PHOTOVOICE: Reducing pedestrian injuries in children

Tracy Van Oss*, Danielle Quinn, Pauline Viscosi and Kristen Bretscher

Department of Occupational Therapy, School of Health Science, Quinnipiac University, Hamden, CT, USA

Received 25 March 2011
Accepted 30 September 2011

Abstract. Pedestrian injury is the second leading cause of injury related death for children. The purpose of this research project was to determine the effectiveness of pedestrian and road traffic safety education with children, as part of the Walk This Way program through Safe Kids USA. Through the implementation of PHOTOVOICE, a project that captured children’s narratives coinciding with a photograph, children engaged in community exploration to identify pedestrian hazards in their communities and explore possible solutions utilizing their photography and narrations. Children participated in an engaging educational session, a community fieldtrip, and reflection. Results concluded that, despite a small increase in post test scores, an increase in awareness of hazards in the community and successful identification of community hazards was achieved. The goal of this research project was determine the effectiveness of a hands-on pedestrian and road traffic safety educational program with children. The results of this research project will be integrated with similar projects completed across the country through the program Walk This Way with Safe Kids USA. Both this research project and the Walk This Way program aim to promote behavior change in children and create safer communities to reduce pedestrian related injury. The overall goal of this research project and the Walk This Way program is to increase education on a national level in regards to pedestrian safety for children and provide a basis for lobbying for public policy changes pertaining to road and pedestrian safety.

Keywords: Unintentional injury, community, safety, safe kids

1. Introduction

Preventative medicine is an innovative and useful method of implementing proactive healthcare. Pedestrian safety is one area of preventative medicine that is not always highlighted and discussed. As there is an increase in efforts for healthy lifestyles, including less vehicle transportation and more walking, there is also an increased risk of pedestrian accidents [5]. This increased risk has resulted in pedestrian accidents being one of the leading causes of pediatric death [1]. Though, not all pedestrian accidents result in death, an estimated 51,000 children are injured every year as pedestrians, and about 5,300 of those children are hospitalized [1]. In addition to the physical implications that occur secondary to the accident, there are also psychological impacts that must be addressed after an accident. Growing up in an environment that is not safe for a child to navigate and interact with severely limits the potential for play, leisure, and educational exploration [16]. To assist in the reduction of the increasingly alarming statistics, government action must be taken and education must occur for both the parent and child [1].

The effects of a pedestrian injury, particularly with a child can be life changing. According to Safe Kids USA, while most pedestrian accidents are not fatal, approximately 630 child pedestrian fatalities occur each year. This number does not include the 39,000 children that were involved in non-fatal accidents, only 6,000 of these accidents did not result in emergency room treatment. An additional 12 children, on average, are killed each year in a school-bus pedestrian accident [16]. Though the statistic vary between Safe...
Kids USA and the American Academy of Pediatrics, both point to an important and crucial concern; too many children are being killed or injured due to a very preventable cause.

Previous attempts to implement an educational curriculum to increase pedestrian safety have been successful, but it has not been fully determined which education methods are most effective in reducing pedestrian accidents. As children are becoming more engaged in interactive media (e.g. computer games, video game systems, and cell phones), multimedia education approaches have been shown to be effective educational techniques [2]. However, there is still question regarding the effectiveness of multimedia based education in communities that display a high risk of pedestrian accidents. While all communities could potentially benefit from an increase in pedestrian education and safety, it is best to target the children at greatest risk, such as those in low-income, urban, densely populated neighborhoods. Educating the children and their families is not sufficient, however. Local officials also need to be aware of environmental and the educational factors that increase pedestrian accident risk, otherwise limited change will occur [4].

