



Safe Kids Austin Bike Safety Position Statement

Safe Kids Austin supports efforts to develop, maintain, and strengthen childhood bike safety initiatives.

Bike safety comprises educational and hands-on interventions, implementation and enforcement of policies and legislation, and environmental design and infrastructure. Effective bike safety efforts decrease the number of fatal and nonfatal injuries in both children and adults.

Background

According to the Centers for Disease Control and Prevention (CDC), children, teens, and young adults (ages 5-24) have the highest rates of nonfatal bicycle-related injuries, comprising over one-third of all bicycle-related injuries treated in U.S. emergency departments (CDC, 2016). In 2014, 726 bicyclists died and 48,000 bicyclists were injured in traffic crashes nationwide. Of all bicycle-related traffic injuries in 2013, children 14 and younger represented 7% of fatalities and 11% of injuries (NHTSA, 2016). In Central Texas, 166 children were admitted to Dell Children's Medical Center (DCMC) for bicycle-related injuries between 2013 and 2015 (DCMC Trauma Registry, 2016).

Main Factors that Impact Fatal and Nonfatal Bike Injuries Among Children:

- **Characteristics of Children.** Children are less visible than adults due to their small stature and, if hit by a vehicle, children are more likely than an adult to sustain a head or neck injury. Small children have difficulty seeing over vehicles, judging the speed of oncoming vehicles, and discerning the distance of a vehicle from its sound. Additionally, physical and cognitive skills in children are not fully developed meaning they may not have the balance, reason, or concentration to successfully navigate certain environments. (WHO, 2008).
- **Poor Lighting and Visibility of Bicyclists.** A common contributing factor for injuries among bicyclists in the roadway is the failure of the driver to notice the bicyclist, particularly at night. Bicycles are more difficult for many motorists to notice compared to other larger vehicles (Goodwin, Thomas, Kirley, Hall, O'Brien, & Hill, 2015). Street lighting and front and rear lights on a bicycle help increase visibility.
- **Unfavorable Bicycling Environments.** An unfavorable bicycling environment, such as unmarked on-road bike lanes, lack of protected bike lanes, lack of off-road bike paths, and high vehicle speed limits, may be the largest determinant for bike-related injuries. Intersections, particular intersections with unusual configurations, pose substantial risk for pedestrians and cyclists due

to the presence of cars turning in multiple directions (Wang & Nihan, 2004; Asgarzadeh, 2016). In a study of nonfatal bike-related injuries treated in emergency rooms in the U.S., children aged 5 to 14 had the highest rate of injury, although their injuries were more likely to occur off the street. Among older cyclists (over age 14), the majority (70%) were injured while biking on the street. Across all ages, 56% of injuries occurred when biking on the street and, of these injuries, nearly all (99.7%) were related to a motor vehicle crash (Chen, 2013). Improving road infrastructure and traffic safety is likely to reduce injury risk overall more substantially than any behavior or knowledge changes from educational interventions (Richmond, Stover, & Zhang, 2013).

- **Low Usage of Bike Helmets and Incorrect Helmet Fitting.** Helmet use reduces the risk of head injury by up to 88% and facial injuries by up to 65% for cyclists of all ages (Richmond et al., 2013). Proper helmet use, which includes correct fit and positioning, is a key principle to include in bicycle safety education. Children and adults often wear a helmet improperly by having it positioned too far back on their head, exposing their forehead, and/or having a loose chinstrap. Poor helmet fit can put a child at twice the risk of head injury if he or she is involved in a bicycle-related crash as compared to a child whose helmet is properly fitted (McLaughlin & Glang, 2010). Of the 54 children who were killed in a biking-related traffic crash in the US in 2014, the majority (70%) were not wearing a helmet (NHTSA, 2016).

Research has found that bike-related injuries can be prevented through a comprehensive approach.

Interventions to prevent unintentional injuries are often considered in terms of the “three E’s” of education, enforcement and engineering and within the framework of the Haddon Matrix (WHO, 2008). The Haddon Matrix is a tool designed to assist in understanding the origins of injury problems and identifying multiple ways to prevent or reduce harm from injuries. As a conceptual model, the Haddon Matrix has helped guide research and the development of injury prevention interventions by examining factors before, during, and after an injury event (Runyan, 2015). Vision Zero, a road safety project that aims to reduce traffic-related deaths and serious injuries to zero, recommends the utilization of the “three E’s” within the Haddon matrix as an effective approach to preventing unintentional injuries (Vision Zero Task Force, 2016). Programs to improve the safety, knowledge, and behavior of children and adolescent cyclists, particularly focusing on helmet use, should be part of a comprehensive approach that encompasses education, legislative, and environmental changes as well (Boufous, Rome, & Senserrick, 2011). Ways to utilize the “three E’s” within the Haddon framework in relation to child bike safety is discussed below.

