

Child pedestrian injuries in the Cape metropolitan area — final results of a hospital-based study

David Bass, Rene Albertyn, Jeanette Melis

Over a 12-month period 430 children under 14 years of age presented to Red Cross War Memorial Children's Hospital in Cape Town having been injured as pedestrians, and 106 children who died from such injuries were registered at the regional state mortuary. Information about the circumstances surrounding injury was obtained from the parents or guardians of all children reporting to hospital and 48 (45,3%) of the fatalities.

Analysis of results revealed a strong relationship between pedestrian injury and children playing or running errands in residential areas during daylight hours, particularly in the later part of the afternoon. Only 24,3% of all children were supervised by an adult at the time of injury. The pattern of behaviour described must be acknowledged in the planning of future road safety measures. The inconsistency of parental supervision highlights the need to include adults in educational and awareness campaigns.

S Afr Med J 1995; **85**: 96-99.

In South Africa, the rapid pace of both motorisation and urbanisation have produced an environment which is particularly hostile to children. At present, road traffic injuries (RTIs) are the single most important cause of injury-related morbidity and mortality in South African children over 4 years of age^{1,2} and pedestrians account for 46% of all casualties in this group as well as 25% of years of potential life lost from all traffic-related deaths.³ As would be the case with any public health problem of similar magnitude, successful prevention of pedestrian injuries depends upon intimate knowledge of the factors underlying the 'disease' process.

In December 1990, we began to interview the parents or other primary caretakers of children presenting to the Red Cross War Memorial Children's Hospital trauma unit with pedestrian RTIs about the exact circumstances of the injury. The provisional results of the hospital study were analysed after 6 months and identified a fairly consistent pattern of behaviour preceding injury.⁴ This paper reports on the data

Trauma Unit and Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital, Cape Town

David Bass, M.MED. (SURG.), F.C.S. (S.A.)

Rene Albertyn, B.SOC.SC., B.A. HONS

Jeanette Melis, DIP. MED. TECH. (MICROBIOL.) (HAEM.)

accumulated over 12 months from both hospital attendances and pedestrian deaths under 14 years registered at the Regional State Mortuary.

Patients and methods

Hospital attendances. Between 1 December 1990 and 30 November 1991, the parents or guardians of children injured as pedestrians who presented consecutively to the trauma unit were interviewed about the circumstances of the child's injury. All interviews were conducted in person prior to discharge and no child was discharged before an interview was obtained. Information sought in the interview was documented on a standard proforma and included: (i) name, age and sex of child; (ii) time and place of collision; and (iii) the child's activity and nature of supervision at the time of injury.

Pedestrian deaths. Examination of police records at the Salt River Police Mortuary yielded the identities of all children under 14 years of age who had died from pedestrian injuries on the Cape Peninsula during the study period. Cross-checking of names and addresses obviated duplication of hospital and mortuary data. A questionnaire identical to that used in the hospital study was mailed to the parents of all children who had died from their injuries. Only one attempt was made to contact each family and no telephone interviews were conducted.

Results

During the study period, 430 children (275 males, 155 females) reported to the trauma unit with pedestrian RTIs; parental interviews were completed in all instances. Police mortuary records revealed 106 fatal pedestrian RTIs but completed questionnaires were returned by only 48 families (45,3%).

Preliminary inspection revealed no appreciable difference between hospital and mortuary data apart from the nature of injuries sustained. Other than that, the distribution in terms of place, time, activity and supervision was proportionally identical. The following results, therefore, refer to all 478 pedestrian casualties for whom completed data were available.

Age and supervision. The average age of the children was 7 years (range 2 - 14 years) and 358 (75%) were aged between 4 and 9 years. Nevertheless, only 116 (24,3%) of all children were under direct adult supervision at the time of collision (Fig. 1).