2. Safe kids PHOTOVOICE project

A program called Safe Kids Walk This Way was developed in 2000 by Safe Kids Worldwide. This program works to reduce the incidence of child pedestrian deaths and non-fatal injuries. The goal of this program was to focus on the role of children’s attitudes, beliefs, and behaviors in response to pedestrian accidents. To meet these goals, Safe Kids Walk This Way works at the level of behavioral and environmental barriers. In the studies leading up the implementation of this program, Safe Kids Worldwide identified a number of environmental risks and behavioral factors that contributed to pediatric injuries and fatalities. The common factors associated with high risk included: crosswalks not located in residential neighborhoods, children frequently crossing the street at mid-block (not using crosswalks), and an absence of sidewalks. The program, Safe Kids Walk This Way, also determined that children can be divided into high and low risk categories, based on demographics [11]. Demographics that increase a child’s risk of being involved in a pedestrian accident include; race (black children have a two times higher rate of pedestrian accidents than white children), low socio-economic status, living in an urban area, and children of young-single parent families. Evidence from Safe Kids USA also supported the following qualitative findings; children report remaining aware of their surroundings while walking, parents teach their children to avoid strangers (resulting in an increased amount of street crossings to avoid strangers), and that children are knowledgeable about pedestrian behavior but environments do not elicit practice of those behaviors [11].

It appears that maximum effectiveness for increasing pedestrian safety for children will be gained by addressing both the behavioral and environmental factors. If these factors are not addressed together this will result in remaining risks for children [11].

3. The effectiveness of multimedia and simulated education programs

In the creation of an educational program for pediatric pedestrian safety, multiple approaches must be considered to result in an intervention that will truly reduce the incidence of accidents [3,6]. The educational programs must be tailored to the developmental milestones that the students are currently achieving including but not limited to, cognition, perception and motor abilities. In Byington et al. [6], it was shown that educational programs must be developed with the specific areas of concern for that targeted population. For pre-teens and teens, an educational emphasis would be on the effects using a cell phone while walking whereas, for younger children, the simple skill of crossing the street would be crucial in safety education [6].

In previous studies, evidence has supported that the use of multimedia technology and simulation, in the education of children, increases pedestrian safety more effectively than contemporary methods [2,14]. Renaud and Suissa [14] utilized three forms of contemporary multimedia interventions with one group of kindergarten students, while a control group received no intervention. The interventions were developmentally based, thus matching the children’s developmental abilities, and they used simulation based learning activities. In post intervention testing, the groups receiving intervention increased in overall appropriate acknowledgment and identification of pedestrian hazards. However, the control group showed significantly lower post testing scores. The research conducted in this study provides evidence to support creating an educational program that allows and encourages children to test, retest, and explore ideas about traffic behavior through the use of simulated multimedia activity [14]. Renaud...
and Suissa [14] compared no education intervention with a specific three-part intervention that allowed the children the experience of computer-based simulation activities. During the post-intervention evaluations, the group that did not undergo an educational intervention scored significantly less understanding of positive and safe pedestrian behaviors and actions [14].

The use of multimedia simulation was supported in Ary et al. [2], during training focused on three areas of safety concern including response to traffic signals, deciding if it is safe to cross, and identifying dangerous cars on the road. Using multimedia, post-testing showed an increase in critical thinking skills, a positive transfer of knowledge to the true environment, and an overall ability to generalize the lessons learned among participating children. Ary et al. [2] compared these results to different studies and concluded that children have the most improved pedestrian safety through an education system that incorporates interactive media and simulated environments. It was also emphasized that the increase in the child’s level of engagement and the amount of reinforcement attained appeared superior with computer programs and interactive media.

While studies have shown that multimedia and/or simulation education programs increase pedestrian safety in children [2,14], a study by Carusone et al. [17] resulted in an increase in post-intervention scoring through the use of less contemporary methods of education. In previous discussed studies, the less contemporary methods of education resulted in less significant (if any) educational change for the participants. This study used three non-computer based interventions in attempt to increase pedestrian safety, increase community awareness, and build community support for pedestrian safety intervention [17]. The three day educational curriculum was designed to be implemented with a child of a specific age and utilized in a specific environment, as discussed in the study Byington et al. [6]. The interventions were provided to a group of inner city youth, consisting of a less contemporary method of education including worksheets and discussions. Contrary to other studies, this non-virtual intervention resulted in an increase in safety, awareness of pedestrian safety by parents and students, and an increase in support from the community [17].

