity and accident risk.* Basingstoke, Hants: AA Foundation for Road Safety Research.

23. Grossman, D. & Rivara, F. (1992). Injury control in childhood. *Pediatric Clinics of North America, 39(3),* 471-485.

24. Lord, A., Easby, J. & Evans, H. (2013) *Pupils not claiming Free School Meals.* Research Report. Department for Education.

25. Sharot, T., Korn, C.W., and Dolan, R.J. (2011). How unrealistic optimism is maintained in the face of reality. *Nature Neuroscience, 14(11),* 1475-1479.

26. Hillman, M., Adams., J., & Whitelegg, J. (1990). *One False Move: A study of children's independent mobility.* London: Policy Studies Institute.

27. Shaw, B., Watson, B., Frauendienst, B., et al. (2013). *Children's independent mobility: a comparative study in England and Germany (1971-2010).* London: Policy Studies Institute.

28. Becker, M.H. & Janz, N.K. (1987). On the effectiveness and utility of health hazard/health risk appraisal in clinical and nonclinical settings. *Health Services Research, 22,* 537-551.

29. Witte, K. & Allen, M. (2000). A meta-analysis of fear appeals: implications for effective public health campaigns. *Health Education & Behavior, 27(5),* 591-615.

30. OFSTED (2005). *Drug Education in Schools.* A report from Her Majesty's Chief Inspector of Schools. HMI 2392.

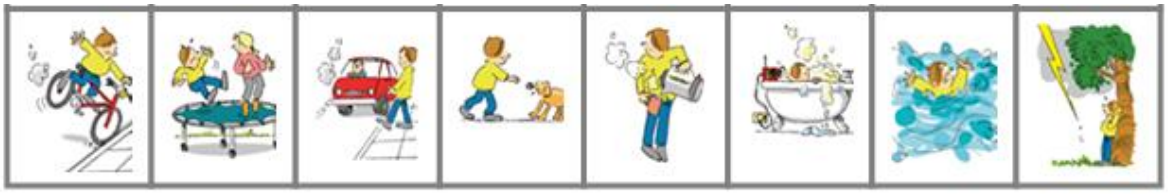
31. Botvin, G.J., Griffin, K.W., Paul, E. & Macaulay, A.P. (2003). Preventing tobacco and alcohol use among elementary school students through life skills training. *Journal of Child & Adolescent Substance Abuse, 12(4),* 1-17.

Interview Script

Here is a picture of a Day in the Life of a person around your age.
Firstly I would like you to tell me what is going on in each picture – for example in the first picture they are waking up, and then in the next picture they are having breakfast. So let's go through them one by one and you can tell me what the person is doing.

Some days are good days – maybe it is your birthday and you get given some presents. Other days are not so good – and maybe you might hurt yourself or have an accident. Now I would like you to look at the pictures again – one by one – and tell me if you can see any accidents that might happen. Some pictures have no accidents, some have one accident, and some have more than one accident. .

OK. Good.
Now I am going to show you 8 pictures – and in each one an accident is about to happen.
First can you tell me what is the accident that is about to happen.



OK. Good.
Now I would like you put the pictures in order of how dangerous you think each accident would be. Imagine that all of these things did happen – that would be very unlucky. But if they did happen – which would the very worst? Put the most dangerous accident there (points to left side); then the second most dangerous, then the third – until you have put all 8 in the order you think – going from most dangerous accident to the least dangerous accident.

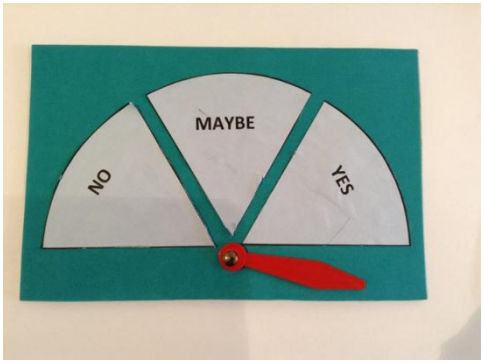
OK. Now I would like you to do something else with the same 8 pictures.
I want you to think about how often these accidents happen to children your age.
Put the one that happens the most often there (points to the left side); then the one that happens the second most often; then the third – until you have put all 8 in the order you think – going from the accident that happens most often to the accident that happens the least often to children your age.