Time, place and activity (Figs 2 - 4). Four hundred and thirty-two collisions (90,4%) occurred during daylight hours with a peak incidence between 16h00 and 17h00 on all days of the week. Four hundred and twenty-two (88,3%) collisions occurred either directly outside the child's home (197) or elsewhere in the same neighbourhood (225). Only 29 injuries (6%) were sustained on main roads or commercial thoroughfares, where children were more often than not supervised by an adult (Fig. 3). There was no evidence of RTIs occurring in 'clusters' in any particular suburb or other locality. At the time of collision, 321 (67,2%) children were either playing or running errands in the

immediate vicinity of their own homes or nearby (Fig. 4). Of note is that the majority of those injured going to or coming from school were hit by cars within their own residential areas, i.e. closer to home than to school.

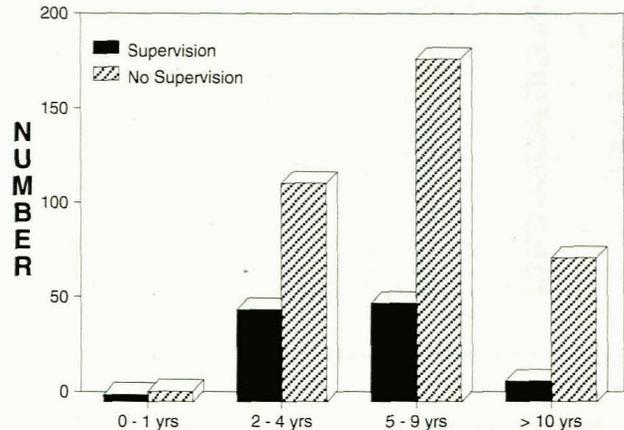


Fig. 1. Relationship between adult supervision and age of child.

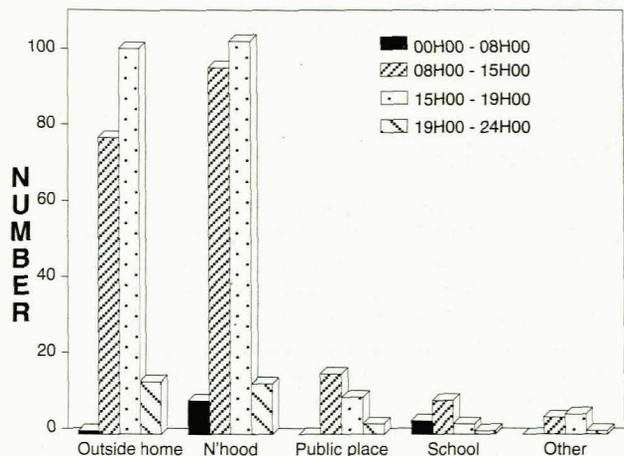


Fig. 2. Place and time of injury.

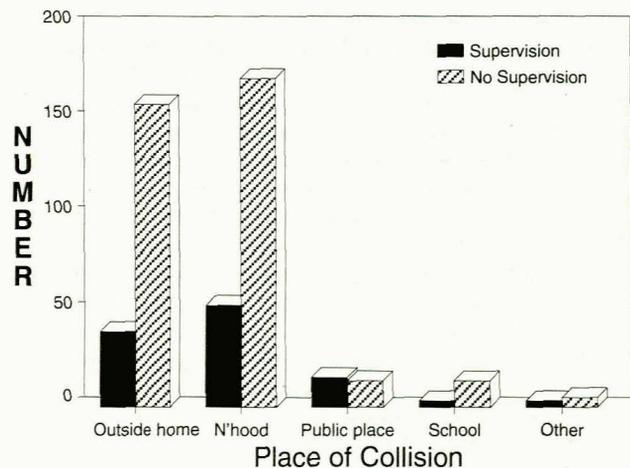


Fig. 3. Relationship between place of injury and presence of supervision.

