Time trends in motorcycle accidents in Britain

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SUMMARY Motorcycle accidents constitute a major cause of death and disability among the young. This paper draws on routinely collected data to describe the trends for motorcycling and motorcycle accidents in Britain between 1951 and 1980. The level of risk (calculated as motorcyclist fatalities per motorcycle kilometre travelled) has fallen, but this effect has been overwhelmed by changes in motorcycle use. The paper discusses some of the factors that may have contributed to these time trends and concludes that accident prevention programmes should address the determinants of use as well as those of risk.

Motorcycle† accidents cause more than 1100 deaths a year in Britain—that is about one in six road deaths. For every death 17 seriously injured casualties are reported in the official statistics,¹ and probably a further seven motorcyclists are seriously injured in accidents that are not reported to the police.² The total extent of the disabilities resulting from these accidents is not known, but the injuries are often severe and slow to heal.³ In addition, motorcycle accidents have particular importance as a cause of premature death and disability. In 1980 only one in seven motorcycle accident casualties was aged over 30,¹ and these accidents are now responsible for a substantial proportion of the deaths among young men.

In Britain in 1978, 3538 men aged between 15 and 24 died. Motorcycle accidents caused 772 of these deaths, while better known medical conditions contributed only a fraction of this number. For example, in that year in the same age group⁴ there were 90 deaths from leukaemia, 23 from Hodgkin's disease, and 22 from asthma.

Britain's roads are in most respects safer than ever before. While the amount of road traffic has continued to grow each year, the number of road accident casualties has been falling in recent years.⁵ The mortality from motorcycle accidents has increased (table 1), however, and the casualty rate per kilometer travelled remains 20 times that of car occupants.¹

Method

Numbers of motorcycle accidents, registered motorcycles, and estimated motorcycle kilometres

travelled were obtained from the Department of Transport for the years 1951–80. Other sources of information included the National Travel Surveys⁶ and the publications of the British Road Federation.⁷

Table 1 *Road accident mortality rates, by selected category of road user, Britain, per 100 000 population*

	1970	1975	1980
Motorcyclists	1.41	1.54	2.14
Car occupants	5.34	4.49	4.19
Pedestrians	5.43	4.31	3.59
All road accidents	13.91	11.70	11.05

(Source: Department of Transport).

Results and discussion

The trends in motorcycle accident fatalities and motorcycle use are shown in the figure and table 2. The number of motorcycle kilometres travelled each year is estimated by the Department of Transport and is derived from roadside traffic counts and the total length of each road system sampled. These data cannot be corroborated as there is no other comprehensive measure of motorcycle use available at present. Questions on motorcycle use are included in the National Travel Survey, which is based on a sample of private households in Britain and has been conducted every three to five years since 1965. These household surveys have provided estimates of motorcycle use 15–20% lower than the Department of Transport estimates for the same year. The trends with time have been similar in the two sets of data, however, and it is highly likely that the lower figures obtained in the National Travel Survey have been due, at least in part, to the overrepresentation of young men among non-responders to the survey.⁸

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†In this paper "motorcycles" includes mopeds and other two-wheeled motor vehicles.

Table 2 displays the trends in motorcycle use and fatality risk for motorcycle riders and passengers. Mortality (the number of motorcyclist deaths) has varied with use, while risk has varied relatively little. Since 1971 there has been, for the first time, a consistent year-by-year fall in the level of risk but, overall, major changes in exposure have overwhelmed the minor reductions in risk. This is of interest since road safety programmes have traditionally been concerned only with lowering risk, and have accepted exposure as fixed or predetermined. Clearly, the level of use has not been constant, and factors that have influenced the number of motorcycles in use and the amount each vehicle was driven have been the principal determinants of motorcycle accident mortality.

Several factors may have contributed to the recent fall in the fatality rate per kilometre travelled. The gradual introduction of safety helmets (which were made compulsory for motorcyclists in 1973) provides an example of effective protection by rider "packaging."⁸ General improvements in road design and, possibly, better treatment of accident casualties may have also contributed.

