

Traffic calming and childhood injury on the road

Key messages

- Child pedestrian injury arising from road accidents is a leading cause of accidental death.
- Children in poor neighbourhoods are five times more likely to be injured by a car than those in affluent areas.
- Area-wide traffic calming is designed to control traffic in urban residential areas and has been shown to be effective in reducing child accidents.
- Introducing an area-wide traffic-calming scheme is likely to be an effective measure in reducing inequalities in child health.

Introduction

Traffic calming refers to interventions designed to control traffic speed. It is most often implemented in urban areas and can be used to reduce the number of car-borne commuters using residential streets and the speed of the remaining traffic. An area-wide scheme will implement several changes to traffic across a neighbourhood. It can involve improving main road capacity to carry additional traffic, restricting or removing traffic from residential streets by closing roads (traffic restraint), putting in speed humps, roundabouts and chicanes, or introducing one-way systems.

Home zone initiatives, which promote social uses of the street space, are becoming increasingly popular in the UK, drawing on experiences from mainland Europe. These schemes include traffic calming, but go one step further by changing the function of the street, prioritising the needs of pedestrians and cyclists over motor vehicles. A home zones initiative may include the introduction of seating, play areas and increased vegetation, as well as traffic calming, to slow down traffic and make a more social space.^{1,2}

Why is traffic calming important?

Child pedestrian injury arising from road accidents is the leading cause of child accidental death in the UK.^{3,4} In 2001, 132 child pedestrians/cyclists under the age of 16 were killed on British roads, 3,818 were seriously injured and 17,322 suffered less severe injuries such as cuts and bruises.⁵ These figures are reported from data collected by the police, but studies suggest they may be an underestimate.⁶ Children make up 37 per cent of all pedestrian casualties and 41 per cent of those in urban areas. Twice as many children die from road traffic accidents in the UK than on average in Europe.^{2,4}

The number of children injured and killed as pedestrians has fallen over the last 20 years.⁷ One reason for this is that fewer children walk, as they are taken to school and elsewhere by car.⁸⁻¹¹ Increased car use is detrimental to children's physical development, increases pollution and the risk to children who do walk or cycle. Research indicates that traffic calming schemes may help increase the number of pedestrians and cyclists.^{12,13} A city-wide speed management programme in Gloucester, which included traffic calming, found that at the end of the five-year intervention the number of parents who said that they let their children go to school on their own had risen from 32 per cent in 1996 to 49 per cent in 2000.¹⁴

Social deprivation is strongly associated with child pedestrian injuries.¹⁵ Children from social class V are five times more likely to be killed in a road traffic accident than children from social class I. Families with fewer resources tend to live in more dangerous housing and road environments, have fewer safe places to play, and go out on foot more often than children from wealthier homes.^{9,16,17}

Benefits of traffic calming

Children themselves identify outdoor safety as important.^{18,19} A report by the Children's Play Council found that 'general fears for personal safety' and 'traffic' were some of the things that stop children from playing outdoors.²⁰ When asked how outdoor play space could be improved one child said: 'No cars in my street so that I can play outside'.²⁰

The faster the traffic, the greater the risk of death and serious injury.² When hit by a car travelling at 40 miles per hour (mph) only one child in 20 will survive.

When the car is travelling at 20 mph 19 children out of 20 will survive.²¹ The risk of injury increases with traffic volume, absence of play areas, poorly-protected play areas, and high levels of kerbside parking.^{21,22} Research has shown that each one mph reduction in average speed will cut accident rates by 3 to 6 per cent on urban roads, depending on the existing speed and type of road.²

Two systematic reviews of traffic calming research have found that urban traffic calming schemes can significantly reduce traffic injuries.^{23,24} In these reviews the evidence was assessed according to how well designed each study was. The magnitude of the safety effects was similar in different countries and traffic calming was found to have a positive impact on levels of fatal accidents, injuries, road traffic crashes and pedestrian-motor vehicle collisions.^{23,24}

Changes in accident rates can be caused by things other than traffic calming (for example, a campaign encouraging people to cycle to work). The best quality studies, therefore, compare one area with traffic calming to another similar area without. One of the reviews estimated that traffic calming reduced the number of injury accidents by 15 per cent (25 per cent on residential streets and 10 per cent on main roads).²⁴ This estimate includes some before and after studies (without a comparison area). A review excluding these types of studies indicates that the effect from traffic calming is weaker, but still statistically significant.²³

The studies in these reviews looked at traffic calming in predominantly urban and residential areas, close to business centres. These areas tend to have high road accident rates.²⁵ An area-wide approach has been found to be more effective in reducing the number of accidents than has the more traditional accident trouble-spot focus.²⁴ The traffic calming measures applied were:

- redistribution of the traffic or reclassification of the road network, for example introducing one or two-way streets, alteration to road hierarchy or blocking of roads
- changes to the road environment such as introduction of street furniture or increased vegetation along the road
- vertical and horizontal shifts in traffic such as road humps, speed cushions and raised crosswalks
- optical changes such as road signs, road surface treatment and alterations to road lighting.