- **Engineering:** A systematic review reported that purpose-built bicycle only paths, such as protected bike lanes and off-road bike paths, reduce crashes and injuries among cyclists (Reynolds, Harris, Teschke, Cipton, & Winters, 2009). Other engineering design strategies that have been shown to reduce bike crashes include lower speed limits, traditional stops versus traffic circles at intersections, intersections with right angles versus oddly shaped intersections, street lighting, and paved surfaces (Reynolds et al., 2009; Asgarzadeh, 2016). Many organizations, such as Vision Zero, have researched and proposed various “complete street” designs with specific engineering design elements to increase safety for all road users.

- **Enforcement:** A systematic review found legislation on bicycle helmets to be effective in increasing helmet use, particularly among the younger age group and in areas with previous low rates of use, and in reducing head injuries (WHO, 2008). In a comparison of bicycle-related deaths across states, states with mandatory bicycle helmet laws had lower incidence of fatalities among child cyclists involved in bike-motor vehicle crashes (Meehan, Lee, Fischer, & Mannix, 2013). In one city, the mortality rate per year decreased by 52% among cyclists ages 1 to 15 after the institution of a mandatory helmet law (Wesson, Stephens, Lam, Parsons, Spence, & Parkin, 2008). Additionally, enforcement of traffic laws among motorists, such as enforcing speed limits, yielding the right-of-way, etc., can decrease traffic collisions and increase safety for cyclists (Goodwin, 2015)
- **Education:** Bicycle safety education serves to increase children's knowledge and awareness of the importance of consistently wearing helmets, the correct use of helmets and other bicycle safety equipment, and the ability to discriminate hazards and understand rules of the road. A bike safety education program's effectiveness is determined by whether children adopt safer behaviors and integrate them into their bicycle riding once they have completed the program (Spinks, Turner, McClure, Acton, & Nixon, 2005). Bicycle safety education is an important preliminary component to improve bicycle safety behaviors and prevent injuries. According to the Health Belief Model, modifying factors, such as knowledge, influence health perceptions and beliefs which then lead to behavior change. Unfortunately, there are a limited number of bicycle safety education programs to date that have been evaluated and shown to be effective at creating behavior change. Additional research is needed to evaluate and strengthen bicycle safety education programs to ensure changes in knowledge and attitudes will lead to behavioral changes that will improve biking safety (Carlin, Taylor, & Nolan, 1998).

Safe Kids Austin Position:

Based on the existing research and evidence, Safe Kids Austin maintains the position that child fatal and nonfatal bike injuries are preventable by the following means: improving environmental design and infrastructure of roads to increase safety for bicyclists; implementing and enforcing policies and legislation to increase the use of bike helmets and increase traffic safety; and implementing bike safety interventions that increase awareness and knowledge, lead to behavior change, and improve bike riding skills.

Best Practices Supported by Safe Kids Austin:

- Implement and evaluate child bike safety interventions for children that impact knowledge, awareness, behavior, and skills. The interventions should increase knowledge and awareness (i.e. the importance of wearing a bike helmet, proper bike helmet fitting and positioning, traffic safety, navigating roads, etc.) and lead to behavior change and improved riding skills. Educational and skills training bicycling programs, such as bike rodeos, increase knowledge of cycling safety but often do not translate into a decrease in injury rate or improved bicycle handling ability (Macarthur, Parkin, Sidky, & Wallace, 1998).

- Bike safety interventions should include parental involvement and education. Activities aimed at both the children and their parents are likely to yield the best result (Berg & Westerling, 2001). For example, studies show that an important element of interventions would be to motivate parents to encourage their children to use helmets. The National Highway Traffic Safety Administration recommends that young children should ride supervised until they are at least 10 years old and are able to ride in a straight line, swerve to avoid hazards in the roadway, comfortably start and stop their bicycles, and maintain balance at slow speeds. Interventions to help parents teach their children to ride safely and to assess their child's biking ability may help them to follow these recommendations and reduce their child's risk of injury.
- Bike safety interventions should include the promotion of bicycle lights and reflectors. Bike lights and reflectors will improve visibility and allow motorists see and avoid collisions with bicyclists (Goodwin, 2015). This solution is especially important for child bicyclists, who are already at higher risk of injury because of their smaller stature compared to adults. In Texas, bicyclists are required by law to have a white light on the front and a red reflector or red light on the rear of the bike when riding at night.
- Increase the use of bike helmets among children by supporting enactment and enforcement of legislation that requires children to wear bike helmets while biking.
- Improve road safety by designing roads and routes that are safer for cyclists, decreasing vehicle speed limits on roads, and installing protected on-road bike routes and off-road bike paths.
- Increase enforcement of traffic safety laws to improve safety for all road users.

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