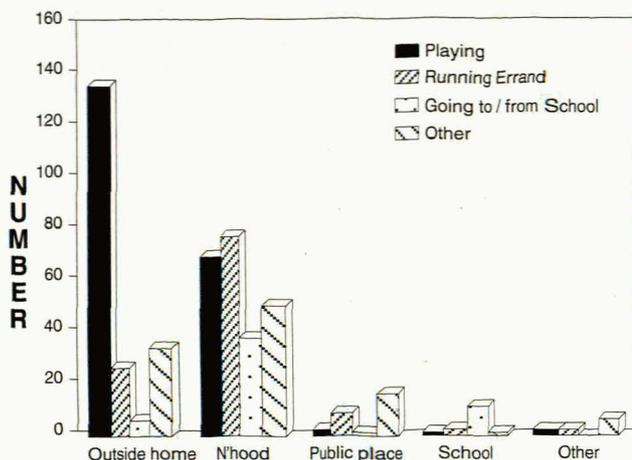


Fig. 4. Place of collision and child's activity at the time.

Nature of injuries. Among the 430 hospital patients, the injury was to soft tissues only in 190 (44,2%), but 240 (55,8%) sustained craniofacial and orthopaedic injuries requiring inpatient management. The main causes of death registered in children reaching the state mortuary were severe brain injury (35, 72,9%) and injury to the heart and great vessels (10, 20,8%).

Discussion

Red Cross War Memorial Children's Hospital is a teaching and service hospital funded by the State and serves the underprivileged communities of metropolitan Cape Town. The hospital's Trauma Unit accepts and treats both referred and unreferred casualties including approximately 50% of paediatric RTIs occurring on the Cape Peninsula.⁵ As has been shown in the UK,^{9,7} we believe that both coroners' records and metropolitan hospitals can provide a unique opportunity for the collection of injury-related data which may otherwise be unavailable. The poor response to our mailed questionnaires on fatalities was disappointing but can be attributed to the high mobility among the community at risk and the difficulties associated with delivering mail within the informal settlements.

The results of this study describe a pattern of behaviour and events which is largely consistent with findings published from other centres.^{6,9} However, the implication of these data for preventive strategies cannot be generalised but must rather be interpreted in the context of the social and physical environment where the injuries occur.

The efficacy of 'active' strategies, i.e. health education and legislation, in promoting the safety of child pedestrians is highly contentious.¹⁰⁻¹³ Educational campaigns in particular are costly if launched on a national scale and must be appropriately tailored to the various age groups targeted.^{7,14} Whatever scepticism exists about the ability of road safety education to bring about safe behaviour, there is growing awareness that parents (and all adults charged with the daytime supervision of children) must be included in the educational process.^{7,8,15,16} The lack of adult supervision of three-quarters of our study subjects attests once again to

how few caretakers fully appreciate or acknowledge the vulnerability of young children in traffic.^{11,17} It is possible that much more can be achieved by empathetic campaigns which address adult misperceptions than by teaching safety drill to children who continue to receive conflicting messages from their role-models. Similar considerations also mean that statutory legislation and enforcement, while entirely appropriate for motorists, may fail to influence children whose appreciation of personal safety owes far more to parental attitudes than to what is preached outside the family circle.¹⁸

In South Africa, environmental approaches may provide the most cost-effective and far-reaching opportunity for increasing the safety of young pedestrians. The vast majority of injuries described in this study occurred on residential streets, which children appear to regard as an extension of their home territory. In areas such as the Cape Peninsula where high-density or informal housing predominates, it is more realistic to accept this behaviour as normal than to seek ways of keeping children off the street. Authorities in the UK^{7,19} and Europe²⁰ have accepted the important role of residential streets in providing space for social interaction where the pedestrian should enjoy priority over the motorist and not vice versa.²¹ In South Africa, acceptance of this philosophy will be integral to the successful deployment of physical measures to protect children in particular. The area-wide distribution of pedestrian RTIs in children indicate that *ad hoc* traffic-calming devices such as speed-humps, chicanes and pedestrian crossings may not provide the best solution. Rather, town planning as a whole will have to incorporate strategies which inhibit the passage of motorised traffic through residential areas, thereby reducing the overall exposure of children to this hazard.

