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Prevention of injuries to children and young people: the way ahead for the UK

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Injury in children and young people is not inevitable. Accidents and the injuries that result from them, are not chance events. Patterns of injury can be identified that reflect a person's age, the environment in which children and young people live, and the activities in which they are engaged. Greater understanding of the causes of injury can help us in the development of effective preventive strategies. Opportunities to prevent injuries occur through a range of educational, environmental, and legislative approaches. We need to fully mobilise these opportunities to save lives and improve the health of children and young people in the UK.

When one considers the worldwide public health importance of injuries to this age group, it is surprising that only a small number of potential interventions have been rigorously evaluated. Moreover, of those with proven efficacy, many prevention measures have been poorly implemented. But there are a number of interventions that we know to be effective and others that have the potential to be effective. In this chapter, we attempt to distill the essence of injury prevention by first providing an overview of the broad approaches. We then discuss the specific interventions and methods that have been shown to be effective. The broader context of policies and cultures that affect injury are then set out. Finally, we pull together the strands to consider what is still required for more effective preventive action in the UK.

Approaches to injury prevention

The problems of injuries to children and young people stem from their complexity and wide ranging nature. Typical examples include an 18 month old child reaching up in a kitchen and pulling down a mug of scalding tea, an 8 year old falling from a climbing frame in a playground and fracturing her leg, or a 12 year old pedestrian knocked down by a car and receiving multiple injuries. These different types of injury occur in different environments and each has a range of possible counter measures. The multifaceted nature of the factors that contribute to injury: characteristics of the child or young person, parent, and family; the environment; social deprivation and exposure to risk—all need to be kept in mind when considering possible preventive strategies.

Generally, there are three broad approaches to prevention: education, environmental modification, and legislation and its enforcement, although in practice there can be much overlap between these.

EDUCATION

Traditionally education in this field has been seen in an excessively narrow way. Critics of its effectiveness have chosen to focus on changing individual decision making by children and parents, such as campaigns to increase bicycle helmet use and road safety education programmes. But, education also encompasses the education of professionals and policy makers and can include lobbying and advocacy. It also shapes the culture by developing the beliefs and attitudes of the general public, that create the imperatives for governments to act.¹

ENVIRONMENTAL MODIFICATION

Environmental modification or engineering involves the design of products or of the built environment to reduce the potential for injury. Large scale measures adopted in urban traffic safety schemes can include measures to redistribute traffic and reduce its speed, and safety improvements in individual roads can be implemented. On a smaller scale, physical barriers, such as window bars, can prevent children from falling. Bicycle helmets and protective equipment, such as mouth guards for rugby players, can reduce the consequences of head or facial injuries.

LEGISLATION

Legislation or regulation can be used to reinforce safety practices. At one end of the spectrum these approaches include a single action that offers passive protection to vulnerable recipients. Examples include the control of nightwear flammability and design changes to banisters. Avery and Jackson² provide a useful summary of children's products covered by regulations or standards in the UK. At the other end of the spectrum, legislative approaches can require repetitive action—for example, the use of car seat belts or bicycle helmets. Intermediate between the two are child resistant containers to prevent poisoning and fencing of domestic swimming pools, each of which offer a degree of passive protection when used correctly.

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What interventions and methods have been shown to be effective?

In 1986 a World Health Organisation (WHO) report highlighted the fact that, despite the worldwide importance of unintentional injuries, there was a lack of studies that evaluated the effectiveness of preventive measures.³ In the decade since the WHO review there has been considerable growth, both in primary studies and in systematic reviews of effectiveness.⁴⁻¹¹ This section draws on these reviews of the evidence and summarises what has been found to work in the road, home, leisure, and work environments, and in broader community based interventions.

ROAD ENVIRONMENT

In the UK, as in most higher income countries, injuries in the road environment are the leading cause of injury and death in children and young people. Here we examine interventions to prevent pedestrian, cyclist and motor cyclist, and car occupant injuries.

Pedestrian injuries

Accidents involving injury to child pedestrians on urban roads are more widely scattered spatially than those involving adults and occur more frequently on the residential roads near to where the children live. Because the accidents are more scattered, they are less susceptible to road engineering modifications suitable for high risk sites. This has led to the development of an area-wide approach. This uses traffic management and traffic calming techniques to encourage drivers to use other roads to achieve a safer distribution, and to manage the speed of traffic, so that it circulates more safely, especially on residential roads where there are children.¹² The Department of the Environment, Transport and the Regions is currently funding a "Safer City Project" in Gloucester, where a strategic and interdisciplinary approach to road safety is being implemented with the aim of reducing the number of casualties in the city by 30%. The approach encompasses changes to the road environment, road safety education, and enforcement.

