

Risk factors associated with severity of hospitalised injury outcome for vulnerable-road users in New South Wales, Australia: A population-based study

Rebecca Seah, Reidar Lystad, Rebecca J Mitchell

Australian Institute of Health Innovation, Macquarie University, Sydney 2113, Australia.

Corresponding Author: Rebecca Seah, Australian Institute of Health Innovation, Macquarie University, Level 6, 75 Talavera Road, Macquarie University NSW 2109, Australia; Tel +61 2 9850 2491; Fax +61 2 9850 2499; Rebecca.seah @mq.edu.au

Key Findings

- Hospitalisations for pedal cycle and motorcycle injuries increased between 2010-13.
- Thirty-day mortality was highest for pedestrians (n=174; 2.9%).
- The total hospital treatment cost for vulnerable road users was AUD \$349.8 million.

Abstract

Vulnerable road users (VRU) – pedestrians, cyclists and motorcyclists account for a large proportion of road fatalities and injuries. The current study identifies injury risk factors associated with the severity of injury outcomes for VRUs. A retrospective analysis was conducted of transport injuries using linked hospitalisation and mortality records during 1 January 2010 to 30 June 2014 in New South Wales, Australia. Of the 73,314 land transport injuries identified, 37,428 (51.1%) consisted of injuries sustained by VRUs. Univariate and multi-variable logistic regression was conducted to examine factors associated with injury severity for each VRU. There were 6,007 pedestrians, 12,619 pedal cyclists, and 18,802 motorcyclists identified. All VRUs ≥ 65 years and those that collided with a motor-vehicle had a higher-odds of sustaining a serious compared to a minor injury. Pedestrians with a head or neck injury had almost 9 times the odds (OR:8.87, 95%CI: 4.13-19.06) and pedestrians with a trunk injury had 10 times the odds (OR: 10.01, 95%CI: 4.55-22.03) of sustaining a serious compared to minor injury. For pedal cyclists, the odds of sustaining a serious compared to minor injury was four times higher (OR:4.11, 95%CI: 1.70-9.93) for trunk injuries. Thirty-day mortality was higher for pedestrians (2.9%) compared to motorcyclists (0.5%) and pedal cyclists (0.4%). The total hospital treatment cost for VRUs was AUD \$349.8 million, with serious injuries accounting for 62.4% of the total cost. Injury preventive initiatives, such as improved infrastructure, educational awareness campaigns to promote safe travel are advocated to reduce injury among VRUs.

Keywords

Vulnerable road users; Injury mechanism; Injury severity; Mortality

Introduction

Transport-related injuries are an important global health issue due to its significant contribution to morbidity, mortality and disability (MacKenzie & Fowler, 2000). Currently, it is estimated to be the ninth leading cause of death, with an annual economic burden estimated to be US\$518 billion (World Health Organization, 2015; World Health Organization and World Bank, 2004). Vulnerable road users (VRUs) such as pedestrians, cyclists and motorcyclists, are at greater risk of a traffic-related injury because they are relatively unprotected and have a relatively small mass compared to other vehicles (SVOV, 2007). Whilst there are fewer VRUs in high income countries, compared to motor-vehicles, they account for almost 50% of road fatalities (Haworth, 2006; World Health Organization, 2009; World Health Organization and World Bank, 2004).

Notwithstanding the risk of injury, the health benefits of walking and cycling compared to driving a vehicle in

an urban environment have been estimated to be 3 to 14 months gained in life expectancy (Basset, Pucher, Buehler, Thompson, & Crouter, 2008; de Hartog, Boohaard, Nijland, & Hoek, 2010). Moreover, walking and cycling are promoted not only to improve health, but to reduce air-pollution, traffic congestion and noise (Austroads, 2010; US Department of Transportation, 2010). Policy makers face the challenge of promoting both walking and cycling as viable primary modes of transport, without compromising an individual's safety in the road environment. Thus, the need to identify and monitor areas where injury risk is greatest is imperative.

In Australia, routinely collected hospitalisation data contain useful information about diagnoses and treatment of injuries admitted to hospital. Moreover, injury severity can be estimated from hospital records using a diagnosis-based injury severity scale and information on survival outcome (Stephenson, Henley, Harrison, & Langley, 2004). Injury severity is a useful health outcome measure as it is

equivalent to assessing mortality risk in patients (Stephenson et al., 2004). By identifying risk factors associated with the severity of injury outcomes, targeted interventions and safety measures can be developed and implemented. The current study, therefore, aims to identify risk factors associated with the severity of injury outcomes for VRUs using linked hospitalisation and mortality data during 2010 to 2014 in New South Wales (NSW), Australia.