Findings from 200 20 mph zones in the UK indicate that traffic calming schemes have the potential to be even more effective. When comparing data before and after implementation, accident frequency was found to drop by about 60 per cent annually. Child pedestrian accidents fell by as much as 70 per cent and child cyclist accidents by 48 per cent. The most common type of measure used by these schemes were humps, either round-top or flat-top.²⁶

Traffic calming has been compared with another popular intervention – road safety education. While the effectiveness on reducing pedestrian injuries from traffic calming has been shown, the beneficial effects on injury reduction from education programmes are less clear.²⁷⁻²⁹

Cost-benefits of traffic calming

Road accidents have been estimated to cost Britain over £16,000 million a year.³⁰ Traffic calming measures are likely to have economic benefits in the longer term, both in relation to health and to the environment.³¹ A review of speed-limit interventions has reported that stricter enforcement, paired with conversion of junctions into roundabouts, reduces accidents and saves time for drivers, pedestrians and cyclists.³² A New Zealand study found that 18 pedestrian

hospitalisations a year (in a child population of approximately 800,000) could be prevented if the annual budget for traffic safety education was allocated to traffic calming.³³ An economic evaluation of area-wide traffic calming schemes in England and Wales found that the schemes had the potential to reduce the overall number of accidents by 17,734 accidents a year. This equalled a gross annual saving of £357,279,509.³⁴

The cost-effectiveness of area-wide traffic calming schemes and single interventions (for example, speed humps) depends on the speed limit, the amount of traffic in the area, the inclusion of other speed-reducing initiatives and the relationship between accident-related costs and the costs of setting up a scheme.³⁵

Examples of direct costs for implementing traffic calming (an additional 15 per cent needs to be added for detailed design and site supervision) and information on regulations are available.³⁶ Once up and running little maintenance is required for the first 10 years.³⁴

Implementing traffic calming

For traffic calming to be effective, attention needs to be given to intervention design. For example, the space between speed humps needs to be such as to prevent drivers from accelerating between them. A UK research study has recommended that the distance between humps should be shorter than 100 metres²⁶ while a European-wide programme has suggested no more than 70 metres.³⁵ When a speed limit is reduced, signs are needed to warn drivers of the change and the road may need some alteration.^{27,37}

The Department for Transport has announced funding of up to £20,000 for organisations, excluding local authorities, to spend on road safety priorities as set out in its road safety strategy (www.dft.gov.uk/roadsafety).

Conclusion

By slowing down traffic, traffic calming schemes can reduce child injuries from road accidents. The schemes reduce the severity of injury in the event of a collision and make it easier for drivers to avoid accidents. Since poorer children are more likely to be injured in a road traffic accident, this is an intervention with the potential to reduce inequalities in child health.

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Further information

www.homezonenews.org.uk Home zones

www.rosipa.co.uk Royal Society for the Prevention of Accidents

www.dft.gov.uk Department for Transport

www.roadpeace.org RoadPeace, a charity working for victims of road crash accidents.

www.capt.org.uk Child Accident Prevention Trust

www.slower-speeds.org.uk The Slower Speeds Initiative campaigns for lower and better-enforced speed limits.

<http://depts.washington.edu/hiprc/practices/topic/pedestrians> evidence on traffic calming.

www.quiet-roads.gov.uk Countryside Agency initiative.

This Highlight has been produced from What Works for Children? evidence nugget on traffic calming, which is a longer, more detailed document, available at www.whatworksforchildren.org.uk

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References

1. www.homezonenews.org.uk
2. Department for Transport (2000) *New Directions in Speed Management: A review of policy*. Department for Transport www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_504682.hcsp
3. Roberts, H (2002) *What Works in Reducing Inequalities in Child Health?* Barnardo's