Vehicles can be designed to reduce the consequences of pedestrian injuries and examples include reducing bumper height,¹³ and the banning of "bull bars" on cars. There is a strong link between vehicle speed and the severity of injury sustained by pedestrians after a collision.¹⁴ The introduction of 20 mph speed limit zones in the UK resulted in local reductions of 70% in child pedestrian and 48% in child cyclist accidents.¹⁵ Road safety education campaigns have often been targeted at children and their parents rather than at car drivers. A programme in Canada targeted both drivers and pedestrians and used a combination of education, engineering, and enforcement measures to increase the safety of pedestrians at crossings. This programme produced an increase in motorists yielding the right of way to pedestrians.¹⁶

One of the problems of road safety education programmes aimed at children and their carers is the complexity of the pedestrian task; Rivara

et al estimated that road crossing can involve up to 26 different tasks to negotiate traffic successfully.¹⁷ A recent examination by developmental psychologists of road safety education programmes has concluded that most do not take into account how children learn and that training in crossing skills in the real road environment is essential.¹⁸

Traffic clubs have been organised in a number of countries, but have only achieved mixed results. In the UK, the "Tufty Club" has been popular among schools and parents of preschool children. Knowledge gains were reported in one study,¹⁹ but not in another.²⁰ The Eastern Region traffic club in England showed an effect on children's behaviour; running ahead of parents when out walking was reduced and there was some effect on casualty reduction (children emerging from behind parked vehicles).²¹ Norway's traffic club has employed practical instruction and training by parents.²² The lower casualty rates for members could probably be explained, however, by selective club membership. Similar traffic clubs have been introduced by other European countries.

When both parents and children have been given pedestrian skills training, programmes in the USA and the Netherlands have demonstrated some improvements.^{17, 23} In particular, parents set better examples and gave more verbal instructions. Other small scale experimental studies have concentrated on specific pedestrian tasks, for example timing skills to improve efficiency in making use of gaps in traffic²⁴ and in finding safe places to cross.²⁵⁻²⁷ These studies have found that training young children can lead to reported change in behaviour.

Based on methods used in experimental studies, the UK "Let's decide walkwise" pedestrian training programme for 5-8 year olds has been developed for schools. It has a curriculum component, complemented by practical roadside training. Children in participating schools showed improvement in crossing behaviour compared with control schools.²⁸ Similar results were found in an Australian programme that also used practical roadside training.²⁹ But practical training is time consuming and labour intensive and one way around this has been to adopt an approach using community volunteers. Local volunteers were recruited to carry out roadside training of children, working in cooperation with schools and project staff in Drumchapel, Glasgow. The judgments and behaviour of trained children improved substantially after training. Training local people in road safety also has the benefit of the local community suggesting their own solutions to local problems rather than relying on external expertise.³⁰

Cyclist and motorcyclist injuries

Within the field of cycle safety, the greatest number of studies relate to the wearing of cycle helmets. There is good evidence that cycle helmets offer protection from head injury. A population based case-control study found that the use of helmets decreased the risk of head

injuries by 85% and reduced the risk of brain injuries by 88%.³¹ In high velocity impacts, helmets are less effective.³²

It has been argued, however, that concentration on promoting helmets diverts attention from improving the environment for cyclists, such as greater use of cycleways, or other means to better separate cyclists from other road vehicles.³³ The effectiveness of separate lanes for bicycles has not been evaluated.¹⁰

An early campaign to increase cycle helmet use in Seattle included a range of educational methods and agencies and resulted in sharp increases in observed helmet wearing. It was highly focused in terms of age group and message and also addressed the barrier of cost.³⁴ In the United States, a comparison was made of education alone, and education combined with legislation in different states, and the latter was found to be far more effective.³⁵ Victoria, in Australia, after a decade of educational campaigns, introduced the first legislation requiring cyclists to wear helmets.³⁶ Considerable reductions in head injuries and deaths have been observed, most of which can be attributed to the legislation, but some may also be attributed to a reduction in cycling.³⁷

Legislation on motorcycle helmet use has similarly resulted in a reduction in motorcycle fatalities.¹¹ In the United States repeal of motorcycle helmet use has been followed by an increase in fatalities of 25–40%.^{11 38 39}

