Cross country variation of fractures in the childhood population. Is the origin biological or “accidental”?*

Editor,—The interesting paper by Lyons et al1 revealed that the annual incidence rate of fractures among children aged 0–12 years was two to three times higher in Wales than in other western European countries.2 This discrepancy prompted us to briefly report on the epidemiological profile of fractures in the childhood population of Greece and discuss the implications of the observed differences.

Our data derive from the Emergency Department Injury Surveillance System (EDISS) database which is run by the Center for Research and Prevention of Injuries among the Young (CEREPR).3 All types of childhood injuries treated at the emergency departments of the participating hospitals, which have well circumscribed catchment areas in rural and urban Greece, are routinely recorded in this database. The catchment area includes the Greater Athens area, where about 40% of the country’s population resides, Magnesia county in Greece mainland, and Corfu county on the island of Corfu. Our methodology was similar to that followed by Lyons et al4 thus allowing for reasonable comparisons.

A total of 8557 fractures were recorded during the three year period 1996–98 among children 0–14 years old and the estimated annual incidence rate was 12 fractures/1000 children. No significant variation was noted among children from the different sites participating in EDISS. This rate is just one third of that recorded in the Welsh childhood population. In line with what is reported by Lyons et al,5 and other investigators,6,7 boys were also over represented in the Greek data so that the sex ratio was 1.9:1 and this preponderance increased with age. Altogether 2.7% of the injured children presented with multiple fractures, a figure that is higher than that reported by Lyons et al (1.8%) and much higher than the high road traffic injury toll in Greece. In fact, one third of the multiple fracture injuries were the result of a road traffic crash, whereas traffic accidents accounted for less than 5% among injured children with one fracture.

The distribution of children by injured body part was comparable to that of the Welsh population, with fractures of radius and ulna accounting for 45% of the total, followed by fractures of fingers (3.9%), humerus (6.9%), and carpal/metacarpals (4.8%). The similarity in the pattern of fractures among children who sought emergency hospital care in the two countries can be considered as an indicator of the high quality registration system in both sites and enhances the possibility that the observed difference of the fracture incidence rate is genuine. It is worth noting, however, that despite the low overall incidence of fractures in the Greek childhood population, the proportion of skull fractures was more than twice as high as that reported in the Welsh7 and in a related Swedish8 study. Cycle helmet use may not be optimal9 but according to data derived from EDISS, use of protective devices for road traffic injuries is unacceptably low, and playgrounds do not usually comply with international standards. Therefore, the underlying causes for the discrepancy in skull fracture incidence should be carefully monitored in Greece, whether it is caused by reluctance to wear helmets or otherwise, and corrective action taken.

One third of the recorded fracture injuries in both studies occurred in residential areas, where children spend most of their time, followed by school areas and public premises. An average of 40% of fractures resulted from sports and leisure activities. Cultural differences and different sports and leisure time preferences between the two population groups, however, become obvious when the injuries are further analyzed by type of sport activity. Thus, ball related injuries were dominant in our population (70% of sports related injuries among Greek compared with 40% among Welsh children), whereas wheeled sports activities were almost twice as common in Welsh compared with Greek children (35% and 20% respectively).

In conclusion, comparison of data from these studies indicate that the incidence of fractures in the Greek childhood population is similar to that observed in Sweden but much lower than that reported by Lyons and his colleagues. The question is: could this variation simply be attributed to different exposure levels and/or different prevention strategies that are followed in the respective countries, or does it reflect the expression of a biological mechanism, possibly related to nutritional factors, that accounts for fewer Greek children suffering from fractures. The latter hypothesis cannot be properly answered, however, without careful consideration of differences in data collection, coding, and processing methods. To test this hypothesis, comparative, population based crude and fracture specific injury incidence data collected from children from southern and northern European countries could be used to elucidate whether the observed differences simply reflect a corresponding difference in the environmental situations or whether they are mainly related to differences in the incidence of fractures. If the latter is the case, further investigation focusing on possible differences of bone mass density or dietary intake should be considered in the interpretation of the observed variation of fractures on different population groups.

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LETTERS TO THE EDITOR

Speed reductions, inequalities, and transport

Editor,—We read the editorials in the BMJ and Injury Prevention about speed limits with interest1,2 and would like to share some of the Scottish experience with them.

