High levels of incorrect use of car seat belts and child restraints in Fife — an important and under-recognised road safety issue

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Abstract

Objective—To pilot data collection instruments and to make a preliminary estimate of the level of incorrect use of car seat belts and child restraints in Fife, Scotland.

Design—Cross sectional survey of cars containing adults and children at a number of public sites across Fife in 1995 to assess use of car occupant restraints. Trained road safety officers assessed whether seat restraints were appropriate for the age of the passengers and whether restraints were used correctly. These assessments were based on standards published by the Child Accident Prevention Trust.

Participants—The survey gathered data from 596 occupants in 180 cars: 327 adults and 269 children. Ten per cent of drivers who were approached refused to participate. Car occupant restraint was assessed in 180 drivers, 151 front seat passengers, and 265 rear seat passengers.

Main results—Three hundred and sixty one occupants wore seat belts, 68 were restrained by a seat belt and booster cushion, 63 in toddler seats, 25 in two way seats, and 18 in rear facing infant carriers. Ninety seven per cent of drivers, 95% of front seat passengers, and 77% of rear seat passengers were restrained. However, in 98 (52%) vehicles at least one passenger was restrained by a device that was used incorrectly. Seven per cent of adults and 28% of children were secured incorrectly. The commonest errors were loose seat belts and restraint devices not adequately secured to the seat. Rates of incorrect use were highest in child seat restraints, reaching 60% with two way seats and 44% with rear facing infant seats.

Conclusions—The incorrect use of car occupant restraints is an under-recognised problem, both by health professionals, and the general public. Incorrect use has been shown to reduce the effectiveness of restraints, can itself result in injury, and is likely to be an important factor in child passenger injuries. The correct use of car seat restraints merits greater attention in strategies aiming to reduce road traffic casualties. Areas of intervention that could be considered include raising public awareness of this problem, improving information and instruction given to those who purchase child restraints, and encouraging increased collaboration between manufacturers of cars and child restraints, in considering safety issues.

(Keywords: road safety; road traffic accidents; car occupant restraints/seat belts.)

Although the number of children killed or seriously injured in road traffic accidents has fallen in the last decade, increasing use of child restraints has been found in the USA to be associated with an increase in the misuse of these devices. In the USA rates of misuse of child restraints of over 60% have been documented. It has been proposed that misuse of car safety seats may now be an important factor in child passenger injuries. One survey of children presenting to a paediatric emergency department found that 7% had injuries associated with misuse.

The effectiveness of seat restraints in preventing injury is reduced when these are used incorrectly. In addition, certain injuries, such as chest and abdominal soft tissue injuries and whiplash injuries to the neck, have been described more commonly since the widespread use of occupant restraints. These injuries are thought to be due, in part, to incorrect use. Included among these are certain serious injuries, such as high cervical spine fractures in children and lumbar spinal dislocations ('seat belt syndrome'), which were previously rare but have become more common in recent years. Adult seat belts have also been associated with increased reports of certain types of injuries, including bowel and lumbar spine injuries with lap belt use, and aortic, pancreatic, and cardiac injuries with lap/shoulder belt use.

As the level of incorrect use of car occupant restraints was unknown in Fife and we could identify no relevant UK data published in the medical or public health literature, we carried out a survey to estimate the level of incorrect use of car seat belts and child restraints in Fife.

Methods

A literature search, contact with the Transport and Road Research Laboratory (TRRL) of the UK Department of Transport, and personal contacts within the road safety officer profession, failed to identify established data collection instruments or methods that could be applied in this survey. Accordingly, consultants with recognised expertise in in-car safety and...
### Guidelines for completion of questionnaire