There have been few studies that have evaluated the effects of cycle training. In Canada, a brief skills training programme aimed at primary schoolchildren was not effective in improving safe cycling behaviour, knowledge, or attitudes.⁴⁰ In the Netherlands, comparisons of practical and theoretical training of young cyclists has shown little effect on safe behaviour at traffic intersections.⁴¹ Munro *et al* found little evidence that training reduced motorcycle injury rates.¹¹ One study did find an effect in reducing risk but the size of the effect diminished after two years.^{11 42} There is some evidence that trained riders make greater use of protective clothing.⁴³

Car occupant injuries

Safety within cars involves a number of design changes to protect passengers from contact with hard objects or surfaces in the interior of the vehicle.⁹ These include energy absorbing steering columns, increased padding on interior contact points, and enhanced side impact protection.¹⁰

Other measures concerned with safety within cars relate to seat belts and child safety restraints. Both have been studied thoroughly and there is now considerable evidence that these are highly effective in reducing injury and death. The problem is for them to be used more widely and properly. In the UK, legislation for mandatory front seat belt wearing in cars was introduced in 1983. Lowne *et al* found a marked reduction in injuries to 11–14 year old children travelling in the front seat.⁴⁴ In 1989, legislation was introduced into Britain, making it compulsory for a child under 14 to be restrained in the rear of the car, providing a

restraint was available. In 1992, observed seat belt use for child rear occupants declined with age, so that 88% of children under the age of 1 were being restrained, compared with 60% in the 10–13 age group.⁴⁵

HOME ENVIRONMENT

Although the roads are the leading cause of injury deaths in childhood (about one child per day), the home remains the setting for a significant number of deaths and large numbers of non-fatal injuries. Preschool children are particularly vulnerable in the home environment, not just because homes are inherently unsafe, but because this is where these children spend most of their time. The domestic environment presents a greater problem than the road environment because it is less amenable to the types of regulatory approach than are available in the road environment. Local councils have a statutory responsibility to implement road safety, but for safety promotion within the home, there is no statutory requirement and staff dedicated to home safety issues vary.

The range of potential hazards in the home is vast and exposure to these varies as a child develops. Injury types include house fires, other burns and scalds, falls, poisonings, drownings, choking and suffocation, and entrapments and lacerations from glass and other sharp objects. Sinnott points out that children make use of their homes, “*in ways that seem to them to be reasonable, but have not apparently been foreseen by the designer*”.⁴⁶ These uses include children who, “*crawl about the floor, climb onto the window ledge, squeeze through stair balustrades, slide down the stair hand-rail, swing on the gate, run from room to room, and ride bikes inside as well as out*”.⁴⁶

In this section we look in more detail at specific interventions aimed at reducing three important types of home injury: house fires, falls, and scalds. Fires are the leading cause of death in childhood home injuries and rank second after pedestrian injuries as the cause of unintentional injury deaths in children under 15 years in the UK. There is a steep social gradient for childhood deaths from house fires, with children in social group V being nine times as likely to die in a house fire than those from social group I.⁴⁷ Fall injuries result in relatively few deaths in childhood, but are the major cause of hospital admissions and accident and emergency attendance.⁴⁸ Scald injuries represent a small proportion of injuries, but they are among the most distressing and painful injuries a child can receive and may result in long term disfigurement and disability.⁴⁹

House fires

Very young children are particularly vulnerable in house fires because they depend on adults for assistance with escape. When a house fire occurs, one of the most important risk factors for death is the absence of a smoke alarm.⁵⁰ Smoke alarms are a reliable, inexpensive means of providing an early warning.⁵¹ A number of studies aimed at increasing smoke alarm use have been evaluated.^{52–54} A recent,

highly effective programme was a targeted intervention in a high risk city centre area of Oklahoma City in the United States that involved a smoke alarm "give away" programme. An 80% reduction in the incidence of injuries from residential fires was recorded in the target area.⁵⁵ The widespread use of such an environmental modification can also be achieved through legislation: a comparison of smoke detector legislation in two states in the United States showed a reduction in fatal fires when smoke alarms were required by law in all homes.⁵⁶ Another study showed that education could also increase smoke alarm use: in this case paediatricians' endorsement of the alarms during "well child" clinics resulted in a significant increase in installation.⁵⁷ But this was a predominantly middle class sample, and targeted intervention in more deprived communities (such as that in Oklahoma City) could potentially provide greater health gains. Attention needs to be paid, not just to increasing the ownership of smoke alarms, but also to their correct installation, positioning, and continued maintenance. Data from fire brigades in the UK show that in over half the cases where a smoke alarm did not operate in a house fire, the battery had been removed.^{58 59}