Now for something else with the same 8 pictures.
I want you to imagine that you are a doctor at a big hospital – like the John Radcliffe. You have been away on holiday for a few weeks and while you have been away 50 children aged around 10-11 have been admitted to the hospital with sufficiently bad injuries that they need to stay in hospital for a while. How many of the 50 will have had each kind of accident?
(Prompt if necessary – Suppose there was a ward for children who had been hurt in a bicycle accident – how many of the 50 would be in that ward etc).
Children given 50 figures to distribute across the pictures.

OK. Good.
Now let's shuffle the cards and go through them one by one.
I would like you to tell me <u>for each one</u> what you think the chance of this accident happening to you compared to other children your age? Is there less of a chance of it happening to you than to others of your age, the same chance of it happening to you as to others of your age, or more of a chance of it happening to you than to others of your age?

- LESS CHANCE
- SAME CHANCE
- MORE CHANCE

OK. Good.
Now - <u>for each accident</u> I would like you to tell me whether you think in the next year or so this is the kind of accident that would happen to you? No, Maybe or Yes



If the child answers NO, then asked:
OK. That's fine. And can you tell me why you think it wouldn't happen to you.
Good excellent.

Last questions now:
Sometimes at school you have to write a story for other children to read.
If you were asked to write a very thrilling exciting story – which one of the accidents would you include to help you make the story a really exciting one?

OK. Good. Why would that accident help make the story exciting and thrilling?

And finally, just suppose you had to write a story that was really dull and boring, and it had to include an accident. Which one of the accidents would you choose to help make the story a really boring one?

OK. Good. And why would that accident help make the story dull and boring?
That's it. Thank you very much.

GLOSSARY of statistical terms

Term	Meaning
Analysis of Variance	A procedure to test the statistical significance of the differences obtained among two or more means.
Chi- squared (χ^2)	A statistic to compare the frequency of various categories of items
Correlation	A term used to describe an association between two variables
df	Degrees of freedom (the numbers of values in the final calculation of a statistic that are free to vary)
Effect size	A statistical convention for quantifying the size of the difference between groups.
${}^{\eta}p^2$	Partial eta squared A measure of effect size: 0.02 small; 0.13 medium; 0.26 large
F	A statistic obtained in analysis of variance calculations
Mean	Average (the sum of all scores divided by number of scores)
r / rho	Pearson's r / Spearman's rho (Statistical tests of correlation / relation between two variables)
Range	A measure of the dispersion of a set of scores, indicating top to bottom scores
sd	Standard deviation (a measure of dispersion, indicating the average deviation of scores away from the mean of those scores)
Statistical significance	A finding (e.g. the difference between 2 means) is described as statistically significant when it can be demonstrated that the probability of obtaining such a difference by chance is relatively low.
$p < .05$	When it is estimated that the obtained result would occur less than 1 time out of 20 by chance.
$p < .01$	When it is estimated that the obtained result would occur less than 1 time out of 100 by chance.
$p < .001$	When it is estimated that the obtained result would occur less than 1 time out of a 1000 by chance

Letter to Head teachers

As sent to Schools visiting Junior Citizens Trust

Department of PSYCHOLOGY, SOCIAL WORK AND PUBLIC HEALTH
Headington Campus, Gipsy Lane, Oxford OX3 0BP
Direct Line for Dr Mary Sissons Joshi: 01865 483779
Email: msissons-joshi@brookes.ac.uk

Date

Dear XXXXX,
Head teacher, xxxx Primary School,

As you know, your Year 6 pupils are due to visit Oxfordshire Junior Citizens Trust at The Franklin-Vermeulen Safety Centre, Oxford on xx 2014.

I am writing to ask you to consider taking part in a research project I am conducting about children's risk perceptions and safety knowledge before and after they visit the Junior Citizens Trust.