**Seat belt**

1. For older children and adults check where diagonal belt crosses body
   - If crosses shoulder—appropriate
   - If crosses neck—inappropriate
2. Fail if anchor points not secure
   - (a) Fail if diagonal strap crosses neck not shoulder
   - (b) Fail if lap strap crosses stomach not pelvis
   - (c) Fail if belt too tight
   - (d) Fail if belt twisted such that function impaired
   - (e) Fail if clip buckle not fastened
3. Fail if diagonal strap crosses neck not shoulder
   - (a) Fail if strap crosses stomach not pelvis
   - (b) Fail if belt too tight
   - (d) Fail if twisted such that function impaired
   - (e) Fail if clip buckle not fastened
4. Fail if frayed or worn webbing
   - (a) Fail if buckle does not work correctly

**Two way seats**

1. Rear facing inappropriate for infants above 9 months
   - Forward inappropriate for infants under 6 months or for children over 4 years
   - (a) Fail if safety device not secured according to manufacturer's recommendations
   - (b) Fail if safety device not secured tightly
   - (c) Fail if buckle not clipped
   - (d) Fail if retaining strap not tight
   - (e) Fail if buckle does not work correctly
   - (f) Fail if frayed or worn webbing
   - (g) Fail if buckle does not work correctly

**Infant carrier**

1. Inappropriate for infants above 9 months
   - (a) Fail if carrier not rear facing
   - (b) Fail if carrier too small
   - (c) Fail if carrier too large
   - (d) Fail if poor anchor points not used
   - (e) Fail if not applicable
   - (f) Fail if frayed or worn webbing
   - (g) Fail if buckle does not work correctly

**Booster cushion**

1. Inappropriate
   - Child too small or too big
   - (a) Fail if buckle not clipped
   - (b) Fail if not secured

**Toddler seat**

1. Inappropriate for infants under 6 months
   - Inappropriate for child over 5 years
   - (a) Fail if safety device not secured according to manufacturer's recommendations
   - (b) Fail if safety device not secured tightly
   - (c) Fail if buckle not clipped
   - (d) Fail if retaining strap not tight
   - (e) Fail if buckle does not work correctly

**Carry cot**

1. Inappropriate for infants above 6 months
   - (a) Fail if unstrapped
   - (b) Fail if recognised carry cot strap not used
   - (c) Fail if poor anchor points not used

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**Appendix**

**Fife Health Board car occupant observation study questionnaire**

<table>
<thead>
<tr>
<th>If 'no' record details below</th>
<th>If 'no' record details below</th>
<th>If 'no' record details below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front seat passenger (3)</td>
<td>Centre passenger (2)</td>
<td>Driver (1)</td>
</tr>
<tr>
<td>1. Is restraint appropriate</td>
<td>Y/N/D</td>
<td>2. Is seat belt correctly</td>
</tr>
<tr>
<td>for weight/age of passenger?</td>
<td>Y/N/D</td>
<td>fitted to the car?</td>
</tr>
<tr>
<td>2. Is safety device</td>
<td>Y/N/D</td>
<td>3. Is passenger secured</td>
</tr>
<tr>
<td>correctly fitted to the car?</td>
<td>Y/N/D</td>
<td>correctly by seat belt or in</td>
</tr>
<tr>
<td>3. Is passenger secured</td>
<td>Y/N/D</td>
<td>a safety device?</td>
</tr>
<tr>
<td>correctly by seat belt or in</td>
<td>Y/N/D</td>
<td>4. Is seat belt/safety</td>
</tr>
<tr>
<td>a safety device?</td>
<td>Y/N/D</td>
<td>device in good condition?</td>
</tr>
<tr>
<td>4. Is seat belt/safety</td>
<td>Y/N/D</td>
<td>Rear seat passengers</td>
</tr>
<tr>
<td>device in good condition?</td>
<td>Y/N/D</td>
<td>1. Is restraint appropriate</td>
</tr>
<tr>
<td>6. Is restraint appropriate</td>
<td>Y/N/D</td>
<td>for weight/age of passenger?</td>
</tr>
<tr>
<td>for weight/age of passenger?</td>
<td>Y/N/D</td>
<td>2. Is safety device correctly</td>
</tr>
<tr>
<td>7. Is passenger secured</td>
<td>Y/N/D</td>
<td>fitted to the car?</td>
</tr>
<tr>
<td>correctly by seat belt or in</td>
<td>Y/N/D</td>
<td>8. Is seat belt/safety</td>
</tr>
<tr>
<td>a safety device?</td>
<td>Y/N/D</td>
<td>device in good condition?</td>
</tr>
<tr>
<td>If 'no' give details below</td>
<td>If 'no' give details below</td>
<td>If 'no' give details below</td>
</tr>
<tr>
<td>Comments on incorrect use (from above)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car position 1 Comments</td>
<td>Car position 2 Comments</td>
<td>Car position 3 Comments</td>
</tr>
<tr>
<td>Car position 4 Comments</td>
<td>Car position 5 Comments</td>
<td>Car position 6 Comments</td>
</tr>
<tr>
<td>Where did you buy the safety device?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New (specify)</td>
<td>Secondhand</td>
<td>No answer</td>
</tr>
</tbody>
</table>