Councils throughout Scotland are conducting trials of advisory 20 mph limits as part of a Scottish Executive initiative. In Lothian these are generally in residential areas and often linked with Safe Routes to Schools projects run by the councils in partnership with Lothian Safe Routes, SPOKES (an Edinburgh based cycle group), Lothian Health, and the police. In addition a small number of mandatory 20 mph zones exist, with proposals in Edinburgh for a city wide 20 mph limit in residential areas and on shopping streets.

Road traffic accidents (RTAs) are not spread evenly across communities, with disadvantaged children having a much worse experience of RTAs.3 In Edinburgh the City of Edinburgh Council has made traffic calming measures in areas with high accident rates a feature of the city’s road safety strategy since the early 1990s. These have been mainly engineering measures to calm traffic in more disadvantaged parts of the city. This has resulted in a reduction in speeds, and a 39% reduction in reported accidents in areas calmed under the “calmness reduction” programme (compared with 29% reduction where “environmental traffic management” was the aim and 4% reduction where measures were in connection with bus priority routes). This is against a picture of relatively stable accident levels in the council areas during the 1990s. This suggests that, where engineering measures are costly, with the council spending some £1.2 million for the “calmness reduction” programme. While it remains to be seen whether the much less expensive advisory 20 mph schemes will be of similar benefit, there are some lessons about implementing and enforcing these schemes. As these 20 mph schemes are merely advisory, they can only be enforced if motorists are driving dangerously. Anecdotal evidence from early 20 mph schemes suggest that, while speeds are in general reducing, a significant proportion of motorists have not moderated their speed. These motorists are often local residents who believe they “know the road” (Lothian and Borders Police, personal communication). This emphasises the importance of community consultation before schemes are introduced and regular feedback to the community after they are in place—in Scotland only around a third of
residents have rated the consultation as suitable. Where there is good consultation there may be an underlying cohort for each type from which cases and controls are sampled. The primary difference between the incidence density and cumulative incidence case-control studies is how we view the cohort and what information the control group provides. The incidence density case-control study views the underlying cohort as being stable and dynamic. The control group in an incidence density case-control study is intended to provide an estimate of the fraction of population time exposed and unexposed. The OR, then, is a ratio of pseudo-rates and provides an unbiased estimate of the incidence rate ratio, with no rare disease assumption (table 1). Thus it does not matter whether the disease is rare, only that controls be selected independently of exposure status to be representative of the distribution of the exposure in the source population which produced the cases.

The cumulative incidence case-control study is where the rare disease assumption is important. The cohort underlying the cumulative incidence case-control study should be thought of as closed and fixed. Incident cases are sampled throughout a defined time period and controls are residual non-cases (that is, those individuals at risk who did not become cases over this period). In this situation, the control group does not provide a representation of person time. Instead, the relationship between the odds and the risk is what is key. That is, when the disease is rare, the odds of disease (cases/non-cases) and the risk of disease (cases/total at risk) are approximately equal (keeping in mind that the odds of disease is not available from a case-control study, only the OR): Risk = 10 cases/1000 total at risk = 10 cases/(1000 total exposure + 10 cases) = 10 cases/990 non-cases = odds

The case-control studies that provide the OR estimates used in Dr Kopjar’s article could be seen as the incidence density type. The OR would then be an unbiased estimate of the incidence rate ratio, with no rare disease assumption.

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1 Bicycle riding hours
2 Amount of time
3 Bicycle injuries
4 Bicycle injuries for each group
5 Bicycle injuries for each group
6 Bicycle injuries for each group
7 Bicycle injuries for each group
8 Bicycle injuries for each group
9 Bicycle injuries for each group
10 Bicycle injuries for each group
11 Bicycle injuries for each group
12 Bicycle injuries for each group
13 Bicycle injuries for each group
14 Bicycle injuries for each group
15 Bicycle injuries for each group
16 Bicycle injuries for each group
17 Bicycle injuries for each group
18 Bicycle injuries for each group

1 Hypothetical example of how the odds ratio is an unbiased estimate of the incidence rate ratio in an incidence density case-control study. The sampling fraction for cases is 10% and the control group provides the estimate of the fraction of person-time exposed and unexposed. This example is based on data from Thompson et al.

