



# Child Pedestrian Safety

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The field of pedestrian safety has advanced with new evidence related to pediatric pedestrian education, the risks of distracted walking, the benefits of design and programming in safe routes to school, and the emergence of the “Vision Zero” strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, equitable mobility for all.

This statement is a revision of the 2009 American Academy of Pediatrics policy statement “Pedestrian Safety” and is accompanied by a technical report ([www.pediatrics.org/cgi/doi/10.1542/peds.2023-062508](http://www.pediatrics.org/cgi/doi/10.1542/peds.2023-062508)) providing additional detail to support recommendations. This statement is intended to assist practicing pediatricians to offer evidence-based advice to families about the benefits of active transportation and the specific risks and safety precautions to consider for child pedestrians at different ages. For community pediatricians and the American Academy of Pediatrics, the statement provides an overview of specific programs and policies that, if implemented, could foster independent mobility for children while increasing pediatric pedestrian safety. This statement identifies trends in public health and urban design relevant to pedestrian safety.

## INTRODUCTION

At some point in the day, almost everyone is a pedestrian, whether walking independently or with the support of an assistive device. Walking is the most fundamental mode of human transport and is a part of every trip, even those completed by driving or on public transit. Although pedestrian deaths decreased consistently over most of the last 30 years, child pedestrian mortality rates have shown an increase of 11% since 2013, driven by increases among 10- to 14-year-olds and 15- to 19-year-olds.<sup>1</sup> Fatality data suggest that evenings (from 6:00–9:00 PM) are the riskiest times of day for child pedestrians. Sixty-four percent of deaths occur in daylight hours or at dusk,<sup>2</sup> and most (62%) child pedestrian traffic fatalities occurred mid-block, rather than at intersections.<sup>2</sup>

The burden of pedestrian injuries differentially impacts certain populations. As with most mechanisms, males are more likely to be injured as pedestrians.<sup>3</sup> The risk of child pedestrian death is greater in rural (0.85 per 100 000) than urban (0.66 per 100 000) areas.<sup>3</sup> Children with

## abstract

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disabilities are also at disproportionate risk.<sup>4</sup> People who use wheelchairs experience a well-documented pedestrian mortality disparity.<sup>5</sup> Preschool-aged children have a higher pedestrian death rate (typically from nontraffic incidents in driveways or parking lots) than do school-aged children. Rates climb again in the teen years when more children become independently mobile as pedestrians. The rate of death of Black and American Indian pedestrians younger than 19 years is 1.8 times that of white children, whereas the risk to Hispanic children is 1.2 times the risk to non-Hispanic children.<sup>3</sup> Factors underlying these inequities include the pervasive impacts of poverty, economic disparities in access to public transportation, individual and systemic racism, and disparities in the investment of transportation safety measures, such as sidewalks, to separate pedestrians from vehicles.<sup>6,7</sup> Low-income areas often have interrupted sidewalk networks and larger roads with a higher traffic burden, which both increase the likelihood of traffic conflicts between pedestrians and vehicles.<sup>8</sup>

Active transport to school—walking or riding a bicycle—is an appealing public health strategy for promoting physical activity and reducing pediatric obesity.<sup>9</sup> However, the safety of commuting to school on foot is integrally related to measures that separate walkers from vehicles and slow vehicle speeds. Compared with automobile passengers, child pedestrians experience double the risk of injury or fatality, whether measured per trip or per mile traveled.<sup>10</sup> Because children from lower socioeconomic backgrounds are more likely to travel as pedestrians, these disparities in risk and exposure contribute to inequities in health outcomes.<sup>11,12</sup> Targeted public health interventions aim to make walking safer, not to discourage pedestrian activity.