4. Environmental factors contributing to increased pedestrian risk

For many communities, the ability to evaluate and implement a program to enhance pediatric pedestrian safety is limited due to finances and limited support from the community leaders and members [4,10]. To assist schools in determining the need for pedestrian safety education programs, Diaz et al. [10] created a simplified evaluation to evaluate infrastructure that is inhibiting and/or promoting pedestrian safety in the school zone. This evaluation includes the basic characteristics of the school and the students (school setting, age of students), an evaluation of sidewalk and road conditions within the school zone, and observation of students walking to and from school. These aspects of the community were determined, by researchers, to be indicative of the risk of pedestrian accidents [10]. The results synthesized from this evaluation yield a priority list of communities that are in need of pedestrian education and infrastructure redesign [10].

Yet, even with such evaluations [10], the support from community officials and local community members to make changes is often lacking [4,10]. Bishai et al. [4] examined the concern and awareness that local government officials have in regards to child pedestrian safety in Baltimore, Maryland. The primary focus of the examination was to:

- Investigate the reasons for the increase in pedestrian accidents
- Increase awareness of pedestrian safety
- Advocate for environmental changes
- Investigate the need for an official process between the community and the local government to make changes.

Using interviews, the researchers concluded that local officials had little knowledge or cause to make environmental changes in the community, regarding pedestrian safety. A common thread among the government officials that responded was their belief that there was little interest within local community officials to make changes in pedestrian safety. Government officials respondents expressed the need for other aspects of community safety to be addressed before pedestrian safety, including education, violence, and drug use. Researchers concluded that local policy makers and government officials need sufficient information on pedestrian safety and creating safe environments for children to walk throughout their community, so they can make informed decisions [4].

Multiple studies have found a correlation between environmental factors and increased risk of pedestrian accident. As in the example of the evaluation presented previously [10], identifying environmental risks helps a community determine the need for intervention [4,
5.9]. Brett et al. [5] found a strong correlation between environmental factors and increased risk of pediatric pedestrian accidents including: downtown areas, busy neighborhoods, and prevalence of stores licensed to sell liquor [5]. As mentioned previously, Bashai et al. [4] found that the more urban a community, the more risk associated with being a pedestrian. Similar results were found by Dai and colleagues, who found that wider streets, two way streets, roads in good condition (drivers are more likely to drive faster), furniture zones (the space between the curb and the edge of the walkway), excess of visual stimuli (business and directional signs), and the absence of speed limit signs increase the risk of vehicle-related pedestrian accidents [9].

Children living in high density, urban, or low income areas are at higher risk for pedestrian injury or death. Those children living in a lower density area or are of higher income have a decreased risk of pedestrian injury [11]. Obviously, children are at a greater risk when their play occurs on streets or in driveways, parking lots, or sidewalks located adjacent to roads. Additionally, one fourth of all pediatric pedestrian accidents occur between the hours of 6:00 and 9:00 pm, when children are the most difficult to see due to lighting [16]. Although crossings should occur at intersections, more than 80% of all child pedestrian accidents occur at non-intersection areas of the road [16].

5. Significance to occupational therapy

The roles of occupational therapists (OTs) are continually expanding. No longer are OTs only seen in hospitals, rehabilitation centers or schools, they work in a variety of locations including research centers, industry, preventive medicine and wellness centers, and private practice. OT’s observe and evaluate their clients in a holistic manner, examining individual abilities and how clients function in the environments in which they live, work, and play.

All children are potentially at risk for being involved in a pedestrian accident, as they have yet to develop the full capabilities that an adult has to evaluate a risky situation. For example, a child may not have the ability to accurately judge the time or distance a car can travel, shift their attention, or moderate their behavior according to spatial cues [15]. However, there are other factors that put a child at risk for pedestrian accident, both behavioral and environmental [16]. Occupational therapists have extensive knowledge of developmental milestones and the process of skill development among children. The knowledge of a child’s physical and mental development is crucial in successfully identifying children who may be at higher risk and in the appropriate development of age- and ability-related curriculums.

