REVIEW

Updating the evidence. A systematic review of what works in preventing childhood unintentional injuries: Part 1

E Towner, T Dowswell, S Jarvis

In the last 10 years there has been considerable progress in the science and art of injury prevention. The scientific study of what works in different fields of health care and health promotion has expanded, and evidence-led policy development has dominated health planning. We have collected evidence on evaluated intervention studies related to childhood injury prevention since 1992, and published reviews in 1993 and 1996.1,2 This paper updates this evidence. We attempt to answer three questions:

(1) Have there been any changes in the evidence relating to the effectiveness of childhood injury prevention?
(2) What additions have been made to the literature, relating to the target groups and implementation strategies of interventions?
(3) What additions have been made to the literature, relating to the ways interventions have been evaluated?

Methods
A database of primary studies has been built up over the years in the Department of Child Health in the University of Newcastle. We identified the relevant literature by a search of computerised databases (for example, BIDS, Medline, Excerpta Medica, the DHSS database, the Social Science Research Index, Web of Science, Transport Research Laboratory databases). This was supplemented by consulting with “key informants” in the field and hand searching of relevant journals, such as the journal Injury Prevention and Accident Analysis and Prevention and the reference lists of recently published books and articles.

The criteria for inclusion of studies were:

(1) They related solely or in part to the prevention of unintentional injuries.
(2) They targeted children aged 0–14 years.
(3) They described (a) primary prevention measures designed to prevent accidents, or (b) secondary prevention measures designed to reduce the impact of accidents.
(4) They had been evaluated using some outcome measure. This could include changes in mortality or morbidity, observed or reported behaviour, change in hazard, or change in knowledge.

Violence prevention studies were excluded.

Two reviewers extracted the data from each study, using a standard data extraction form (available if required). This form included sections on the aims and objectives and content of the intervention. The aims and description of the evaluation were also summarised; study design, sample size, outcome, impact, and process measures were documented. Using these extraction sheets, three reviewers independently assessed the quality of evidence for each of the studies. Studies were graded on a five point scale: good, good/reasonable, reasonable, reasonable/weak, and weak. Thus a well designed randomised controlled trial could be rated as “good” but a randomised controlled trial with a small sample size or high attrition rate of subjects, could be rated as “good/ reasonable” or “reasonable”. The British National Health Service Centre for Reviews and Dissemination review guidelines were used to assess the quality of the evidence.3 Using the data extraction forms, the tables were developed; the quality rating and level of effectiveness of studies were consensus decisions by the three reviewers and a fourth member of the team was called on for additional advice.

We have summarised the key features of the studies in tables relating to the road environment,4–21 and in part 2 the home environment,22–32 the leisure environment,33–37 community based studies,38–42 and general/mass media interventions.43–45

<table>
<thead>
<tr>
<th>Author, date, and country</th>
<th>Injury target group and setting</th>
<th>Aims and content of intervention</th>
<th>Study type and sample size</th>
<th>Outcome measures</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webster and Mackie (1996), UK</td>
<td>General population Road environment</td>
<td>20 mph zones in 200 residential areas Traffic speed reduced by physical measures</td>
<td>Before and after study (A) 72 schemes: accidents (B) 33 schemes: speed data (C) 6 schemes: public acceptability to 16 mph</td>
<td>(A) Accidents (B) Speed data (C) Attitudes</td>
<td>(C) 61% reduction in total injuries. 70% reduction in child pedestrian injuries 48% reduction in child cyclist injuries (B) Speeds reduced by 9 mph from 25 mph (C) Public reaction favourable Effective Good/reasonable evidence</td>
</tr>
</tbody>
</table>
**Results**

We identified 42 publications for the period 1995 to 1999 which were not included in our previous systematic reviews. Of the 42 recent publications, 18 related to interventions in the road environment, 11 the home environment, five the leisure environment, five broader community based studies, and three mass media or general training studies. We rated the quality of the evidence as good/reasonable in 12 of the studies, as reasonable in 13 studies and reasonable/weak in 17 studies. The publications reviewed included eight randomised controlled trials, five of which were rated as good/reasonable evidence and three as reasonable.