Smoke alarms provide an early warning of a house fire, but other solutions include tackling the cause of the fires and reducing the amount of toxic smoke. Smokers' materials, such as matches, lighters, and cigarettes are a frequent cause of fires in the home: an estimated 35% of deaths and 20% of non-fatal injuries are caused by these materials.⁵⁸ Children living in the homes of smokers are more at risk from house fires and reducing smoking would have this added public health benefit. Cigarette lighters and matches pose a special risk to children. In the United States, Canada, and Australia there are requirements that all lighters are child resistant, but there are no similar requirements at present in the European Union.⁶⁰ Research is currently under way in the UK on the feasibility of producing child resistant match boxes.⁶¹ Reductions in the amount of toxic smoke produced in a fire have been achieved through a ban on the most hazardous grades of foam in furniture.⁶⁰ Deaths have fallen from 51 per 1000 fires in 1988 to 34 in 1991, stabilising at 40 subsequently.⁶²

Falls

The circumstances in which falls occur relate to the child's developmental stage and their exposure to particular environments.⁶³ Safety gates are often used to prevent falls on stairs. Although their use has been associated with lower risk,⁶⁴ no specific study has evaluated their value in the home.⁶⁵ There is evidence that babywalkers are also associated with severe fall injuries, in particular with head injuries.⁶⁶ Consequently there is growing pressure in the United States and Australia to ban babywalkers. Falls from greater heights, for example from windows and balconies, result in more serious injury and death. Building design changes can reduce these injuries.^{67 68} A campaign, evaluated in New York, that pro-

vided free window guards to families living in apartments and was reinforced by mass media campaigns, home inspections, and local regulations for landlords showed a 50% decrease in falls occurring and a 35% decrease in mortality.⁶⁹

Scalds

Scalds caused by tap water, bathing, and by hot beverages have different profiles that require different preventive strategies.⁷⁰ Lowering the temperature of tap water has been achieved through legislative approaches and broadly based educational campaigns and have reduced the number of child casualties.⁷¹ Scald injuries to young children reaching up and pulling kettle flexes would be reduced by the greater use of coiled or short kettle flexes, but no evaluated study has been reported.⁷ Scalds from cups and mugs pose a difficult problem. In Australia, there have been attempts to develop a spill resistant mug⁷² but widespread use of such mugs may not be acceptable. Mass media campaigns aimed at burns prevention have resulted in some gains in knowledge, but have not been found to reduce injury.⁷³ Moller suggests that a behavioural solution is the only possible one for preventing beverage scalds and needs to be targeted at the parents of children aged 6 to 36 months.⁷⁰

These three examples of injuries that cause severe, frequent, or particularly distressing injuries in the home serve to illustrate the wide range of circumstances of injuries and the numerous preventive strategies that arise from these. There are many more examples: poisonings, where child resistant packaging of medicinal and non-medicinal agents has been shown to be effective; lacerations from glass which have been prevented through the use of safety glass, required under Building Regulations in new housing in the UK⁶⁰; and drownings in the bath where adult supervision has met with some success.⁷⁴

General approaches

Some campaigns have attempted to target a wide range of home injuries. One such campaign in a deprived community in Newcastle supplemented a mass media campaign (the television "Play it Safe" campaign) with individual health visitor home visits. Sixty per cent of the intervention group (who had received a home visit) made some physical change to their homes, compared with 9% of a control group who had only been encouraged to watch the television series.⁷⁵ The severely disadvantaged families in Newcastle responded positively because the advice offered was small in amount, specific, and concrete.