While environmental factors greatly increase a child’s risk of being involved in a pedestrian accident, there are number of identified demographics that increase risk, that are not related to the physical environment. Children under the age of four years are at greater risk and account for four out of five accidents occurring in driveways. Parents of children who have been involved in a pedestrian accident are three times more likely to be young single parents and are less likely to practice preventive behaviors such as pedestrian education. Young males account for two thirds of all children’s pedestrian deaths and black children are twice as likely to be involved in a fatal pedestrian accident as white children [16]. Occupational therapists can work with concerned parents and community members to remove barriers that limit successful participation in daily activity and help create opportunities for all children in a community [8].

6. Social learning theory

The theoretical perspective incorporated into this project will be the social learning theory. The social learning theory was initially established by Rotter in 1954 and adapted by Bandura in 1977. According to this theory, the environment, one’s personality and behaviors are constantly interacting with each other. This theory explains that change occurs as a two way process; the environment and the person work to shape each other [13]. Bandura identified three basic models of observational learning as an important aspect of social learning theory. These three models represent the ways in which humans learn from observing and considering social situations.

- The live model involves observing other individuals complete an action and then replicating those observed behaviors or actions.
- A verbal instructional model involves descriptions and explanations of an expected behavior.
- The final model of observational learning is, a symbolic model, this involves real or fictional characters displaying behaviors in books, films, television programs, or online media [13].
Reinforcement is also a key aspect of this theory. According to Campbell [7], learning is enhanced through reinforcement. Reinforcement can occur in three ways. “Direct reinforcement is supplied directly to the person. Vicarious reinforcement involves the participant observing someone else being reinforced for behaving in an appropriate or inappropriate manner.” Finally, “reinforcement by self-management involves record-keeping by the participant of her/his own behavior” [7]. The idea is that when an individual acts or behaves in a particular manner, a specific change or action may occur.

Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences [12]. During health education, these concepts must combine to demonstrate an understanding of what the expected behavior is and how to successfully accomplish that behavior. As mentioned previously education and training should be written at the intellectual level of the individual receiving the training. If an appropriate education program is implemented, Bandura’s theory of self-efficacy will greatly affect the ability of one to change. One’s own perception of their ability to successfully complete a desired behavior can greatly enhance or inhibit their ability to make a change. Self-efficacy can be influenced through mastery of the task, observation of others completing the task, verbal persuasion, and the arousal of emotional state [13].

The ultimate goal of this project is to learn the ways in which the pedestrian’s environment influences their occupational and community participation by identifying the hazards or unsafe areas and using education and modeling to equip the individual with the appropriate behaviors and knowledge of pedestrian safety. Therefore allowing them to safely engage and participate in their community surroundings.

7. Case study

Grant money was secured by the coordinator of Safe Kids Greater New Haven in Connecticut to begin the PHOTVOICE project. Educational materials including a coordinator’s guide and digital cameras were provided to the grant recipients. Quinnipiac University occupational therapy graduate students were included in the efforts as part of a capstone group. The purpose of the capstone project at Quinnipiac University is for graduate occupational therapy students to participate in a research project that allows them to culminate their academic career and participate in an academic research process. The capstone group that conducted this research process was responsible for writing the literature review, collecting data, implementing the intervention, and then presented the data to peers.