The research is funded by RoSPA and will help build a case for enhanced funding for interactive child safety education of the kind offered by Junior Citizens. The study has been approved by the Chairman of Oxfordshire Junior Citizens and by the Director for Children's Services, Oxfordshire.

This is what the study would involve from a particular school's point of view:

1. I would be looking to interview Year 6 children in school ideally a few weeks before and a few weeks after the school visit to Junior Citizens.
2. I would ask the school to distribute a letter to parents (hard copy provided by myself, or email - as advised by you) asking for parental permission for their child to be interviewed (see attached letter and a consent form which the parents would return to the school as a hard copy).
3. I or my research collaborator, Claire Stevens, would visit your school on two consecutive days a few weeks prior to, and again for two consecutive days a few weeks after your school visit to Junior Citizens.
   Each participating child would be interviewed for about 10 minutes on two occasions – once before and once after the Junior Citizens visit. The interviews would take place at school at times of your choice, and in a suitable environment within the school.
4. The interview would follow a 'questionnaire' format, but the children themselves are not required to write. Their responses would be written down by the researcher.

The interview will be in two parts:
Firstly children will identify risky situations embedded in a colourful cartoon depicting a day in the life of a Year 6 child (getting up, having breakfast, journey to school etc) which include possible hazards – such as a busy road, pots on an unguarded stove.

Secondly children will be shown cartoon pictures of four rare and four common hazards and asked to indicate, by using a sliding arrow, how dangerous the situations are, and the likelihood of children their age encountering such situations.

Care has been taken to ensure that neither the visual material in the interview nor the wording of the questions will alarm or upset children.

Once the data have been gathered the children's names will be permanently removed from the material. The anonymised data will be kept confidentially, stored securely, and only seen by myself and the other researcher. It will be impossible for individual children or your school to be identified in any reports or publications about the research. However the help provided by your school will be fully acknowledged and you will be provided with a copy of the resulting report. The study has been granted ethical clearance by the Oxford Brookes University Research Ethics Committee. I and the other researcher on the project both have enhanced Disclosure and Barring Clearance.

I do appreciate that asking schools to cooperate with research of this kind takes time out of the school day but hope that any disruption to school timetables would be offset by the children enjoying the interviews. Most children find this kind of interview interesting and fun, and do not feel under performance evaluation. It is also likely that the post-visit interviews will reinforce some the learning which took place at Junior Citizens.

I am approaching a number of schools booked to visit Junior Citizens and hope that as many schools as possible will decide to participate as the study will benefit from interviewing as large a number of children as possible. I also hope that schools will value contributing to research which will have a direct input into RoSPA's safety campaigns and promotion of safety education. My previous research in this area is featured on page 15 of RoSPA's *The Big Book of Accident Prevention.* http://www.rospa.com/BigBook/big-book.pdf

If you have any questions or would like any further information, please do contact me. Meanwhile, I look forward to hearing from you.

With regards,

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msissons-joshi@brookes.ac.uk
Senior Lecturer in Psychology, Oxford Brookes University
http://www.psychology.brookes.ac.uk/dr-mary-sissons-joshi

Letter to Parents

As sent to Schools visiting Junior Citizens Trust

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Direct Line for Dr Mary Sissons Joshi: 01865 483779
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Xxx 2014

Invitation to participate in a research project associated with your child's school visit to Oxfordshire Junior Citizens Trust.

Dear Parent,

I am writing to parents and caregivers of all Year 6 children who, with their school class, will be visiting the Oxfordshire Junior Citizens Trust at the Franklin-Vermeulen Safety Oxford on xxx 2014. The Junior Citizens programme teaches basic safety skills by enabling children to learn about and react to risk in a safe environment.

Your child's school has agreed to take part in a research project which will look at children's risk perceptions and safety knowledge before and after they visit Junior Citizens. Before you decide whether you wish to allow your own child to take part I am sure you would like to know why the research is being done and what it will involve. This is explained below.