Finally, in South Africa, cognisance will have to be taken of the sociopolitical atmosphere in which the problem of traffic-related injuries is confronted. Socially disadvantaged communities where the risk of pedestrian injury is highest, may appear to regard the protection of child pedestrians as a low priority,²² being preoccupied with issues more intimately connected with their day-to-day survival. Such resistance should not be misconstrued as a lack of interest, however, but rather as a challenge to the resources of health, traffic and educational authorities, all of whom are responsible for translating research data into workable preventive strategies.

This study was made possible through financial assistance from the National Road Safety Council (South Africa) and the Lions Club (Rondebosch). The authors also wish to thank Sr T. Khobane and Ms N. du Toit who assisted with the data collection, and Ms C. J. Hart who typed the manuscript.

REFERENCES

1. Kibel SM, Bass DH, Cywes S. Five years' experience of injured children. *S Afr Med J* 1990; **78**: 387-391.
2. Kibel SM, Joubert G, Bradshaw D. Injury-related mortality in South African children, 1981-1985. *S Afr Med J* 1990; **78**: 398-403.
3. Department of National Health and Population Development (South Africa). Motor vehicle accidents in South Africa 1970-1986. *Epidemiological Comments* 1989; **16** (3): 1-24.
4. Bass DH, Albertyn R, Melis J. Road traffic collisions involving children as pedestrians: provisional results of a hospital-based study. *S Afr Med J* 1992; **82**: 268-270.
5. Dickerson DA, Bass DH, Rodrigues AF. Motor vehicle accidents — an avoidable cause of injury in childhood (Correspondence). *S Afr Med J* 1990; **78**: 431.
6. Levene S. Coroners' records of accidental deaths. *Arch Dis Child* 1991; **66**: 1239-1241.
7. Ward H, ed. *Preventing Road Accidents to Children: The Role of the NHS*. London: Health Education Authority, 1991.

8. Guyer B, Talbot AM, Pless IB. Pedestrian injuries to children and youth. *Pediatr Clin North Am* 1985; **32**(1): 163-174.
 9. Rivara FP, Barber M. Demographic analysis of childhood pedestrian injuries. *Pediatrics* 1985; **84**(6): 375-381.
 10. Pless IB, Peckham CS, Power C. Predicting traffic injuries in childhood: a cohort analysis. *J Pediatr* 1989; **115**: 932-938.
 11. Rivara FP, Bergman AB, Drake C. Parental attitudes and practices toward children as pedestrians. *Pediatrics* 1989; **84**: 1017-1021.
 12. Robertson LS, Kelley AB, O'Neill B, Wixom CW, Eiswirth RS, Haddon W. A controlled study of the effect of television messages on safety belt use. *Am J Public Health* 1974; **64**: 1071-1080.
 13. Tanz RR, Christoffel KK. Pedestrian injury: the next motor vehicle injury challenge. *Am J Dis Child* 1985; **139**: 1187-1190.
 14. Ampofo-Boateng K, Thompson JA. Children's perception of safety and danger on the road. *Br J Psychol* 1991; **82**: 487-505.
 15. Michon JA. Traffic education for young pedestrians: an introduction. *Accid Anal Prev* 1981; **13**: 163-167.
 16. Rivara FP. Child pedestrian injuries in the United States. *Am J Dis Child* 1990; **144**: 692-696.
 17. Eichelberger MR, Gotschall CS, Feely HB, Harstad P, Bowman LM. Parental attitudes and knowledge of child safety. *Am J Dis Child* 1990; **144**: 714-720.
 18. Schor EL. Unintentional injuries: patterns within families. *Am J Dis Child* 1987; **141**: 1280-1284.
 19. *Health on the Move: Policies for Health Promoting Transport*. Birmingham: Public Health Alliance, 1991.
 20. Avery JG, Avery PJ. Scandinavian and Dutch lessons in childhood road traffic accident prevention. *BMJ* 1982; **285**: 621-626.
 21. Appleyard D, Lintell M. The environmental quality of city streets: the residents' viewpoint. *Journal of Accident and Injury Prevention* 1972; **3**: 84-101.
 22. Klein D. Societal influences on childhood accidents. *Accid Anal Prev* 1980; **12**: 275-281.
-