An Institutional Review Board through Quinnipiac University reviewed the research project in January 2011. Contact was made with the local community group with access to children between the ages of 11–14 years of age, whom all live in an urban, low income community. Consent forms were distributed and collected prior to the start of the educational sessions. The capstone students met with the participants once a week for a total of three weeks. The first session included implementation of an educational session designed by Safe Kids Walk This Way and tailored to the target population. Included in the first session was a pre and post-test regarding participants’ knowledge of pedestrian safety. The second session included a field trip into the community to identify and photograph hazards as seen through the participant’s point of view. During the third and final session, the participants wrote reflections describing thoughts related to the photographs they had taken. Analysis of the data resulted in an increase in knowledge, an increase in awareness of hazards in the community as well as identification of community hazards. This information along with a behavioral survey and an observational research checklist was forwarded to the grant provider. Future plans include additional education and efforts for public policy changes pertaining to road and pedestrian safety by Safe Kids USA.

8. Conclusion

Pedestrian accidents are one of the leading causes of accident injuries in children, with considerable associated financial and societal costs [1]. The results of this research help to annotate the importance of community education and intervention programs. Through safe community development, risk assessment, and provision of targeted intervention programs by preventive medicine specialists, including Occupational Therapists, the risks of pedestrian accidents can be reduced, resulting in safer environments for children to play and explore.

References


Appendix

Safe Kids USA: Greater New Haven Participants’ photos and Narratives

Fig. 1. In both of these situation there is a car blocking the sidewalk. This exposes people especially children to critical danger. I advise that the government give a ticket to anyone of a vehicle that parks in the middle of a sidewalk. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 2. This picture shows a deep hole and a pipe that is out of the ground and someone can fall. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 3. These two pictures involve defamation of street signs. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)
Fig. 4. What I think is bad about this picture is that someone can fall and trip and get hurt. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 5. What I think is bad is that if someone was to turn the corner the guy could get real bad because there is no sidewalk to go on to go across the street in front. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 6. There were a lot of crack in the street. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 7. I saw a crack in the sidewalk and someone might trip. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 8. This is bad because a kid could be walking, trip and fall. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 9. What I think is bad about this picture is that a rock was in the middle of the sidewalk and someone could trip and it was blocking the sidewalk. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)
Fig. 10. This picture shows a snow bank blocking the side walk and view of the road. Someone can get hit by a car if they don’t see it coming. (Colours are visible in the online version of the article; dx.doi.org/10.3233/WOR-121495)

Fig. 11. There is ice and trash covering the sidewalks and drain. This can cause flooding. Someone could trip or slip on the ice. (Colours are visible in the online version of the article; dx.doi.org/10.3233/WOR-121495)

Fig. 12. This sidewalk is really skinny because of the snow and ice. There is little room for people to walk. (Colours are visible in the online version of the article; dx.doi.org/10.3233/WOR-121495)

Fig. 13. This is our group leader. She has to walk on the street because of the snow in front of her. (Colours are visible in the online version of the article; dx.doi.org/10.3233/WOR-121495)

Fig. 14. This picture shows a snow pile on the street corner. Cars can’t see and could hit each other or a person. (Colours are visible in the online version of the article; dx.doi.org/10.3233/WOR-121495)
Fig. 15. This car is driving fast in a school zone. Kids could get hit. This crosswalk is bumpy and broken. People might fall when crossing the street. The white lines are fading. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 16. This is a crack in the sidewalk. It is dangerous because someone could stub their foot and trip and fall. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 17. This caution light to slow down. Cars were speeding past this speed limit sign. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495).

Fig. 18. This street sign post is rusty, crooked, and bent. Someone could get cut or fall. The sign may not be facing the right way. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 19. This is a open wire on a telephone pole. This is dangerous because someone can get electrocuted or shocked. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)
Fig. 20. This is graffiti on the sign. People can’t see what the sign says. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 21. These branches are hanging on the wire making the wires really low. Someone could hit them and get electrocuted. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 22. This is graffiti, when I see it, it makes me feel like bad people are close. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495).

Fig. 23. This graffiti makes me think that I should not be alone in this area. Makes me feel ashamed to live here. It looks dirty. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)

Fig. 24. This is ice on the sidewalk. Someone can walk over it, slip and fall and hit their head badly. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/WOR-121495)
Copyright of Work is the property of IOS Press and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder’s express written permission. However, users may print, download, or email articles for individual use.