**Vehicle details**

<table>
<thead>
<tr>
<th>Registration letter</th>
<th>E-M</th>
<th>D or older</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>If there are unstrapped passengers in the car and seat belts available, please give details here</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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This form was used by road safety officers in the survey (see text for explanation or contact author for further details). Y = yes, N = no, D = don't know.
experience in training were invited to run a two
day course at which Fife road safety staff were
trained in how to assess correct use of car
restraints. Data collection instruments based
on an established TRRL questionnaire were
developed and piloted by road safety officers
(appendix 1). Standards adopted for the
assessment of correct use and definitions for
appropriate age and weight for each device are
those published by the Child Accident Preven-
tion Trust (CAPT). 24

Seven sites were selected across all districts
of Fife. These included car parks of super-
markets, leisure and recreation facilities, or
outdoor centres. Observations took place on
Saturday mornings and afternoons in August
and September 1995. Two road safety officers
carried out the survey by approaching cars as
they entered the car park and stopping those
that contained both adults and children. They
invited the occupants to take part in a survey to
assess correct use of seat restraints and to
receive expert advice, as appropriate. Approxi-
mately 10% of drivers declined to take part,
usually because of lack of time. Vehicle checks
took between 10 and 25 minutes with the two
officers working together. Assessment of cor-
rectness of use followed CAPT guidelines,
recorded on a standardised recording form.
Any problems identified were discussed with
the vehicle occupants. Once completed, the
next suitable vehicle was stopped and invited to
participate.

Data were entered into a dBase IV database
(Ashton Tate) and analysed on SPSS for
Windows (SPSS Inc) to produce frequency
Tables.

Results
Five hundred and ninety six occupants in 180
cars were surveyed. One hundred and thirteen
vehicles were registered after 1 August 1987,
57 were registered before 31 July 1987, and for
13 the registration year was unknown. The
fitting of rear belts became statutory in cars
manufactured on or after 1 October 1986. The
age of the car occupants, their position in the
car, and the assessment of restraint use by
position in the car and age of passenger, is
shown in tables 1, 2, and 3.

Drivers
Six drivers (3%) were unrestrained, all in the
17–29 age category. On four (2%) occasions
the drivers were recorded as being incorrectly
secured by the seat belt.

Front Passengers
Only five (4%) passengers were unrestrained,
al above 14 years of age. Three children wore
adult seat belts which were inappropriate for
their age. Sixteen passengers were wearing a
restraint device that was being used incorrectly.
In four instances (3%) the safety device was
not correctly fitted to the car, and in 15 cases
(10%) the passenger was not correctly secured
by the seat belt or safety device.

Rear Passengers
Fifty (19%) passengers were unrestrained; 46
of these were travelling in vehicles registered
before 31 July 1987 in which rear seat belts
were not fitted. Only one passenger was
travelling unrestrained in a car registered after
1 August 1987.

Of the 50 unrestrained passengers, five were
aged 14 and over and 45 were aged between 1
and 13 years. A further 11 children wore adult
seat belts inappropriate for their age. Fewer
passengers (26) were sitting in the centre
position than the right or left positions, but a
much higher proportion of those in centre seats
were unrestrained (54% compared with 15%).
Sixty five (25%) passengers were wearing a
restraint device being used incorrectly: in 41
instances the restraint device was incorrectly
fitted to the car, and in 45 cases the passenger
was not correctly secured by the seat belt or
safety device.