**Table 3 The road environment: promotion of bicycle helmets**

<table>
<thead>
<tr>
<th>Author, date, and country</th>
<th>Injury target group and setting</th>
<th>Aims and content of intervention</th>
<th>Study type and sample size</th>
<th>Outcome measures</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert, Dick, and McRobbie (1998), USA</td>
<td>6–12 years. Primary health care</td>
<td>Free helmet distribution (I) or helmet discounts (C) along with educational intervention at public health clinics (I and C)</td>
<td>Randomised controlled trial I: 3 clinics (n=243) C: 3 clinics (n=180)</td>
<td>(A) Reported use of helmets</td>
<td>(A) Reported helmet use: 76% in I and 82% in C. Partially effective for some groups Reasonable evidence</td>
</tr>
<tr>
<td>Britt et al (1998), USA</td>
<td>3–4 years. Low income</td>
<td>Multifaceted promotion programme</td>
<td>Controlled trial without randomisation I:14 sites, 680 children C:4 sites, 200 children</td>
<td>(A) Observed helmet use</td>
<td>(A) Helmet use: I: 43% to 89% C: 42% to 60% (B) Reasonable/weak evidence</td>
</tr>
<tr>
<td>Henrickson and Becker (1998), USA</td>
<td>10–12 year old children attending schools. Low income families</td>
<td>I, school intervention + telephone parental counselling I, school only intervention</td>
<td>Randomised controlled trial I:142 children 3 schools C:163 children 3 schools C:102 children 3 schools</td>
<td>Self report of helmet use</td>
<td>Reported helmet use: I: 25% to 39% C: 17% to 20% Partially effective Reasonable evidence</td>
</tr>
</tbody>
</table>

C = control; I = intervention.
Summary of findings related to effectiveness

INTERVENTIONS TO REDUCE INJURIES IN THE ROAD ENVIRONMENT

One new study evaluated the effect of area-wide environmental change on traffic speeds and cyclist and pedestrian injuries (table 1). This study evaluated the impact of traffic speed reduction zones (20 mile per hour (mph) zones) in 200 residential areas in the UK. This study did not include control data but it did report on a large range of schemes and included a long period of data collection. It strengthens the evidence related to reducing accidents to vulnerable road users provided by earlier urban safety schemes.

Five articles examined the issue of pedestrian and cyclist training as a means of increasing knowledge and promoting behavioural change (table 2). These additions to the literature mean that there is now increased, but still limited, evidence that bicycle training schemes can improve safe riding behaviour and that education on safe bus boarding can achieve some positive effect. Thomson and Whelan’s study suggests that children’s choice of safe places to cross can be improved by intensive roadside training.

The promotion of bicycle helmets was addressed in a relatively large number of papers. Eight studies evaluated the effects of educational campaigns (table 3) and two examined the impact of legislation on helmet use by children (table 4). These studies suggest that educational campaigns and legislative change can achieve some positive effect on behaviour. There is more limited evidence relating to the effect of such interventions on injury rates.

There is increasing evidence that legislation requiring the restraint of children in cars has a positive effect. Two papers addressed this issue (table 5).

This project has been funded by England’s NHS Executive National R&D Programme in Mother and Child Health (CRD10-21).

Unintentional injuries: Part 1
what works in preventing childhood unintentional injuries: Part 1
E Towner, T Dowswell and S Jarvis

Inj Prev 2001 7: 161-164
doi: 10.1136/ip.7.2.161

Updated information and services can be found at:
http://injuryprevention.bmj.com/content/7/2/161

These include:

References
This article cites 37 articles, 23 of which you can access for free at:
http://injuryprevention.bmj.com/content/7/2/161#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections
Clinical trials (epidemiology) (117)
Epidemiologic studies (842)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/