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Risk factors for motorcycle injury: the role of age, gender, experience, training and alcohol

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A thesis submitted in fulfilment of the requirements for Doctor of Philosophy, University of Auckland, 1997

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Abstract

Introduction: Motorcyclists in New Zealand suffer a disproportionate number of road traffic crashes. In 1995, 2% of all registered vehicles in NZ were motorcycles, but 9% of reported injuries and 13% of all fatalities were in motorcycle riders. Generally there is a lack of good evidence about many postulated risk factors, with previous studies reporting inconsistent findings.

Aim: To identify the role of age, gender, experience, training and alcohol consumption as risk factors for moderate to fatal injury resulting from a motorcycle crash. These factors were chosen because they are the subject of current policy debate in New Zealand.

Methods: A population-based case-control study was conducted in the Auckland region over a three year period from Feb 1993. The study base was defined as motorcycles being ridden on non-residential public roads of the Auckland region over a three year period between the 15th of February 1993 and the 14th of February 1996 between 6am and midnight. A case was defined as a motorcycle crash occurring within the study base in which either or both the motorcycle driver or pillion passenger met the injury criteria: were admitted to a public hospital within Auckland; were treated in the Public Hospital Emergency Department in the region with an Injury Severity Score of 5 or greater; or died as a result of a motorcycle crash. The aim was to identify all cases using comprehensive case finding procedures included surveillance of emergency departments, the Coroner's office and injury crashes reported to the Police. Controls, or the sample of the study base, were identified from roadside surveys which were conducted at random times from 150 random sites chosen from non-residential roads. Each road was sampled in proportion to its total length. This produced a random sample of motorcycle riding from the study base. If possible, the motorcyclist was stopped at the survey site. If this was not possible, they were identified by following up their registration plate number. Interviewer-administered questionnaires were used, either face-to-face or by telephone, to obtain

exposure data. Objective alcohol data were also obtained from blood and breathalyser tests.

Results: Information was obtained on 477 cases and 1518 controls, with interviews completed for 94.5% of case drivers and 81.2% of control drivers. Motorcyclists aged 25 years and over had the lowest risk of moderate to fatal injury from a motorcycle crash when compared to drivers aged from 15 to 19 years (adjusted RR=0.45, 95%CI=0.33-0.62); the risk for 20 to 24 year olds was intermediate (adjusted RR=0.72, 95%CI=0.52-1.00). There was insufficient evidence from this study to assess whether there was a changing pattern of risk for motorcycle riders aged over 50 years. The population attributable risk for 15 to 16 year olds in this study was only 0.72%. There was no evidence of an association between gender and risk, indicating that most motorcycle injuries occur in males because most motorcycle riding is done by males. Motorcyclists with more than five years of regular on-road motorcycle riding experience were associated with some increased risk compared to those with less than two years (adjusted RR=1.57, 95%CI=0.96-2.58), particularly among the 20 to 24 year age group. Motorcyclists who had ridden their motorcycle 10,000 kilometres or more had a lower risk compared to those who had ridden less than 1000 kilometres (adjusted RR=0.52, 95%CI=0.35-0.79). There was no clear effect observed for other measures of experience including off-road motorcycle riding, other motor vehicle driving and familiarity with the road. There was some evidence that motorcyclists who had attended motorcycle training were at lower risk (adjusted RR=0.74, 95%CI=0.49-1.14), but the precision of this estimate was poor. There was less clear evidence of an association with recent non-motorcycle training and risk. Motorcyclists who reported having consumed alcohol within 12 hours were at higher risk (adjusted RR=1.53, 95%CI=1.05-2.23) with a population attributable risk of 11%.

Discussion: The methods used in this study to identify and sample the study base by obtaining a random sample of motorcycle riding are likely to have provided a valid estimate of the risks associated with the exposures measured. However some limitations of the study design include the general reliance on self-reported measures of exposures, the lack of data collected on other motor vehicles on the road and the poor quality of data available on alcohol and other environmental factors. This study

has identified the following groups of motorcyclists to be at increased risk of moderate to fatal injury: riders aged less than 20 years, riders with more than five years of riding, riders who have not undertaken a motorcycle training course, riders who have ridden less than 1000 kilometres on their current motorcycle and those who have recently consumed any alcohol. Given these results, combined with the information obtained from the systematic literature review, the provisions of the Graduated Drivers Licensing System should be reviewed. This should include consideration of basing restrictions for riding primarily on the age rather than the experience of the motorcyclist and the completion of specific motorcycle training courses only, rather than a training course for any motor vehicle. Further research should consider some of the shortcomings of this study that have been outlined above and also consider methods of increasing the proportion of female riders and older riders in research. The limited evidence of benefit from motorcycle training courses, while encouraging, indicates that further investigation of their benefit in controlled trials is required.

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List of Abbreviations

95% CI	95 % Confidence Interval
ACC	Accident Rehabilitation Compensation Insurance Corporation
AIS	Abbreviated Injury Scale
BAC	Blood Alcohol Concentration
BrAC	Breath Alcohol Concentration
cc	Cubic capacity
FAR	Fatal Accident Report
GDLS	Graduated Driver Licensing System
ICD.9.CM	International Classification of Diseases. 9th Revision. Clinical Modification
ISS	Injury Severity Score
kms	Kilometres
LTSA	Land Transport Safety Authority
RR	Estimate of the Relative Risk
s.d.	Standard Deviation
TAR	Traffic Accident Report
TLA	Territorial Local Authority
UMIS	University Motorcycle Injury Study