Incorrect Use of Safety Devices
Ninety eight occupants were incorrectly re-
strained. Of these, 13 were also inappropriately
restrained, that is, an inappropriate age to use
an adult seat belt, and the remaining 85

### Table 1 Age categories of the drivers and passengers; results are number (%)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Driver</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>17–29</td>
<td>60 (33)</td>
<td>14 (14)</td>
</tr>
<tr>
<td>30–59</td>
<td>98 (54)</td>
<td>1–13</td>
</tr>
<tr>
<td>60+</td>
<td>22 (12)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total</td>
<td>180 (100)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2 Assessment of restraint use by position in the car; results are number (%)

<table>
<thead>
<tr>
<th>Position</th>
<th>Driver</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back left and right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back centre</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3 Assessment of restraint use by seat position and age of passenger; results are number (%)

<table>
<thead>
<tr>
<th>Drivers</th>
<th>No</th>
<th>Unrestrained</th>
<th>Inappropriate restraint</th>
<th>Incorrect use of restraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>180</td>
<td>6 (3)</td>
<td>0</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Front passengers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>117</td>
<td>5 (4)</td>
<td>0</td>
<td>12 (10)</td>
</tr>
<tr>
<td>Children (0–14 years)</td>
<td>34</td>
<td>0</td>
<td>3 (9)</td>
<td>4 (12)</td>
</tr>
<tr>
<td>Rear passengers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults</td>
<td>30</td>
<td>5 (17)</td>
<td>0</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Children (0–14 years)</td>
<td>235</td>
<td>45 (19)</td>
<td>11 (5)</td>
<td>63 (27)</td>
</tr>
<tr>
<td>Total</td>
<td>327</td>
<td>16 (5)</td>
<td>0</td>
<td>18 (6)</td>
</tr>
<tr>
<td>Adults</td>
<td>269</td>
<td>45 (17)</td>
<td>14 (5)</td>
<td>67 (25)</td>
</tr>
<tr>
<td>Overall</td>
<td>596</td>
<td>61 (10)</td>
<td>14 (2)</td>
<td>85 (14)</td>
</tr>
</tbody>
</table>
Table 4 Problems identified with restraints

<table>
<thead>
<tr>
<th>Type of restraint used</th>
<th>No used</th>
<th>No (%) failed</th>
<th>Reasons for failing</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults seat belts (13 of these occupants were an inappropriate age/weight for using an adult seat belt)</td>
<td>361</td>
<td>37 (10)</td>
<td>Twisted such that function impaired</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Belt not tight</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diagonal strap crosses neck not shoulder</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lap restraint crosses stomach not pelvis</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clip buckle not fastened</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prayed or worn webbing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Booster cushion not attached to seat through hooks or ears</td>
<td>9</td>
</tr>
<tr>
<td>Booster cushion</td>
<td>68</td>
<td>16 (24)</td>
<td>Twisted such that function impaired</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Belt not tight</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ruckle does not work correctly</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Booster cushion not sitting securely on seat</td>
<td>1</td>
</tr>
<tr>
<td>Two way seats (forward and backward)</td>
<td>25</td>
<td>15 (60)</td>
<td>Safety device not secured tightly</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Retaining strap not tight</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Safety device not secured according to manufacturer's recommendations</td>
<td>3</td>
</tr>
<tr>
<td>Toddler seat (traditional and polystyrene)</td>
<td>63</td>
<td>22 (35)</td>
<td>Safety device not secured tightly</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Safety device not secured according to manufacturer's recommendations</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Retaining strap not tight</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ruckle not fastened</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Buckle not clipped</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Retaining strap not tight</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Safety device not secured according to manufacturer's recommendations</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Safety device not secured tightly</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Buckle does not work correctly</td>
<td>1</td>
</tr>
<tr>
<td>Infant carrier — rear facing</td>
<td>18</td>
<td>8 (44)</td>
<td>Safety device not secured according to manufacturer’s recommendations</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Safety device not secured tightly</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Buckle does not work correctly</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 5 Child restraint devices: site of purchase and instruction given by retailer; results are number

