

Background/Purpose

Many community organizations run educational events for children to teach them how to prevent unintentional injuries. However, not all of these educational programs evaluate whether learning occurs. In addition, injury prevention efforts are often targeted at children of elementary school age, but tweens (ages 10-13) do not participate in as many injury prevention education programs.

Safe Kids USA is a national nonprofit focused on preventing unintentional injury in children ages 14 and under and is part of the Safe Kids Worldwide network. Safe Kids coalitions had requested a pre-designed program that they could implement at the local level. The purpose of this project was to develop an interactive educational event to teach tweens key injury information and safety practices and to evaluate whether learning occurred. The project was part of Safe Kids Week 2008, a national communications and education campaign, focused on tween safety, and sponsored by Johnson & Johnson.

Five risk areas were chosen for the safety game based on the high number of deaths in the 10-14 age group: motor vehicle occupant injury (423 deaths), pedestrian injury (174 deaths), drowning (138 deaths), fire/burn injury (87 deaths), and wheeled sports (78 pedal cyclist deaths).

Methodology

A safety game, entitled "The Gear Up Games", was developed for Safe Kids coalitions to use during Safe Kids Week. The Games were modeled on the Olympics by having five activity stations (to represent the five rings) focused on above-mentioned risk areas, a competitive element to most activities, and gold medals for the children at the end. A pre-game questionnaire and post-game questionnaire was given to measure children's safety knowledge before and after the Games.

The Gear Up Games was piloted with three Safe Kids coalitions in January 2008, Safe Kids Central Shenandoah, Safe Kids Greater Dayton, and Safe Kids St. Louis. The pilots went well with many children showing increases in knowledge and positive feedback from the coalition leaders. A few changes were suggested for the game and the questionnaire. Revisions were made to the Games directions, and materials were then developed for all coalitions and chapters participating in Safe Kids Week 2008.

Six coalitions were selected to provide participating children's scores on the pre-game and post-game questionnaires and in-depth feedback on the overall game and individual activities. These six coalitions were Safe Kids Robeson County (NC), Safe Kids Greater Dayton (OH), Safe Kids River Cities (KY), Safe Kids Fairfield County (OH), Safe Kids Mid-South (TN), and Safe Kids Fayette County (KY). The results reported here cover these six coalitions' activities. All coalitions were provided with a guidebook and an online instructional video about how to run the Games.

At each location, the children first took the pre-game questionnaire, which consisted of 10 questions (two per risk area). They were then divided up into four or five groups of 8-12 children. Each small group rotated through the five activity stations sequentially. After all groups completed all stations, the children filled out the post-game questionnaire, which included the same questions as the pre-game questionnaire.

Activity Stations

Instructions were written for all activity stations which consisted of some safety information to be delivered in a question and answer format and then a game to help illustrate one of the key messages. Most of the stations were made to be physically active to better engage the students in the learning activity. Ideas for the activity stations came from several Safe Kids coalitions, who had used them in the past.



Fire Safety Station: "Smoke Alarm Relay"

Children learned about smoke alarms: where they should be located and how often to test and change the batteries. They were then divided into two teams to have a race to test the battery and then write down when the battery should next be tested and changed based on a pre-written date (different for each child).

An Interactive Safety Game for Tweens Suzanne Morton, MBA, Safe Kids USA; Jurek Grabowski, PhD, MPH







Pedestrian Safety Station: "Give Me a Brake"

First, a discussion was held about when and where to cross streets. Next, the children were asked to estimate how long it would take a car to stop when it sees a person crossing the road when the car was traveling 20 miles per hour, 30 mph, and 40 mph. Children marked their answers on their own papers and then the volunteer determined whose answer was the closest.

Wheeled Sports Safety Station: "Protect Your Brain"

At this station, children learned about why they should wear a helmet and how a brain injury can affect different abilities, such as speech, emotions, etc. They then were asked to write their names (and sometimes other pictures) on a piece of paper while looking into a mirror that displayed their writing.

Children learned the importance of sitting in the back seat until age 13, how the seat belt should fit, and how to help drivers look around the car for small children and pets before getting in the car. They then divided into two teams and raced to see which team was fastest at having all team members walk around the car with the driver (volunteer), find objects to move out of the way, get in the back seat, and buckle up correctly.

Water Safety Station: "In a Boat, Stay Afloat"

Four children were asked to pretend they were taking a boat ride. Children had various flotation devices that they either wore or were located under their seats. The volunteer led a pretend boat trip and then announced, "The boat is sinking, what do you do?" The volunteer timed the children as they tried to put on the various flotation devices. A discussion was then held about why it's important to always wear a life jacket.



Children were asked the same ten multiple choice questions on both the pre-game and post-game questionnaires. There were two questions per risk area station, with each question valued at 10 points, for a total possible score of 100 points. A total of 468 children filled out both the pre-game and postgame questionnaires.