What is the study about and what will it involve?
The study is about children's perception of risks, and how a visit to Junior Citizens affects children's understanding of risks. If you agree to your child taking part in the research, he/she will be interviewed at school for about 10 minutes – once before and once after the visit to Junior Citizens. He/she will be asked to spot risky situations in a cartoon showing scenes which include possible hazards – such as a busy road, pots on an unguarded stove. He/she will also be shown cartoon pictures of three rare and three common hazards and asked how dangerous they think the situations are, and the likelihood of children their age encountering such situations.

Care has been taken to ensure that the pictures and wording of the questions will not upset children. You can see examples of the kinds of pictures to be used at the end of this letter. Children generally find these 'spot the danger' tasks fun. It is also likely that the post-visit interview will reinforce some of the safety learning which took place at Junior Citizens.

Do I have to give my consent?
No, giving your permission and allowing your child to take part in the study is entirely voluntary. Also, if you do decide to take part you are free to withdraw your child at any time.

Your child will also be asked if they wish to take part, but only if you have already given your consent.

Benefits and disadvantages of your child taking part
Allowing your child to take part in the study will enable us to gain a better understanding of children's understanding of everyday risks. All we require is 10 minutes out of the school day on two occasions to allow us to interview your child.

What will happen to the findings of this study?
After the interviews, children's names will be permanently removed from the material and it will not be possible for parents or teachers to have access to individual children's results. The anonymised data will be kept confidential, retained for ten years, and stored securely in accordance with the University's policy of academic integrity. It will be impossible for individual children or schools to be identified in any reports or publications about the research. Schools will be provided with a copy of the resulting report for the school website.

Who is funding the research?
The research is funded by The Royal Society for the Prevention of Accidents (RoSPA) and will help build a case for enhanced funding for interactive child safety education of the kind offered by Junior Citizens. The study has been approved by the Chairman of Oxfordshire Junior Citizens and by the Director for Children's Services, Oxfordshire.

Ethics
This study has been approved by the Oxford Brookes University Research Ethics Committee (UREC no: 130783). If you have any concerns about the study please contact ethics@brookes.ac.uk

Please do not hesitate to contact me with any other questions or queries you may have about this study. My contact details can be found at the top of this letter.

What should I do if I agree to my child taking part?
If you agree to your child taking part then please return the completed consent form to your child's teacher by xxx 2014. .

Thank you for taking the time to read this.

Dr Mary Sissons Joshi,
msissons-joshi@brookes.ac.uk
Senior Lecturer in Psychology, Oxford Brookes University
http://www.psychology.brookes.ac.uk/dr-mary-sissons-joshi

CONSENT FORM

To be returned to your child's class teacher

Children's risk perceptions

RoSPA funded research study to be conducted by
Dr Mary Sissons JOSHI
Senior Lecturer in Psychology
Ms Claire Stevens
Postgraduate Research Assistant
Department of Psychology, Social Work & Public Health
Oxford Brookes University
Oxford OX3 0BP

Please tick boxes as appropriate

I confirm that I have read and understand the information contained in the letter to Parents of Year 6 children at xxxx Primary School for the above study ☐

I understand that participation in the project is voluntary ☐

I agree that my child can take part in the above study. ☐

I agree that the data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research. ☐

_____
Name of Child

_____ _____ _____
Name of Parent (or Guardian) Date
Signature

Acknowledgements

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Jim Leivers, Director for Children's Services, Oxfordshire County Council
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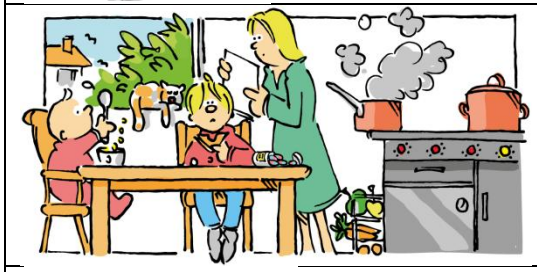
Lynn Pilgrim & Debbie Lock at Injury Minimisation Programme for Schools, Oxfordshire