<table>
<thead>
<tr>
<th>Type of retailer</th>
<th>Motorist outlet</th>
<th>Baby outlet</th>
<th>Supermarket/ shop</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration and fitting</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Demonstration</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Instructions</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>No instructions</td>
<td>8</td>
<td>7</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>No answers</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>18</td>
<td>17</td>
<td>59</td>
</tr>
</tbody>
</table>

occupants (16% of the 535 who were restrained) were using the restraint incorrectly. The most frequently identified problems are shown in Table 4. The proportion of car occupants incorrectly secured by a restraint was much higher in children than adults (25% compared with 6%), and by restraint device used (60% of children in two way seats compared with 44% of infants in rear facing carriers, 35% of children in toddler seats, and 24% of children using booster cushions). In cars where a problem had been identified, only 19% of drivers were aware of these problems. Those who were aware of the problem either cited economic reasons for not correcting them or gave no explanation.

CHILD CAR RESTRAINTS

Seventy two child car restraints (80%) were purchased new. Details of the type of retailer and of instructions given at the time of purchase were asked in 59 cases and these are recorded in Table 5. The level of correct use among those given some kind of instruction or demonstration and those not given any instruction is 60% and 53%, respectively. The degree of bias in these data due to selective recall of information over a period of several years is unknown.

Discussion

Properly used lap/shoulder seat belts are effective in reducing the risk of fatal and serious injuries when car occupants are involved in accidents. In addition, a 60% reduction in injuries has been documented. However, as car occupant restraint use reaches high levels it becomes increasingly important to consider whether restraints are being used correctly.

Incorrect use of restraint devices lessens the protection they provide. Results from sled tests with belted dummies indicate the greater potential for serious head injury with as little as 25 mm slack in a seat belt. Investigations of severe or fatal injuries have shown excessive belt slack as an important contributor to injuries. Reports are predominantly from hospital based case studies and do not represent incidence data from which statements of risk can be inferred. They suggest, however, that further research to estimate risks associated with incorrect use is needed, and that health workers should be aware of the different pattern of injuries found among restrained passengers involved in accidents compared with those who are unrestrained.

In this study of 596 car occupants in Fife, in cars with seat belts fitted, 97% of drivers and 83% of passengers were travelling protected by a seat belt or other restraint device. The level of rear seat restraint use in cars with rear belts fitted as standard was significantly higher, at 96%. We therefore expect that rear seat restraint use will continue to rise as the proportion of cars without rear seat belts falls. The study population can be described in terms of two significant populations—one being occupants of older vehicles without seat belts in their rear seats, and people with newer cars with seat belts in the rear of the vehicle. Impressively, the majority of individuals in newer cars with seat belts in all seating positions had only 12 unbelted occupants. The large proportion of unbelted children in the study in older cars may arise from families in Fife having limited resources and driving
High levels of incorrect use of car seat belts and child restraints in Fife

Table 6   Car occupant restraint: summary of legal requirement in the UK in 1996

<table>
<thead>
<tr>
<th></th>
<th>Front seat</th>
<th>Rear seat</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>Child under 3 years</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>Child aged 3–11 and</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>under 1.5 m (approx</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>5 ft)</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>Child aged 12 or</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>younger child 1.5 m</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>(approx 5 ft) or more</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>in height</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
<tr>
<td>Adult passengers</td>
<td></td>
<td></td>
<td>Driver</td>
</tr>
</tbody>
</table>

Table 6: Car occupant restraint: summary of legal requirement in the UK in 1996

Table 6 highlights the legal requirement for car occupants in the UK in 1996. It shows the legal requirements for different age groups and seating positions, including front seat and rear seat restraints, and the responsibility for ensuring compliance.