A paired t-test of students' scores on the pre-game and post-game questionnaires was performed using SPSS version 12. In addition, the proportion of students answering each question correctly in the pre-game questionnaire was compared with the proportion answering correctly in the post-game questionnaire. The method used to calculate a confidence interval for the difference between two proportions was the Newcombe-Wilson method without continuity correction. The coalitions were also asked to rate the overall game and individual stations for both their ability to engage the children's attention and to teach the children new concepts.

Results

Questionnaire Scores

The mean score on the questionnaire by the participants improved significantly from the pre-game questionnaire (58 points) to the post-game questionnaire (81.1 points) for a gain of 23.1 points (95% CI: 21.5 to 24.7).

Comparis	on of Mean Sc	ore on Que	estionnaire:	Paired 1-lest
	Maximum Sc	ore = 100 p	points; $n = 46$	6
	Pre	Post	Difference	95% Confidence Interva
Mean Score	58.0	81.1	23.1	(21.5, 24.7)
Std Deviation	13 54	15 22		

The percent of correct answers on five of the knowledge questions improved by 28 or more percentage points. Knowledge of how long it takes a driver to stop a car when it is going at 20 miles per hour and at 40 miles per hour improved by 48.3 percentage points and 36.4 percentage points, respectively.

Car Safety Station: "In and Around Cars Safety Race"

Knowledge about how often to change a smoke alarm battery increased by 43 percentage points. In addition, large improvements were seen in the number of children knowing the age at which it is safe for them to move to the front seat of a car (increase of 28 points), and for knowing that drivers should walk around the car to check for small children or pets (increase of 39 points). Knowing to use a life jacket in open water (versus other flotation devices) and knowing which abilities would be affected by brain damage also improved moderately. Knowledge was already high at the beginning for "wearing a life jacket on a boat" (95.3 percent) and which type of gear to wear for wheeled sports (92 percent) and did not change significantly. Knowing when to test the battery in a smoke alarm also did not change significantly.



There were some limitations with the evaluation design. Three coalitions reported needing someone to read questions to students or explain a term on the questionnaire, and one coalition indicated that some Spanish-speaking children had difficulty comprehending the information in English. While the knowledge level improved from before the Games to right after the Games, a better measure of learning would be to give the children the questionnaire one month later to gauge knowledge retention. There was also no control group.

Additional Qualitative Information/Feedback

Coalitions rated the overall game and individual stations on engaging children's attention and teaching them. The scores were as follows (1= poor, 5=excellent):

There was variation across the six coalitions in which activities were best at engaging and teaching children, with all stations getting at least 2 or 3 mentions. Ideas for changing the overall game process included finding a way to make some stations last longer to allow for some activities to be inside and some outside (car, pedestrian), making all stations be very active for the children, and having a way to "win" (or get points) for each station. They also suggested listing important points on a big board or having classroom lessons a week in advance of the Games. Coalitions did several things to reach out to tweens or interact with them to make their activities more effective. These activities included giving incentives, having a teen guest speaker who had been injured, and having a helmet decorating activity. The time required to run the Gear Up Games was approximately 1 – 1 ¹/₄ hours, and 12-15 volunteers were sufficient to run the Games.

Conclusion

The Gear Up Games was effective in improving tweens' short-term knowledge of safety behaviors. The mean score of the participants on the questionnaire improved significantly from a score of 58 out of 100 points to 81.1, for a gain of 23.1 points (85% CI: 21.5 to 24.7). Five of the knowledge questions improved by 28 or more points, including the car stopping distances, how often to change the smoke alarm battery, and how to be safe in and around cars.

Safe Kids coalitions rated the overall game at 4.5 out of 5 points for engaging the students and 4.3 for teaching influence. The coalitions gave several ideas for improving the Games including how to manage rotating children around to the different stations when the stations take different amounts of time. Recommendations were also provided for each activity station. Based on the learning gains seen for this program, interactive safety games such as this one should be used to educate more tweens about how to be safe inside and outside of the home.

	Sample Size	Pre	Post	Change
	(n)			
t in open water - Life jacket	466	80% (76, 83)	96% (94, 97)	16%
on a boat - On your body	466	95% (93, 97)	96% (95, 98)	1% *
alarm batteries - Once/year	466	24% (20, 28)	67% (62, 71)	43%
rm batteries - Once/month	462	74% (70, 78)	81% (77, 84)	7% *
takes to stop - 47 feet	464	30% (26, 35)	78% (75, 82)	48%
takes to stop - 149 feet	466	10% (7, 13)	46% (42, 51)	36%
er needs to sit in the back seat of a car -	467	59% (55, 64)	87% (84, 90)	28%
or small kids/pets near the car - Walk around the car	464	40% (36, 45)	79% (75, 83)	39%
poarding, etc elbow and knee pads	468	92% (89, 94)	90% (87, 93)	(2%) *
d if you don't wear a helmet for wheeled sports -	466	76% (72, 80)	90% (88, 93)	14%

	Engagement	Teaching		
Overall Game	4.5	4.3		
Smoke Alarm Relay	4.5	4.3		
Protect Your Brain	4.7	4.5		
Give Me a Brake	3.5	4.0		
In a Boat, Stay Afloat	4.5	4.2		
In and Around Cars Race	e 4.3	4.0		