Child pedestrian safety can be characterized on a spectrum from active programs designed to educate or train individuals to change their behavior, to passive interventions that increase the safety of products or environments in a manner that impacts all users.<sup>13</sup> These passive interventions tend to be more costly and difficult to implement but are also more likely to result in real and sustained reductions in injury incidence.<sup>14</sup>

Road environments should safely accommodate the needs of all users. Although streets were used for all manner of social activity until the advent of the automobile, the early 20th century saw a cultural change wherein roads were viewed as solely for the rapid conveyance of motorized traffic.<sup>15</sup> This perspective was actively encouraged by campaigns that characterized pedestrian injury as the result of irresponsible individual behavior.<sup>16</sup> This focus on the behavior of the victim obscures the fact that speed, technology, and road design create the context in which these injuries occur. Planning and policy can be used to make the streets safer for all users, regardless of age or ability. This includes traffic-calming measures, increasing walkability through changes in the built environment, urban planning with the pedestrian in mind, and legislative advocacy for pedestrian-friendly policies.

Complete Streets policies promote the development and use of roadways with all forms of transportation and people in mind, including motor vehicles, pedestrians, bicyclists, and others.<sup>17</sup> These policies are most effective when implemented in conjunction with land use development with all forms of transportation in mind, and education, enforcement, and technology use. This type of coordination requires a multidisciplinary effort including policy makers, city planners, architects, and developers.<sup>18</sup>

“Vision Zero” is another effort focused on the reduction of traffic fatalities and severe injuries. Vision Zero is built on the premise that traffic injuries are a public health problem in which human error is assumed and accepted, and solutions are created with that assumption at the foundation.<sup>19</sup> This effort has shifted the focus away from individual behavior and toward systemwide change created with human error in mind. After implementation of Vision Zero policies in Sweden, there was a 50% reduction in pedestrian fatalities.<sup>20</sup> In the United States, as of 2016, there were over 30 cities in which Vision Zero was being implemented.<sup>19</sup>

Modifications in automobile product design are integral components of many injury-prevention campaigns. Design features to reduce severity of pedestrian injuries include soft bumpers, an active hood mechanism to provide a more forgiving crumple-zone, and pedestrian airbags to protect from impacts on the windshield or frame.<sup>21</sup> Technological improvements in vehicle function include pedestrian crash avoidance and automatic braking systems, seen by many as steps toward fully autonomous vehicles (AV). As this technology advances, the ability of AVs to detect and avoid pedestrians has been one source of concern. AVs depend on prediction software, cameras, and a collection of sensors to detect the environment (including pedestrians).<sup>22</sup> Child pedestrians are smaller and less predictable in their roadside behavior and may not be well served by algorithms that are adequate for adults.<sup>23</sup> Thus, although AVs have the potential to decrease pedestrian crash risk, the technology may intensify age-related disparities by primarily reducing crashes with adults.<sup>24,25</sup>

Although changes in policy, planning, and the built environment have the greatest potential to improve pedestrian safety, many of the most promoted strategies to address pedestrian risk focus on individual-level interventions to improve the skills or behavior of child pedestrians, their adult guardians, or the drivers with whom they interact.

Pedestrian and driver distraction are two factors that increase the risk of a pedestrian being struck. Almost 500 000 people drive daily while using cell phones<sup>26</sup> and up to 14% of those injured by distracted drivers are pedestrians.<sup>27</sup> Pedestrians can also be distracted.<sup>28,29</sup> Observational data show that, when using smartphones and other devices, both children and adults are less likely to follow basic safety measures when crossing the street.<sup>30–32</sup>

Although there are promising educational techniques for improving the skills needed to navigate roadways and intersections, these require careful attention to implementation and will not, alone, ensure the safety of child pedestrians.<sup>33,34</sup> The literature does suggest that pedestrian safety hinges on skills that can be actively learned and that, at some point, can reliably be taught. However, the abilities and developmental level of the individual child are important, and it is unlikely that most children can be taught to safely navigate diverse traffic environments earlier than 10 years of age.<sup>35</sup>

## RECOMMENDATIONS

To reduce pediatric morbidity and mortality from pedestrian injury and promote walking and increased physical activity, the American Academy of Pediatrics recommends the following:

