



THE ACCIDENT RISK OF MOTORCYCLISTS

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This report contains the findings of a study conducted on behalf of Road Safety Division, Department for Transport. The objective of the study was to explore and quantify the interacting influences which determine motorcyclist accident (and casualty) liabilities.

The study first reviewed existing data sources to investigate the trends in motorcycling accidents over the last decade or so. Analysis of this trend data, along with other published national data showed no evidence that the emergence of a previously unrecognised risk factor is needed to explain the recent trends in motorcycle accidents. The data showed that the number of casualties either per motorcycle or per km travelled has been fairly stable over the last decade or so. Thus it would appear that the increase in the number of casualties is mainly due to the increased number of motorcycles and the increase in the distances being travelled.

The main part of the study was to carry out a survey of current motorcyclists designed to explore the relationship between accident (or casualty) risk and variables such as annual mileage, age, experience, journey type, training, personal characteristics of the riders, and the self-reported behaviours and attitudes of the riders.

After careful design and piloting, a questionnaire was sent to 30,000 motorcyclists who were current riders and whose motorcycle was privately owned. About 40% of recipients responded to the questionnaire mailing and this provided 11,360 responses for analysis. The questionnaire asked about riding experience, accidents (including minor spills and more serious accidents), whether the rider was to blame, and a number of 'psychological' measures related to the rider's behaviour and attitudes. The questionnaire also asked for basic data about the rider's age, sex, socio-economic status, and car driving experience.

Analysis of the data returned by respondents showed that male riders were in the majority; female riders constituted only 9% of the sample. Just over 11% of male riders and just over 15% of female riders were accident involved in their past 12-months of riding, the overall accident involvement for all riders being 11.7%.

The number of accidents reported by riders within the past 12-months of riding were modelled using generalised linear techniques to take into account factors such as mileage, age, experience, bike size and the conditions prevailing when they rode (summer/winter, wet/dry etc). The multivariate model found that all these factors were important in 'explaining' accident involvement. The sex of the rider, whether the rider had taken compulsory basic training, or whether he or she had 'taken a break from riding' did not enter the model as statistically significant variables. The findings may be summarised as follows:

Annual mileage – the relationship was non-linear in that accident liability was proportional to mileage^{0.4}.

Age and riding experience – accident liability fell with increasing age and increasing experience (number of years riding). The magnitude of the age effect was such that for a novice 'all season, all weather' rider with a single year's experience, accident liability fell from 0.65 at age 17 to 0.19 at age 60.

A 'rider dedication' hierarchy showed that after mileage, age and experience differences had been allowed for, 'all season, and all weather riders' (Category 1) had the highest accident liabilities. 'Summer all weather' riders (Category 3) had liabilities which were 41% lower than Category 1 riders and 'Summer occasional' riders (Category 4, 5 or 6) had liabilities which were 59% lower.

Bike size – once mileage, age and experience had been allowed for in the model, riders of bikes over 125cc had accident liabilities (for 'all accidents') that were 15% lower than riders of smaller bikes. However, there appeared to be an effect of bike size on accident severity, such that the higher accident risk of bikes of 125cc and below was restricted mainly to the least severe accidents. This is consistent with previous work that has shown a risk per mile of fatal accidents that increases with engine size.

Two models of rider behaviour were developed using statistical modelling techniques. In these models attitudes/motivations/perceptions and rider style influence rider behaviour, which in turn influence the likelihood of accident involvement. Age, sex and experience may influence both attitudes and behaviour, and may also have a direct influence on accidents. Accident risk is also directly influenced by the number of miles ridden in the past 12-months.

The reported frequency of errors was the most important behavioural contribution to accident involvement (once the mileage effect had been taken into account). Traffic errors (mostly associated with failures of hazard perception or observational skills) were the most consistent predictors. Control errors (mainly to do with difficulties of control associated with high speed, or errors in speed selection) were also important in some analyses. However, these errors occur in a context that suggests they may be closely linked with riding styles involving carelessness, inattention and excessive speed – i.e. styles that might be termed ‘violational’.

When age and experience were not permitted to influence accidents directly in the model, stunt/high risk behaviours became significant predictors of accidents. This is consistent with the explanation that one of the risk-increasing characteristics of young or inexperienced riders is their tendency to indulge in overtly risky behaviours.

Riding style, getting pleasure from motorcycling, and a liking for speed were identified as predictors of behavioural errors (that were, themselves, predictors of accidents). These predictors were also inter-correlated. Such relationships lend support to the view that an important part of the motorcycle safety problem stems directly from the motivations for choosing to ride motorcycles. This presents a challenging problem for road safety.

The report makes a number of recommendations for improving the safety of motorcycle riders including the following:

- Young, inexperienced riders should continue to be a target group for safety interventions – they are at particularly high risk and they can be reached by the training/testing/licensing system. It would be useful to undertake research to develop and validate suitable interventions for these riders – which might include elements of graduated licensing as well as improvements in training and education.
- As motorcyclists become more experienced and develop improved riding skills they may make more demands on those skills as they continue to seek fun and excitement from motorcycling. There may be potential in the training and rider development provided by the advanced motorcycling organisations to promote a careful, safe, responsible riding style, perhaps by promoting alternative aspirations for motorcyclists – e.g. competence, wisdom and safety rather than excitement, ‘progress’ and speed.
- Although behavioural errors associated with lack of control skills show a consistent relationship with accident liability, they tend to be errors associated with an ‘enthusiastic’ riding style. This reinforces the by now well-recognised need for rider and driver training not to focus on control skill alone, but to improve insight into risk and self-limitations.
- There was no evidence that people returning from riding after a long break are at increased risk (though the study was not able to rule out a short term increase in risk). Nevertheless, returning riders increase the amount of motorcycling and the number of motorcycling accidents. Consideration should be given to developing training and educational material for these riders and to encouraging them to participate. This might be done in collaboration with manufacturers, insurers and motorcycling organisations.
- Given the very striking facts about the risks faced by motorcyclists, it would seem desirable to make sure that riders are actually aware of these risks. This might encourage riders to modify their riding behaviour or to take-up further training. Ways of communicating the risks of motorcycling should be explored, and riders’ current understanding of these risks assessed.

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