Socioeconomic status and risk of car crash-related hospitalisation: results from the DRIVE Study
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INTRODUCTION
Young people from lower socioeconomic status (SES) backgrounds have significantly higher risks of traffic injury than those from higher SES backgrounds [1-9]. The same pattern has been found for adolescents as pedestrians, motor vehicle passengers and bicyclists [9] as well as for adults as drivers [10]. Factors underlying this increased risk remain unclear, even though various hypotheses have been proposed, including that drivers from low SES backgrounds exhibit more risky behaviours [11], such as more often driving under influence of alcohol and drugs [12], longer driving exposure [2], or driving in riskier environments, compared to drivers with high SES [13].

As previous studies also show that rural young drivers are over-involved in fatal or severe crashes [14, 15], and SES and rural residence are strongly correlated [16, 17], place of residence (for example, urban, inner regional or rural) is likely to be an important determinant of crash-related injury. However, previous studies focusing on the effect of SES among young drivers’ crash risk have failed to either measure or adjust for place of residence or other important risk factors including driving exposure, which may have overestimated the risk of SES on crash.

The objective of this study was to differentiate the risk of crash-related hospitalisation among young drivers by SES, adjusting for multiple confounders that are well-known risk factors for crashes, including driving exposure and place of residence.

METHODS
Young drivers aged 17-24 years old and holding a provisional licence were invited to participate in the DRIVE Study between June 2003 and December 2004 in New South Wales, Australia. Information on known and hypothesised crash risk factors was collected via online questionnaire from 20,822 drivers, with consent given for subsequent linkage to routinely collected data. Probabilistic linkage was used to link 1996-2005 crash-related hospitalisations, from the NSW Health, to survey responses. The mean prospective follow-up period of this cohort was 2 years (median=2.1 years). Detailed methods and characteristics of study participants of the DRIVE Study have been described previously [18]. This study was approved by the University of Sydney Human Research Ethics Committee and the NSW Health Ethics Committee.

The Education and Occupation Index, one of the 2001 Socio-Economic Indexes for Areas (2001 SEIFA) in Australia [19], was used as a proxy for SES. As most participants in DRIVE were still students, and did not have a formal occupation, parental postcodes were used for the index. The SES index was classified into three equal-sized groups to indicate drivers from relatively high, moderate or low SES areas. Residential postcodes of young drivers were also grouped into three levels of urbanisation—urban (metropolitan cities), regional (country towns and surrounds) and rural (including remote areas) based on guidelines developed by the Australian Bureau of Statistics (ABS) indicating distances to public services [20].

Poisson regression was used to determine the relative risk (RR) and corresponding 95% confidence intervals (CI) of crash-related hospitalisation (one or more hospitalisations due to crash vs. none) by SES. Age, gender, driving exposure (average driving hours per week) as well as other potential risk factors (only variables with p<0.2 were included in the multivariable models) were adjusted in multivariable models, and place of residence was entered as a final adjustment. Continuous variables were categorised before testing in models. Length of time of participation (days) in the DRIVE Study was included as an offset to estimate person-days at risk. Final multivariable models were created using backward elimination to take out variables if variable removal did not change the direction, or the estimate, of the main study factor (SES) by greater than 10% or the precision of the estimated effect to a significant level. The statistical software package SAS was used for all analyses [21].

RESULTS AND DISCUSSION
This study examined the risk of crash-related hospitalisation by residential SES of young drivers. The relative risk (RR) of having a crash-related hospitalisation for drivers of low SES was almost double (RR:1.94, p<0.01) that for drivers of high SES. After adjusting for multiple confounders, including driving exposure, this RR reduced slightly to 1.86 (p=0.03). For all adjustment sets, risk of crash-related hospitalisation increased with decreasing SES. While the observed direction and strength of association between SES and risk of crash-related hospitalisation among young drivers is similar to findings from the only other large prospective cohort study in Sweden [1-4, 7, 8, 12], this is the first study that has been able to adjust for individual risk factors hypothesised to explain the social gradient in traffic injury [9].

We used a measure of parental education and occupation as a proxy of SES, which has been deemed the best

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61
approximate measure for SES in young people [22]. However, exactly how parental education and occupation might influence the crash risk of their children has been subject to ongoing debate. Young drivers may adopt parental driving behaviours [23, 24]. Young drivers from low SES households may only access older cars that offer lower occupant protection or others’ cars that are unfamiliar [8, 25]. Young drivers of low SES may also crash more frequently due to living in a community with poor traffic environment [13]. It was not possible to examine these issues in this study but they are worthy of further investigation.

Strength of this study include the prospective cohort design and collection of comprehensive information on known and hypothesised risk factors that enabled examination of the relative risk for crash related to SES after adjusting for multiple risk factors. Nonetheless, the limitations of this study need to be considered when interpreting the findings. Firstly, the DRIVE Study did not attempt to be representative of any specific population. However, a representative cohort is not necessary to obtain an unbiased and generalisable estimate of association between an outcome and potential risk factor [26]. Secondly, the composite nature of SEIFA index may mask the variation between areas (two areas with the same score may differ in the values that contributed to that score), and sometimes increase the difficulty of identifying the focus for interventions (areas with low education attainment or areas with low occupation class) [27]. This needs to be examined in future work.

CONCLUSIONS
After adjusting for well-known risk factors for crash, young drivers from low SES areas were twice as likely to have a crash-related hospitalisation. As individual level factors were well controlled for in the analysis it is possible that this increased risk may be due to area level effects of SES; however, further work is needed to examine this hypothesis. Elucidating the unique aspects of low SES that independently contribute to increased crash injuries may lead to improved and better targeted intervention to reduce the over-representation of youth in road traffic injuries. Furthermore, an increased risk of crash-related hospitalisation in NSW for those of low SES irrespective of place of residence indicates the need for drivers from low SES areas to receive priority or specific targeting in future intervention initiatives, regardless of where they live. Improving road safety in low SES areas, such as general road infrastructure, has the potential to benefit young drivers in these communities, as well as other drivers with whom they share the roads.

REFERENCES