Table 2 *Motorcycle accident mortality (numbers of motorcyclist fatalities), motorcycle usage (motorcycle kilometres travelled a year), and risk (motorcyclist fatalities per 10⁷ motorcycle kilometres travelled). Britain 1951–80*

	Mortality (No of motorcyclist deaths)	Use (motorcycle km × 10 ³)	Risk (mortality/use)
1951	1175	555	2.11
1952	1142	601	1.90
1953	1237	669	1.85
1954	1148	687	1.67
1955	1362	752	1.76
1956	1250	740	1.70
1957	1425	830	1.72
1958	1421	836	1.71
1959	1680	975	1.72
1960	1743	1004	1.74
1961	1544	970	1.60
1962	1323	865	1.53
1963	1279	757	1.69
1964	1445	755	1.92
1965	1244	669	1.87
1966	1134	597	1.90
1967	920	517	1.78
1968	877	470	1.87
1969	791	415	1.91
1970	761	388	1.96
1971	800	380	2.11
1972	729	353	2.07
1973	750	371	2.03
1974	796	397	2.00
1975	838	486	1.72
1976	990	580	1.71
1977	1182	675	1.75
1978	1163	683	1.70
1979	1160	700	1.66
1980	1163	770	1.51

(Source: Department of Transport).

Motorcycle rider training was introduced in Britain by the Royal Automobile Club and Auto-Cycle Union in the 1940s. The number of riders receiving formal training has increased greatly in the past ten years as new schemes have been established with the support of the motorcycle industry.⁹ Have these programmes reduced accident rates? Comparisons of the accident records of formally trained and informally trained riders have failed to provide clear evidence of a protective effect from formal training.^{10 11}

Have motorcycle rider training programmes increased motorcycle use? Recent evidence from the United States suggests that compulsory car driver training in schools there has been associated with earlier driver licensure, and an increase in miles driven.¹² Rider training in Britain is promoted widely by the motorcycle industry, often with advertisements aimed at reassuring parents of potential motorcycle riders, and the number of training schemes has increased in parallel with the recent increase in motorcycle use. If these schemes do stimulate use the probable effect will be to increase total accident mortality, as there is no evidence at present that such training reduces the risk of injury per kilometre travelled.

Is the price of petrol related to the popularity of motorcycling? The steep rise in the price of petrol in 1974 corresponded with the beginning of the most recent upsurge in motorcycle use.⁵ While petrol prices have risen sharply again since 1979, there is no information available yet on motorcycle use during that period, although the number of casualties has not increased (table 2). There have been other occasions in the past—for instance, the late 1940s—when petrol was costly, but motorcycling remained relatively unpopular.⁷

There is no clear association with trends in personal wealth as measured by average disposable income. Incomes rose steadily throughout both the 1960s (when motorcycle use was declining) and also most of the 1970s (when motorcycling increased).¹³ Rising incomes and the greater availability of cars in the 1960s may have been an important reason for the move away from motorcycles during that decade. The National Travel Survey found (in 1975–6), however, that household income was positively associated with the number of motorcycle rider licences held by household members.⁶ It may be that rising incomes have led, firstly, to a move away from motorcycles as a form of basic transport and, secondly, to a move back to motorcycles for recreation.

The apparently inconsistent effect of economic factors may be at least partly due to changes in the age composition of the motorcycling population.

Table 3 gives numbers and percentages of severe motorcycle rider casualties for the quinquennial age groups 15–19, 20–24, and 25–29, together with values for the casualties of other ages. (This group includes, with a few exceptions, riders over the age of 29.)