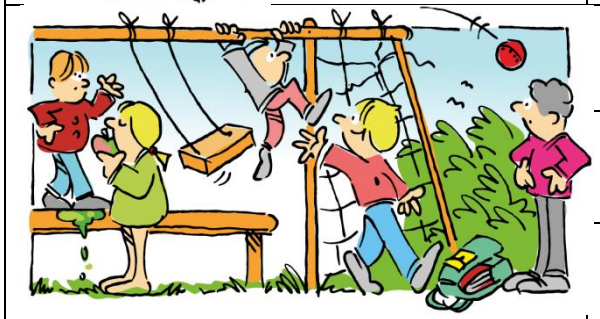
Kevin Watson, Public Health England, for the provision of Hospital Episode Statistics

Robert Duncan, for art work

At Oxford Brookes University
Morag MacLean, for instrument advice
Wakefield Carter, for statistical advice

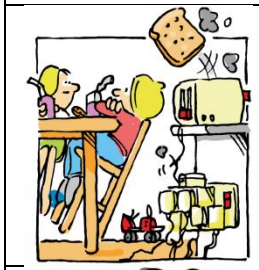
Staff and year 6 children at:
Appleton C of E Primary School (Abingdon)
Chilton Primary School (Didcot)
Cholsey Primary School (Wallingford)
Clifton Hampden C of E Primary School (Abingdon)
Culham Parochial C of E Primary School (Abingdon)
Dunmore Primary School (Abingdon)
Great Milton C of E Primary School (Oxford)
Long Wittenham C of E Primary School (Abingdon)
Longworth Primary School (Abingdon)
Marcham C of E Primary School (Abingdon)
Manor Primary School (Didcot)
Peppard C of E Primary School (Henley-on-Thames)
Ridgeway C of E Primary School (Wantage)
Sandhills Community Primary School (Oxford)
Shrivenham C of E Primary School (Swindon)
South Moreton Primary School (Didcot)
St John Fisher Catholic Primary School (Littlemore)
St Joseph's Catholic Primary School (Oxford)
St Nicolas C of E Primary School (Abingdon)

	Classification of cause of injury	ID as on Table 1 page 6	Frequency of injury	RoSPA area	% children who spot hazard (N = 307)		
					BEFORE safety education	AFTER safety education	Statistical test
	Fall on same level, slip, trip, stumble	A1	High	At home	11%	21%	$\chi^2 = 29.77$ p <.001
	Electrical current	L1	Low	At home	8%	31%	$\chi^2 = 219.52$ p <.001
	Fall/slip on same level	A2	High	At home	5%	5%	
	Accidental poisoning (pills)	I1	Medium	At home	16%	50%	χ^2 258.41 p<.001
	Contact with hot food, drinks	J1	Medium	At home	70%	85%	χ^2 32.64 p<.001
	Hot steam/smoke	J2	Medium	At home	3%	3%	
	Car occupant injury (seat belt child)	K1	Medium	On road	86%	98%	χ^2 38.31 p<.001
	Car occupant injury (seat belt mother)	K2	Medium	Care of others	11%	22%	χ^2 39.25 p<.001

							
	Fall involving playground equipment	C1	High	At play	55%	70%	$\chi^2 = 27.85$ p <.001
	Fall involving playground equipment (slip off beam)	C2	High	At play	46%	72%	$\chi^2 = 86.15$ p <.001
	Fall involving playground equipment (broken ladder)	C3	High	At play	2%	4%	$\chi^2 = 7.32$ p = .007
	Fall/trip on same level (bag)	A3	High	At play	22%	47%	$\chi^2 = 112.00$ p <.001
	Fall from/out of building	E1	Medium	At play	97%	100%	NS

	Pedestrian injured in collision with car, pick-up truck or van	D1	High	On road	13%	23%	$\chi^2 = 25.34$ p <.001
	Drowning in natural water	P1	Low	At play	62%	69%	$\chi^2 = 7.31$ p =.007
	Fall on same level, slip, trip, stumble	A4	High	At play	24%	35%	$\chi^2 = 20.98$ p <.001
	Stranger danger	R1		Stranger danger	26%	50%	$\chi^2 = 95.87$ p <.001
	Fall involving playground equipment (off trampoline)	C4	High	At play	52%	79%	$\chi^2 = 89.84$ p <.001
	Fall from tree	H1	Medium	At play	69%	89%	$\chi^2 = 56.72$ p <.001
	Fall involving playground equipment (off trampoline onto others)	C5	High	Care for others	9%	22%	$\chi^2 = 62.88$ p <.001