In other studies of home hazards, the results have been less conclusive.⁷⁶⁻⁷⁸ A home visitation programme from the United States had a broader emphasis, attempting to also tackle problems associated with social deprivation. This targeted poor, unmarried teenagers during their pregnancy and first two years of their infants' lives. In addition to home hazards and safety practices, issues such as child abuse and neglect, mothers' warmth, and control of their

children, were studied. The mothers who had received home visiting support had fewer hazards in their homes, but there was no effect on how they stored poisonous substances or on whether they used child safety restraints in their cars.⁷⁹

Roberts *et al* analysed a number of home visiting programmes for their effect on injury and child abuse outcomes. Although they found few that had been rigorously evaluated, they concluded that the results were sufficiently encouraging to call for further evaluation of the effects of social support on the prevention of childhood injury.⁸⁰

LEISURE ENVIRONMENT

Large numbers of children and young people are injured every year in informal leisure activities and actively participating in sports. Sports related injuries are an important cause of hospital admissions in the UK, particularly for school aged children, and they make a considerable contribution to impairment and disability.⁸¹ But the leisure environment has been largely ignored as a setting for prevention programmes. Although the outdoor leisure environment forms part of the “public domain” where regulation and enforcement are more feasible than within the home, this setting suffers from the fact that no one agency has the remit to prevent injury.

All forms of sport and recreation present some injury risk to children and young people. There is a balance to be achieved between the promotion of sports and recreational activities which encourage both physical and social development, and reducing the risk of injury (particularly the most serious injuries) through the use of safety equipment, appropriate supervision, and training.

Playground injuries

The safety of children in public playgrounds is a complex interaction of a number of factors: the type, height, and maintenance of the equipment, the type and maintenance of the surface, the number of children playing and the type of play, the quality of supervision, and weather conditions.⁸² There is no direct experimental evidence that restricting the height of equipment or resurfacing playgrounds with rubber or bark reduce injury in children. But there is a growing body of indirect, epidemiological evidence that suggests that equipment heights below 1.5 metres and impact absorbing surfaces are associated with less frequent and less severe injury.^{83 84}

Sports injuries

There is a need for more investigation into the value of protective devices in sporting activities. Helmets are of known value for horse riders⁸⁵ and a study of mouthguards in rugby players showed that they were associated with reduced dental injuries.⁸⁶ Evidence from Australia of a high incidence and severity of eye injuries in racket sports (especially squash and badminton) has led to the development of more effective and acceptable eye protection.⁸⁷ Rule changes in some sports, such as American

football and ice hockey, have been effective in reducing certain types of injuries.¹¹ An educational programme for recreational runners which included warm-up and cool-down exercises, had no effect on injury rates but had some influence on knowledge and attitudes.^{11 88} But a programme of warm-up exercises, protective equipment, and rehabilitation directed at elite soccer players in Sweden reduced injuries by 75% when supervised by medical personnel, and by 50% when supervised by coaches.⁸⁹

Drownings

Although not a significant problem in the UK, barriers for domestic ponds and swimming pools have been shown to reduce injury deaths and injury risk, particularly in those under 5, in Australia and the United States.⁹⁰⁻⁹⁵ Pool barrier legislation has been estimated to reduce domestic pool deaths by half.⁹⁵ Adult supervision is clearly important in the prevention of drownings among young children, but drowning in rivers, canals, lakes, and the sea is predominantly a problem of older boys who play unsupervised.⁹⁶ Teaching children to swim may offer some protection.⁹⁷ The provision of guards on beaches and popular swimming areas are associated with a reduction in drowning deaths.^{90 98 99}

WORK ENVIRONMENT

Injury among children and young people in the work environment has received little attention in the literature.^{100 101} A British study conducted in 1991, estimated that 40% of the population under 16 years was working, and over a third of these had had an accident at work in the past year.¹⁰² Agricultural injuries are a significant component of injuries in the work environment for both children and adults.^{103 104} Cameron *et al* have analysed fatal farm accidents to children in Britain over a four year period and found that tractor related injuries were the most serious farm related injuries.¹⁰³

Tractor related deaths in children have declined since safety regulations on design have been introduced. Munro *et al* only report one example of an intervention specifically targeted at young people at work.¹¹ This was an educational campaign conducted by Corcoran in the United States, but a full evaluation of the study was not carried out.¹⁰⁵

COMMUNITY BASED APPROACHES

Community based approaches offer ways in which a broad range of interventions can be introduced that may complement and reinforce each other in particular geographical areas. They also represent a shift from a focus on individual responsibility to a social responsibility.⁹⁹

Falköping in Sweden was one of the earliest communities to develop a broad based approach to injury prevention and has served as a model for initiatives in many parts of the world.¹⁰⁶ The Safe Community network fosters this approach.¹⁰⁷ Successful elements in the community based approach are good local

data, interagency collaboration, an action committee to lead the programme, and time to develop local networks and a range of local programmes. Good local data on injury are needed to stimulate local interest, target specific interventions, and to evaluate the effect. The synergistic effect of educational, environmental, and legislative approaches can be achieved when a variety of agencies work together in a coordinated manner.⁷