1. **Legislative advocacy:** to address environmental and urban design factors that impact pedestrian safety. Pediatricians can work with local, state, or federal lawmakers to do the following:
  - a. Encourage support for Complete Streets policies and the Vision Zero strategy.
  - b. Support legislation to reduce speed limits in urban areas, including areawide 20 mph zones, and to permit photo speed limit enforcement in critical areas, including school zones.
  - c. Develop legislation to encourage or require adoption of safety technology, such as pedestrian detection systems and automatic braking in new vehicles.
  - d. Advocate for the unique needs of child pedestrians as algorithms and technologies to control autonomous vehicles are developed.
2. **Advocacy:** As community experts in child and adolescent health, pediatricians can do the following, placing special priority on high-risk communities and minority populations:
  - a. Lobby for safer and healthier pedestrian environments through engineering and design approaches in the local community.
  - b. Support, or introduce and promote, community-level Vision Zero interventions.
  - c. Support, or introduce and promote, Safe Routes to School interventions.
  - d. Promote safe and active transport, including walking, as an alternative to motorized conveyance, to reduce vehicular traffic and increase demand for pedestrian amenities.
  - e. Advocate for pedestrian infrastructure when communities consider how to repurpose urban space and roadway lanes that are freed up by a reduced demand for parking as autonomous vehicles become more prevalent.
  - f. Lobby for areawide 20 mph zones in residential or commercial districts to reduce pedestrian injury risk and improve walkability.

- g. Support research to further understand and test interventions for pedestrian education for children and their caregivers.
  - h. Support the development of more robust surveillance systems to collect exposure data for pediatric pedestrians and identify high-risk locations for pediatric pedestrian injury.
3. **Anticipatory guidance:** Although legislative and community advocacy, as discussed above, have the most potential to make a significant impact on pedestrian safety as a public health problem, it is important for pediatricians to also provide individual guidance to families. Important pedestrian safety-centered anticipatory guidance for children and their parents includes the following:
- a. Remind parents of the complexity of the traffic environment and the unique vulnerability of child pedestrians exposed to tasks that exceed their cognitive, perceptual, and behavioral abilities.
  - b. Advise parents of young children that driveways and adjacent, unfenced yards are unsafe play areas, because small children may not be seen by drivers in backing vehicles.
  - c. Recommend adult accompaniment, with ongoing, active instruction on pedestrian safety, for most child pedestrians younger than 10 years of age, in most environments. Depending on their developmental level, older children may be granted more independence. When they are granted more independence, it should be given on protected routes with signalized crossings in low-traffic environments.
  - d. Encourage parents of children with limited mobility or other disabilities to invest extra time in helping their child to acquire pedestrian skills. This might include selection of routes with low barriers to mobility, interventions to increase pedestrian visibility, instruction on use of audible pedestrian signals, and white-cane skills for children with visual impairment.
  - e. Counsel patients of all ages about the risk of distracted walking, including text messaging, talking on or looking at the mobile phone, and listening to music.

## CONCLUSIONS

Walking is the basic mode of human locomotion and, for children, the primary source of independent mobility. Active transport is associated with a host of physical and mental health benefits. However, when pedestrians share the roadway with vehicular traffic, they face real risk of injury or death. Child pedestrian mortality decreased for the last 3 decades but has shown an upward trend in recent years, with disproportionate impact on low-income and underrepresented ethnic communities.

The most important interventions to address pedestrian safety involve urban planning and street design to safely accommodate all users. The Vision Zero initiative assumes that a target of no pedestrian fatalities or serious injuries is

realistic with appropriate design and infrastructure investment. The development of autonomous vehicles presents urgent new opportunities to enhance child pedestrian safety. And although environmental modifications should have top priority, there is also a need for continued innovation and rigorous testing of educational interventions to help parents and communities safely train young pedestrians.

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### ABBREVIATION

AV: autonomous vehicles

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