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REFLECTIONS ON PUBLIC SAFETY – A UK EXPERIENCE

David J. Ball
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County Hall, London
LONDON in the 1960s

Acute effects of AIR POLLUTION
Predicted number of deaths = $f(dose, \text{dose-response function, number of people exposed})$
WHAT ABOUT ACCIDENTAL INJURIES?
THE CASE OF LONDON UNDERGROUND

Subjectively this is a high risk situation
THE CASE OF LONDON UNDERGROUND

But objectively the risk is very low. We know this because of the *injury data base*

The Injury Data Base is currently the only way of getting *objective data*
ONE EXAMPLE OF THE USE OF AN INJURY DATA BASE
CHILDREN’S PLAYGROUNDS
– a hot topic since 1986
A holistic approach to accident and injury prevention in children’s playgrounds
by Karen King and David Ball

Statistical analyses using injury data bases

Some findings
<table>
<thead>
<tr>
<th></th>
<th>Fatalities</th>
<th>Hospital admissions</th>
<th>Hospital attendances</th>
<th>Other medical treatment</th>
<th>Non-medically treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment-related</td>
<td>0.3</td>
<td>3,600</td>
<td>41,700</td>
<td>100,000</td>
<td>~0.4 million</td>
</tr>
<tr>
<td>Equipment-related and non-equipment related</td>
<td>-</td>
<td>4,200</td>
<td>49,000</td>
<td>110,000</td>
<td>~0.5 million</td>
</tr>
</tbody>
</table>

Playground accidents: annual average, UK estimate
How significant are these numbers?

a) 41,700 hospital attendances from playgrounds compares with 2.25 million due to home and leisure accidents (i.e. 2% playground–related)

b) 0.3 fatalities per year from play compares with ~500 per year from accidental injury

c) Calculate risk of hospital attendance per 100,000 hours of participation -

12 million children, 1.5 hours per week of play, suggests

~ 4 cases per 100,000h of exposure to outdoor play equipment
Figure 1: Non-fatal injury rate based on A&E attendances

Non-fatal accident rate per 100,000 hours of exposure

- Rugby
- Soccer
- Hockey
- Netball
- Cricket
- Basketball
- Squash
- Skiing
- Athletics
- Motor sports
- Tennis
- Badminton
- Riding/horse sport
- Running/jogging
- Climbing/mountaineering
- Sailing
- Public playgrounds
- Fishing
- Swimming
- Golf
- Bowls
- Table tennis
- Table stick sport

0 50 100 150 200 250 300
THE ECONOMICS OF CONSUMER SAFETY

Premise: A safety intervention *should* be made if the benefits of the intervention (the reduced risk) exceed the costs.

Decision rule: Proceed if $B > C$.

Is $B > C$?
BUT, HOW CAN CONSUMER SAFETY BE VALUED?

Two main methods:
• revealed preference
• expressed preference
QUESTION: Imagine you are in Tokyo. You wish to travel to Nagaoka by train and two train companies (A & B) offer a service. The services are identical except that the trains run by A are more likely to result in fatal accidents. Your risk of death on A is 1 in 50,000 whereas on B it is half of that i.e. 1 in 100,000. The fare on train A is $100. How much more would you be prepared to pay to travel on the safer train B?

An EXPRESSED PREFERENCE QUESTION
If you answer $50, the implied value of your life would be:

$$\frac{50}{(1/50,000 - 1/100,000)} = 5 \text{ million}$$
Based on a nationally representative sample, the value of a statistical life in the UK is currently ~ £1.5M (~200M Yen)

(Non-fatal injuries can be valued by the same ‘willingness to pay’ approach, or by scaling)
ASSESSING A CONSUMER SAFETY INTERVENTION

Injury data base → Prior risk

Scientific assessment of safety benefits of intervention → Post intervention risk

Cost of intervention → Cost-benefit evaluation

Any other considerations? → Decision
Scientific analysis shows that the safety benefits of rubber surfaces are << their cost
COMPLEXITY

Kensington High Street, London
Kensington High Street (after ‘improvement’)
The challenge posed by cycle helmets
TWO PARADIGMS

Children must be kept safe

Children need danger

Somewhere in Portugal

RATIONAL ACTOR PARADIGM

Toddlers at a Norwegian kindergarten

THE ADAPTIVE PARADIGM
CONCLUSIONS

• public safety is an important challenge

• however, it is complex and not easily achieved

• subjective assessments of public risk are unreliable

• understanding how to invest in public safety requires, as a starting point, a good injury data base
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Complexity and public safety
• Hans Monderman https://www.pps.org/reference/hans-monderman/
• David Spiegelhalter http://www.bmj.com/content/346/bmj.f3817 and http://road.cc/content/news/85306-top-scientists-
  cycle-helmets-debate-will-go-and-and