4. Traffic and Children Coalition (2002) *Inquiry: Road traffic speed. Submission from the Traffic and Children Coalition*
5. Department for Transport (2001) *Transport Statistics Great Britain: 2002*. TSO
6. Simpson, H (1996) *Comparison of Hospital and Police Casualty Data: National study*. (TRL 173). Transport Research Laboratory
7. Department for Transport (2004) *Tomorrow's Roads: Safer for Everyone. The First Three Year Review*. DfT
8. Mackett, R L (2001) *Reducing Children's Car Use: The health and potential car dependency impacts. Are we making our children car dependent?* University College London, Centre for Transport Studies
9. Hillman, M, Adams, J and Whitelegg, J (1990) *One False Move... A study of children's independent mobility*. Policy Studies Institute
10. DiGiuseppi, C and others (1998) 'Determinants of car travel on daily journeys to school: cross sectional survey of primary school children', *British Medical Journal*, 316, 7142, 1426-8
11. Coupland, C, and others (2003) 'Severe traffic injuries to children, Trent 1992-7: time trend analysis', *British Medical Journal*, 327, 593-4
12. Traffic Advisory Unit (2001) *Urban Street Activity in 20 mph Zones - Seedley, Salford*. Department of the Environment, Transport and the Regions
13. Gärder, P, Leden, L and Pulkkinen, U (1998) 'Measuring the safety effect of raised bicycle crossings using a new research methodology', *Transportation Research Record*, 1636, 64-70
14. Department for Transport (2000) *Report on the Gloucester Safer City Project*. DfT
15. Wazana, A and others (1997) 'A review of risk factors for child pedestrian injuries: are they modifiable?', *Injury Prevention*, 3, 4, 295-304
16. Roberts, I and Power, C (1996) 'Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991', *British Medical Journal*, 313, 7060, 784-6
17. Roberts, I, Norton, R and Tava, B (1996) 'Child pedestrian injury rates: the importance of 'exposure to risk' relating to socioeconomic and ethnic differences, in Auckland, New Zealand', *Journal of Epidemiology & Community Health*, 50, 2, 162-5
18. Children and Young People's Unit (2002) *Have Your Say Consultation*. CYPU
19. Office of the Children's Rights Commissioner for London (2001) *Sort It Out! Children and young people's ideas for building a better London*. Office of the Children's Rights Commissioner for London
20. Cole-Hamilton, I (2002) *Something Good and Fun: Children's and parents' views on play and out-of-school provision*. Children's Play Council
21. Child Accident Prevention Trust (2003) *Child Road Accidents (fact sheet)*.
22. Roberts, I (1995) 'Adult accompaniment and the risk of pedestrian injury on the school-home journey', *Injury Prevention*, 1, 4, 238-44
23. Bunn, F and others (2004) 'Area-wide traffic calming for preventing traffic related injuries (Cochrane Review)', *The Cochrane Library*, 1
24. Elvik, R (2001) 'Area-wide urban traffic calming schemes: a meta-analysis of safety effects', *Accident Analysis and Prevention*, 33, 3, 327-36
25. OECD Road Research Group (1979) *Traffic Safety in Residential Areas*. OECD
26. Webster, D C and Mackie, A M (1996) *Review of Traffic Calming Schemes in 20 mph Zones*. (TRL 215). Transport Research Laboratory
27. University of Leeds, Nuffield Institute for Health and University of York, NHS Centre for Reviews and Dissemination (1996) 'Preventing unintentional injuries in children and young adolescents', *Effective Health Care Bulletin*, 2, 5, 1-16
28. Towner, E and others (2001) *What Works in Preventing Unintentional Injuries in Children and Young Adolescents?* Health Development Agency
29. Duperrex, O, Bunn, F and Roberts, I (2002) 'Safety education of pedestrians for injury prevention', *British Medical Journal*, 324, 7346, 1129-31
30. Royal Society for the Prevention of Accidents (2002) *Road Safety Project sheet*. ROSPA
31. Slower Speeds Initiative (2001) *Killing Speed: A good practice guide to speed management*. www.slower-speeds.org.uk
32. Plowden, S and Hillman, M (1996) *Speed Control and Transport Policy*. Policy Studies Institute
33. Roberts, I and others (1994) 'Preventing child pedestrian injury: pedestrian education or traffic calming?', *Australian Journal of Public Health*, 18, 2, 209-12
34. Viudes, A (2002) *Economic Evaluation of the Provision of Area Wide Traffic Calming Schemes Designed to Prevent Accidents in Urban Areas in the Whole of England and Wales*. London School of Hygiene and Tropical Medicine
35. Managing Speeds of Traffic on European Roads (MASTER) (1998) *MASTER: Final report*. www.vtt.fi/rte/projects/yki6/master/deliver.htm
36. www.homezones.org
37. Department for Transport (1997) *Measures for Rural Single-carriageway Roads*. DfT