Implications for prevention

In summary, the levels of car occupant restraint use found in this survey in Fife are high in vehicles with seat belts fitted. In part this reflects the design of the survey, which selected vehicles in family use at weekends. Despite studying this safety conscious group, however, examples of incorrect use of restraints were found in 52% of vehicles surveyed. The rates of incorrect use were substantially higher in children and were particularly associated with specific types of child car restraints. Action to address this problem is required across a number of related areas. More attention should be given to child safety in car and car seat belt design. Efforts should be made to encourage car and car seat manufacturers to provide information that highlights common faults in restraint use and}

accept standards published by CAPT,19 and we trained road safety officers in the practical assessment of restraints in relation to these standards. Thus the faults we report are serious in that they compromise the effectiveness of the restraint devices9,9 or may directly result in serious injury.12,13

We were unable to distinguish between incorrect use resulting from misuse and that due to poor design of restraint systems. For example, it is considered that the increase in high cervical spinal injuries in children is due to the lack of top tethering because these injuries are rarely seen in Australia where top tethers are mandatory. It may be, therefore, that in some situations current child seat restraints simply cannot be tightened sufficiently when using an adult lap and diagonal seat belt with an inertia reel. Car manufacturers appear to give highest priority to the effectiveness of restraint of adults rather than children. Currently, seat belt anchorage points are being moved further forward to place the lap strap across adult thighs rather than the stomach. This makes it more difficult to secure child seats safely. Moreover, car seats and belts are rigorously tested to ensure adequate protection of adult occupants. Child seats, unlike adult car seats, are not made by the car manufacturers and thus car manufacturers do not test the performance of child restraints in their vehicles.36

The level of incorrect use of seat belts in serious accidents that result in car occupant injuries or fatalities is not known. Data on seat belt use at the time of accidents has not been collected by the police during accident investigations since 1994. A study of fatalities among restrained children in UK road traffic accidents from 1979–94 carried out by Vehicle Safety Consultants, Silverdale, Lancashire, England on behalf of the TRRL has shown that, where information on correctness of restraint of children was recorded, 38% of these children were restrained incorrectly at the time of the fatal accident (SJ Rattenbury, personal communication). It is not known what proportion of these deaths would have been avoided if the restraint had been used correctly.

Implications for prevention

In summary, the levels of car occupant restraint use found in this survey in Fife are high in vehicles with seat belts fitted. In part this reflects the design of the survey, which selected vehicles in family use at weekends. Despite studying this safety conscious group, however, examples of incorrect use of restraints were found in 52% of vehicles surveyed. The rates of incorrect use were substantially higher in children and were particularly associated with specific types of child car restraints. Action to address this problem is required across a number of related areas. More attention should be given to child safety in car and car seat belt design. Efforts should be made to encourage car and car seat manufacturers to provide information that highlights common faults in restraint use and
that provide proper instruction in their correct use.44
Health care professionals need appropriate guidelines59,60 so that they can provide up-to-date information for parents regarding their child safety seat choices and use.41 Including discussion of car safety as a routine part of child health promotion programmes is an important new initiative.42 In Fife we have also held awareness raising seminars outside the health sector for social work department staff who deal with young children and their families, nursery staff, childminders and nannies, as well as vehicle registration and inspection service staff.
Community initiatives such as the establishment of infant car seat loan schemes have been shown to be effective and should be explored further.41 Since it has been shown that lack of parental knowledge about child restraint device use contributes to improper use of these devices,42 efforts should be made to raise public awareness and knowledge of this issue.44,45
In the UK, the ‘In-Car Safety’ initiative has organised public displays and open access In-Car Safety clinics at which the public can receive a free car restraint safety check. It is important that priority is given to these initiatives and that this is coupled with ongoing evaluation so that the most effective initiatives in the UK are identified. Without such activity the potential for reducing road traffic accident injuries and fatalities will not be fully achieved.

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High levels of incorrect use of car seat belts and child restraints in Fife--an important and under-recognised road safety issue.

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