In Falköping there was a strong emphasis on the education of policy makers and health professionals using training sessions. Greater public awareness was achieved through harnessing the power of the local media.¹⁰⁶ An American programme in a poor African-American inner city community also achieved some success the recruitment of community volunteers to coordinate and involve their neighbours in home hazard reduction.¹⁰⁸ "Cascade" training methods were used to train the trainers. Another American programme, targeted at a disadvantaged community, included the renovation of playgrounds, the involvement of children in safer or supervised activities, the provision of injury and violence prevention education, and the provision of safety equipment.¹⁰⁹ The community based approach allows the combination of such different types of intervention.

The community based studies harnessed the efforts of a range of agencies at a local level. For example, the Harlem Safe Kids-Healthy Neighborhoods programme recruited 26 organisations in its endeavours.¹⁰⁹ A range of programmes is important in the community based approach. The Shire of Bulla programme in Australia developed 113 strategy activities over its first three years.¹¹⁰ To successfully work with a range of agencies in a variety of local programmes a long term time commitment is required. The Harstad programme in Norway continued for a period of 7–9 years, which allowed networks and a range of local programmes to develop.^{111–113}

The community based programmes that have been evaluated have usually only included one intervention and one control community. The Statewide Child Injury Prevention Program (SCIPP) in Massachusetts is a notable exception, with nine intervention and nine control communities. Its intervention, however, only took place over a 22 month period—far shorter than in many of the other studies reported.¹¹⁴ Lessons from a range of community based studies suggest that we need to combine robust evaluation methods using a range of different intervention and control communities, with well designed interventions. Community strategies lay the foundation for interventions, but require access to knowledge about effective strategies, if they are to produce reductions in injury. Their ultimate effectiveness, however, has not been conclusively demonstrated.

The wider context

Childhood injury patterns and the specific preventive interventions that have been proved to work, do not exist in a social, cultural, or politi-

cal vacuum. Transport, land use, housing, social, and fiscal policies all affect injury. Cultural factors affect the way in which people behave and respond to the environment in which they live and to the acceptance of legislation or regulation. Underpinning these issues are the value we place on children and young people and on individual and social rights versus responsibilities. We look here in more detail at the effects of land use and transport policies and the impact of deprivation.

Land use and transport policies have a significant influence on where children live, where they go to school, how they use the road environment for play and for moving from place to place. National and local policies have an impact on the speed, location, volume, and composition of traffic which, in turn, affects the number and severity of pedestrian, cyclist, and car occupant casualties. There is a strong link between vehicle speed and the severity of injury sustained by pedestrians.¹⁴ Closing of streets, redirecting traffic, and bypassing residential neighbourhoods reduces pedestrian exposure to traffic.

Increased traffic volume can also influence how people use the road environment as pedestrians. Hillman *et al* believe that parental fears about increased traffic has limited children's independent mobility, both in terms of walking and as users of public transport, and has increased the amount of time parents transport children in cars.¹¹⁵ The composition of traffic is also significant. Gilbert and McCarthy found in an analysis of cyclist deaths in London, that heavy goods vehicles were much more frequently involved than expected, both in relation to the proportions of traffic in London or compared with national data on vehicles.¹¹⁶ Policies affecting the private/public mix of traffic can affect injury rates: when subsidies were removed from public transport in London, traffic levels increased, leading to increased road casualties.¹¹⁷ Hillman *et al* argue that "*children's issues in transport planning have been marginalised by policies accommodating the growth in the demand for motor transport*".¹¹⁵

In the UK, greater weight has increasingly been given to the needs of pedestrian and cyclists. This can be seen in the development of a cycling strategy,¹¹⁸ and a walking strategy and new targets for injury reduction are soon to be published by the Department of Transport.

Policies that concern other land uses, such as the location of shopping centres or health centres,¹¹⁹ can also generate traffic that, in turn, influence injury rates. Policies that relate to schools have particular relevance to children's travel patterns. In the 1970s in England an increase in school size was accompanied by increased school journey time and Preston observed a corresponding increase in child casualties on these journeys.¹²⁰ Increased parental choice for school allocation has the potential to increase the catchment area of schools with children travelling longer distances to more popular schools. Local transport policies could take into account

school catchment areas and children's school journeys.