Table 3 *Motorcycle riders, fatally or seriously injured, by age group. (Numbers in parentheses represent row percentages)*

	Age group				
	15–19	20–24	25–29	Others*	Total
1951	1 371 (12.6)	3672 (33.7)	2407 (22.1)	3432 (31.5)	10 882 (100)
1955	2 629 (16.5)	4635 (29.1)	2753 (17.3)	4874 (37.0)	15 891 (100)
1960	7 405 (30.5)	6497 (26.8)	2664 (11.0)	7680 (31.7)	24 246 (100)
1965	10 686 (44.1)	3663 (15.1)	1306 (5.4)	5465 (25.9)	21 120 (100)
1970	7 326 (52.8)	2529 (18.2)	730 (5.2)	3281 (22.7)	13 866 (100)
1975	8 231 (54.7)	2748 (18.3)	1125 (7.5)	2952 (19.6)	15 056 (100)
1980	10 655 (55.3)	4435 (23.0)	1487 (7.7)	2685 (13.9)	19 262 (100)

(Source: Department of Transport).

*Aged 30 and over, with few exceptions aged under 15.

The average age of motorcycle rider casualties has fallen in the past 30 years. In 1951 more than half the riders fatally or seriously injured were aged 25 or older. This proportion has since decreased, and in 1980 most severely injured motorcycle riders were under 20. There are no national data available on motorcycle use by age, so this change may be the result of higher age specific accident rates among the young or a fall in the average age of all motorcycle riders. Motorcyclists generally are probably younger than in the past,¹⁵ and this may mean that economic factors, such as rising incomes, no longer have the same effects on choice of mode of transport as applied in the 1950s.

The riders of mopeds (motorcycles with an engine capacity of under 50 cc) have consistently accounted for 4–6% of the fatalities total, but the proportion of motor scooter riders and passengers has varied. In 1959 12% of the motorcyclist fatalities were riders or passengers on motor scooters, but the popularity of this form of motorcycling has declined considerably, and the same proportion in 1980 amounted to only 2%.

Nearly all motorcycle accident casualties throughout this period have been men. In 1951 the sex ratio, male:female, for motorcyclist fatalities (riders and passengers) was 11.7:1; in 1959 the ratio was 10.8:1; and in 1980 it was 10.7:1. By contrast, the sex ratio for all road accident fatalities in 1980 was 2.4:1.

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The ratio of motorcycle riders : passengers has changed since 1951. Table 4 shows that during this time passengers have tended to make up a smaller fraction of all fatally or seriously injured motorcyclists, and in recent years there have been eight to nine fatally or seriously injured riders for each passenger similarly injured. If this pattern reflects a reduction in the amount of travel by motorcycle pillion and sidecar passengers then the trend is towards greater road safety. In recent years usage figures have become available for riders and passengers separately, and passengers apparently are at much greater risk than riders of severe injury per kilometre travelled. In 1978 in Britain there were 14.7 motorcycle rider fatalities per 100 million motorcycle kilometres and 25.5 motorcycle passenger fatalities per 100 million motorcycle passenger kilometres. (In the same year there were 0.7 car driver fatalities, and 0.6 car passenger fatalities, per 100 million kilometres travelled by car.)

Table 4 *Motorcycle riders and passengers, fatally or seriously injured*

	Riders	Passengers	Ratio riders:passengers
1951	11 865	2792	4.3:1
1955	15 891	3466	4.6:1
1960	24 246	4827	5.0:1
1965	21 120	3710	5.7:1
1970	13 866	2272	6.1:1
1975	15 056	1554	9.7:1
1980	21 377	2483	8.6:1

(Source: Department of Transport).

Motorcyclist deaths and motorcycle kilometres travelled, Britain 1951–80. (Source: Department of Transport.)

Conclusions

The trends described here are a clear reminder that the mortality due to motorcycle accidents is chiefly a consequence of the number of motorcycles in use, and the miles these vehicles are ridden. For this reason alone, exposure should not be accepted as a predetermined variable in the accident mortality equation. Instead, from the point of view of health services, exposure is part of the problem of road trauma, and research into the causes of motorcycle accidents must consider also the factors that encourage this particularly dangerous form of road transport.

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