	Pedestrian injured in collision with car (inattention due to headphones)	D2	High	On road	72%	84%	$\chi^2 = 23.16$ p <.001
	Pedestrian injured in collision with car (no crossing)	D3	High	On road	2%	3%	$\chi^2 = 5.08$ p = .024
	Pedestrian injured in collision with car (not looking at car)	D4	High	On road	21%	24%	$\chi^2 = 1.581$ NS
	Bitten by dog	F1	Medium	Out and about	96%	98%	$\chi^2 = 4.25$ p = .039
	Fall on same level, slip, trip, stumble (bag)	A5	High	Out and about	1%	6%	$\chi^2 = 75.74$ p <.001
							

	Pedal cyclist injured in non-collision transport accident (no helmet)	B1	High	On road	24%	36%	$\chi^2 = 25.95$ p <.001
	(fall off)	B2	High	On road	16%	17%	NS
	(not looking)	B3	High	On road	49%	63%	$\chi^2 = 23.00$ p <.001
	(bumpy ground)	B4	High	On road	10%	20%	$\chi^2 = 29.34$ p <.001
	(crash into object)	B5	High	On road	6%	3%	$\chi^2 = 3.99$* p = .046
	(crashing into others)	B6	High	Care of Others	12%	18%	$\chi^2 = 9.96$ p = .002
	Fall on same level, slip, trip, stumble skate	A6	High	At home	15%	38%	$\chi^2 = 125.30$ p <.001
	Contact with hot food, drinks etc	J3	Medium	At home	20%	33%	$\chi^2 = 20.57$ p <.001
	Electrical current (overloaded plugs)	M2	Low	At home	62%	87%	$\chi^2 = 79.77$ p <.001
	Discharge of fireworks	N1	Low	At play	55%	67%	$\chi^2 = 18.05$ p <.001
	Controlled/ Uncontrolled fire (get burned)	O1	Low	At play	44%	43%	NS
	(too close)	O2	Low	At play	17%	25%	$\chi^2 = 14.25$ p <.001
	(fire spread)	O3	Low	At play	14%	9%	$\chi^2 = 4.66$* p = 0.03
	(smoke inhalation)	O4	Low	At play	3%	6%	$\chi^2 = 6.62$ p = .01
	(adult needed)	O5	Low	At play	32%	44%	$\chi^2 = 22.92$ p <.001

	Pedestrian injured in collision with car, pick-up truck or van	D5	High	On road	41%	42%	NS
	Fall on same level, slip, trip, stumble	A7	High	Out and about	8%	12%	$\chi^2 = 7.94$ p =. 005
	Exposure to alcohol	L1	Low	Out and about	9%	15%	$\chi^2 = 11.01$ p = .001
	Broken glass	G1	Medium	Out and about	33%	47%	$\chi^2 = 28.57$ p <.001
	'Dodgy people'	R2		Stranger danger	67%	78%	$\chi^2 = 16.\ 15$ p <.001
	Being alone	R3		Stranger danger	8%	11%	$\chi^2 = 3.53$ p = 0.06 / NS
	Late/dark	R4		Stranger danger	12%	20%	$\chi^2 = 21.27$ p < .001
	Lightning (hit because near tree)	Q1	Low	Out and about	17%	31%	$\chi^2 = 45.52$ p <.001
	Lightning (direct hit)	Q2	Low	Out and about	49%	49%	NS
	Baby unattended	S1		Care of others	7%	16%	$\chi^2 = 94.35$ p <.001

* indicates significant in reverse direction – i.e. lower numbers of children spot this risk after safety education

NS indicates no statistically significant difference between before and after safety education scores