Table 1

<table>
<thead>
<tr>
<th>Hypothetical cohort</th>
<th>Helmet</th>
<th>No helmet</th>
<th>Total</th>
<th>Incidence rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>220</td>
<td>535</td>
<td>757</td>
<td>0.316</td>
</tr>
<tr>
<td>Bicycle riding hours</td>
<td>194</td>
<td>764</td>
<td>1117</td>
<td>0.316</td>
</tr>
</tbody>
</table>

1 Bicycle injuries for each group
2 Bicycle injuries for each group
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field, one that Jerry Moller has long called for, which will incorporate the “beliefs and behaviours of individuals and the social and cultural structure” (Moller quoted in Rothe, paviu, and originally, Moller’) into accident prevention. Without it our understanding is that of the individual; we fail to appreciate the intricate interplay of causes of unintentional accidents and injuries and in so doing, fail to make real headway to creating effective prevention strategies.

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**UPDATE ON ISCAIP**

From the Chair of ISCAIP

As many readers will be aware, the elections for the new ISCAIP Board were held in 2000. I feel deeply honoured to have been elected Chair and wish to thank all concerned for their support. My colleagues on the Board are an outstanding team of highly respected injury prevention professionals and I am confident that we, together with the membership, can take ISCAIP into the new century with a renewed sense of purpose and urgency.

I want especially to record my appreciation of the incalculable contribution of Fred Rivara, founding Chair of ISCAIP, in laying the foundations of the organisation and in providing a model of leadership and vision. Fred’s leadership has been truly inspirational and unlikely to be equalled in any future. Fred’s personal commitment to the field, one that Jerry Moller has long called for, which will incorporate the “beliefs and behaviours of individuals and the social and cultural structure” (Moller quoted in Rothe, paviu, and originally, Moller’) into accident prevention. Without it our understanding is that of the individual; we fail to appreciate the intricate interplay of causes of unintentional accidents and injuries and in so doing, fail to make real headway to creating effective prevention strategies.

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**DETR Good Practice Conference**

20–22 June 2001, Bristol, UK. The DETR, the UK government department with responsibility for road safety, is staging this conference to disseminate good practice in road safety engineering and speed management, and to launch their good practice guidelines.

Further information: Kevin Clinton, RoSPA, Road Safety Dept, Edgbaston Park, 353 Bristol Road, Birmingham B5 7ST, UK (tel: +44 (0)121 248 2125, fax: +44(0)121 248 2001).

**Nordic Safe Communities Conference**

21–24 August 2001, Denmark. Further information: Moa Sundeström, Karolinska Institutet, Department of Public Health Sciences, Division of Social Medicine, Norrbacka, SE-171 76 Stockholm, Sweden (tel: +46 8 517 77948, fax: +46 8 334693, email: moa.sundstrom@socmed.slu.se).

**4th International PhD Course on Safety Promotion Research**


Further information: Moa Sundeström, Karolinska Institutet, Department of Public Health Sciences, Division of Social Medicine, Norrbacka, SE-171 76 Stockholm, Sweden (tel: +46 8 517 77948, fax: +46 8 334693, email: moa.sundstrom@socmed.slu.se, web site: www.ksi.se/phs/education).

**1st International Course on the Global Burden of Injury**

30 October–3 November 2001, Stockholm. The aim of the course is to provide a general scientific platform for the understanding of global trends and international differences in injury mortality and morbidity; for PhD and postgraduate students and senior researchers.

Further information: Moa Sundeström, Karolinska Institutet, Department of Public Health Sciences, Division of Social Medicine, Norrbacka, SE-171 76 Stockholm, Sweden (tel: +46 8 517 77948, fax: +46 8 334693, email: moa.sundstrom@socmed.slu.se, web site: www.ksi.se/research/courses/postgrad_catalogue/fall2000_en.html).

**CALENDAR**

**10th Annual Conference on International Safe Communities**

21–23 May 2001, Anchorage, Alaska, USA. The theme is Safe Work, Safe Play Around the Clock. Further information and online registration: www.alaska-ips.org or from Conference Manager, Diana Hudson, The Alaska Injury Prevention Center, PO Box 210736, Anchorage, Alaska, USA 99521-0736 (tel: +1 907 929 3939, fax: +1 907 929 3940, email: diana_hudson@hotmail.com).

International Child Passenger Safety Technical Conference

2–6 June 2001, Indianapolis, Indiana, USA. This conference will offer workshops on child passenger safety certification, boosters and belts for school age kids, legislation and advocacy, model law enforcement programs, restraint programs for children with special needs, transportation in other vehicles, and more. Professionals and volunteers from the field of transportation, engineering, public health, education, medical services, and insurance are invited to attend. Further information: International Center for Injury Prevention, www.cipsafe.org.