Different housing types and their urban location (for example city centre or suburban) have different child road casualty rates. Postwar housing estates in the UK have lower injury rates than streets of Victorian terraced houses with few or no gardens, few garages, and much on-street parking.¹²¹ Council housing policies determine whether families with children are housed in high rise flats and whether gardens or play areas are available. These policies also effect the quality and location of temporary accommodation for homeless families.

The internal design of the home is also important, particularly in relation to injuries sustained by preschool children. The number of stairs, the way in which windows open, and how balconies are designed are all important examples. Child safety can also be enhanced by features such as low level hand rails on stairs. Homes are often designed with the needs of adults rather than children in mind.⁶⁰ A will is required by architects and builders to include such measures, or pressure must be brought to bear on them to do so.

Perhaps the most important aspect of the wider context relating to injury is that of deprivation. The standard of living and its distribution have a powerful impact on people's health.¹²² There is clear evidence in the UK that childhood injuries are strongly linked to deprivation¹²³ and that socioeconomic mortality differentials for children are increasing.¹²⁴ In the UK over the last 20 years the gap between the richest and poorest has increased greatly and the resulting inequality has affected some age groups more than others. The reasons for increasing inequalities are complex but include higher unemployment, the polarisation between two earner and no-earner couples, rising self employment, and a greater emphasis on indirect taxes rather than direct taxes (the latter have a greater effect on less affluent individuals).¹²⁵ Children as a group are particularly vulnerable to these changes: in 1992/93, 33% of children lived in poverty (defined as below 50% of average income after housing costs). This contrasts markedly with a figure of 10% of children in 1979.¹²⁶

Poverty is particularly marked in the children of single parents. An estimated 47% of single parents live in poverty, compared with 20% of two parent families.¹²⁶ Poverty, combined with poor housing conditions and social isolation, helps to explain some of the increased injury rates for the children of lone mothers. Roberts and Pless advocate an antipoverty strategy through the greater provision of day care facilities. This could have an important effect on the health and welfare of single mothers and their children by transforming their social position, while at the same time providing a safer environment for their children.¹²⁷

Conclusions and recommendations

This section has attempted to describe the current state of knowledge on the prevention of unintentional injury in children and young

people, and place it in the context of wider cultures and policies that affect these age groups. Injuries are not inevitable: they can be prevented. But their causes are complex and multifaceted and a wide range of countermeasures are required.

The way ahead for the UK is to generate more activity in injury prevention programmes through the wider implementation of evidence based approaches, and to stimulate better quality research in the field.

IMPLEMENTING EVIDENCE BASED INTERVENTIONS AND APPROACHES

Effective interventions and approaches need to be implemented in a far more widespread manner (implementation of injury prevention is explored in more detail in section 4). These interventions are summarised below.

Interventions that have been demonstrated to reduce injury mortality or morbidity include:

- Area wide urban safety measures to reduce pedestrian and cycle injury.
- Traffic speed reduction.
- Seat belt legislation.
- Legislation on child restraints in cars.
- Bicycle helmet legislation.
- Motor cycle helmet legislation.
- Child resistant closures to prevent poisoning.
- Provision of smoke alarms.
- Window guards to prevent falls.
- Domestic product design.

Interventions that have been demonstrated to change behaviour and thus reduce injury risk include:

- Educational campaigns to increase the use of safety devices (bicycle helmets, child restraints in cars, smoke alarms, seat belts).
- Pedestrian education aimed at the child and parent.
- Parent education on home hazard reduction.

Legislative, environmental modification and educational approaches all have a part to play, and their effect in combination is important.

Community based approaches allow injury prevention messages to be repeated in different forms and contexts. Important elements of such approaches are a long term strategy, effective focused leadership and commitment for injury prevention, good local data, interagency collaboration, and time to develop a range of local networks and programmes.

IMPROVING THE RESEARCH BASE

- Funding is inadequate for multifaceted research on the causes and prevention of injury. Funding levels need to reflect the importance of injury as a major cause of death and ill health in children and young people.
- There are a number of gaps in research that need to be filled. More interventions are needed that target the adolescent age group, sports and leisure injuries, and the problem of social deprivation.
- In order to test whether lessons from other countries are applicable to the UK, inter-

vention studies conducted in other settings should be refined and tailored for different cultural environments.

- There is a need for more appropriate and better designed interventions to be evaluated in a more rigorous manner.

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