Methods

A retrospective analysis of injury following land transport incidents identified in linked hospitalisation and mortality records during 1 January 2010 to 30 June 2014 was conducted. Ethical approval was obtained from the NSW Population and Health Services Research Ethics Committee (2015/08/599).

Data Sources and Inclusion Criteria

The hospitalisation data in NSW includes information on all inpatient admissions from private and public hospitals. The hospitalisation data contains information on patient demographics, source of referral, diagnoses, external cause(s), separation mode and Australian Refined-Diagnosis Related Groups (AR-DRGs). The principle diagnoses and external cause codes are classified using the International Statistical Classification of Diseases, 10th revision, Australian Modification (ICD-10-AM) (National Centre for Classification in Health, 2006). Patients admitted for a transport injury were identified as those with an injury principal diagnosis (i.e. ICD-10-AM: S00-T78) and an external cause code for a land transport incident (ICD-10-AM: V00-V89). All VRUs were identified using their respective ICD-10-AM codes (Pedestrians: V00-V09; Pedal cyclists: V10-V19; Motorcyclists: V20-V29). Mortality data was obtained from the NSW Registry of Births, Deaths and Marriages (RBDM) and was available for the period 1 January 2010 to 31 March 2015. The RBDM includes information collected from death certificates and this includes demographic information and fact of death.

Injury Severity

The International Classification of Disease Injury Severity Score (ICISS) was used to calculate injury severity scores. The ICISS is calculated for each person by multiplying the probability of survival for each injury diagnosis using survival risk ratios (SRR) calculated for each diagnosis (Stephenson et al., 2004). The ICISS was divided into three severity categories; minor (≥ 0.99), moderate (0.941-0.99) and serious (≤ 0.941) injury (Dayal, Wren, & Wright, 2008).

Urban and rural residents in NSW were identified using the Australian Statistical Geographical Standard Remoteness Area (ASGS RA) (Australian Bureau of Statistics, 2013). The ASGS RA uses defined index scores of distances to service centres to assign residents to one of five categories. For ease of analysis and reporting, these categories were collapsed into: urban (i.e. major cities) and rural (i.e. inner regional, outer regional, remote, and very remote).

Hospital treatment cost estimates

Hospital treatment cost estimates were obtained from the *National Hospital Costing Data Collection, Round 14 2009-10* (Independent Hospital Pricing Authority, 2013) and the *NSW Costs of Care Standards (2009-10)* cost-calculation guidelines applied (NSW Ministry of Health, 2011). Using the hospitalisation data, the AR-DRGs, episode of care length of stay (LOS) and episode of care type (e.g. acute or subacute non-acute patient) were used to estimate hospitalisation cost. Average cost per AR-DRG included hospital operation and medical services and staff on-costs (Department of Health and Ageing, 2007). The average daily cost per AR-DRG was multiplied by the episode of care LOS to 120 days. Where an episode of care exceeded 120 days, a flat rate of \$200 per day was applied (NSW Ministry of Health, 2011). Public hospital costs were used as an approximation of private hospital cost. All costs were calculated in 2009-10 Australian dollars.

Data management and analysis

All statistical analyses were performed using SAS 9.4 (SAS Institute, 2014). All hospital episodes of care related to the VRU injury were linked to form a period of care (i.e. all episodes of care related to the VRU injury until discharge from the health system). Descriptive statistics were used to identify the most common principle injury type and 30-day mortality. Thirty-day mortality is calculated from the date of admission of the first VRU-related injury hospital admission. For the description of VRU hospitalisations by year only data from 1 January 2010 to 31 December 2013 were examined.

Individual (e.g. age group and sex), environmental (i.e. time of day and day of week related to hospital admission, urban or rural area) and type of collision risk factors for each VRU by injury severity were examined. Univariate predictors of injury severity were examined using logistic regression for each VRU. Significant univariate predictors of injury severity were then included in multivariable logistic regression models for each VRU using backward selection, where statistical significance was assessed at 0.25 (Hosmer & Lemeshow, 2005). In the multivariable model, each interaction effect was assessed separately, and all significant interaction effects were re-inserted back into the multivariable model. In the multivariable model, the dependent variable was injury severity for each VRU. For pedestrians, the independent variables included in the final model included age group, time of day, area and type of collision. For pedal cyclists, the final model included sex, age group, time of day, day of the week, area and type of collision. For motorcyclists, the final model included age group, time of day, day of the week, area and type of collision.

Results

Of the 73,314 land transport injuries identified within the hospitalisation data, 37,428 (51.1%) were sustained by VRUs in NSW. There were 6,007 (8.2%) pedestrians, 12,619 (17.2%) pedal cyclists, and 18,802 (25.7%)

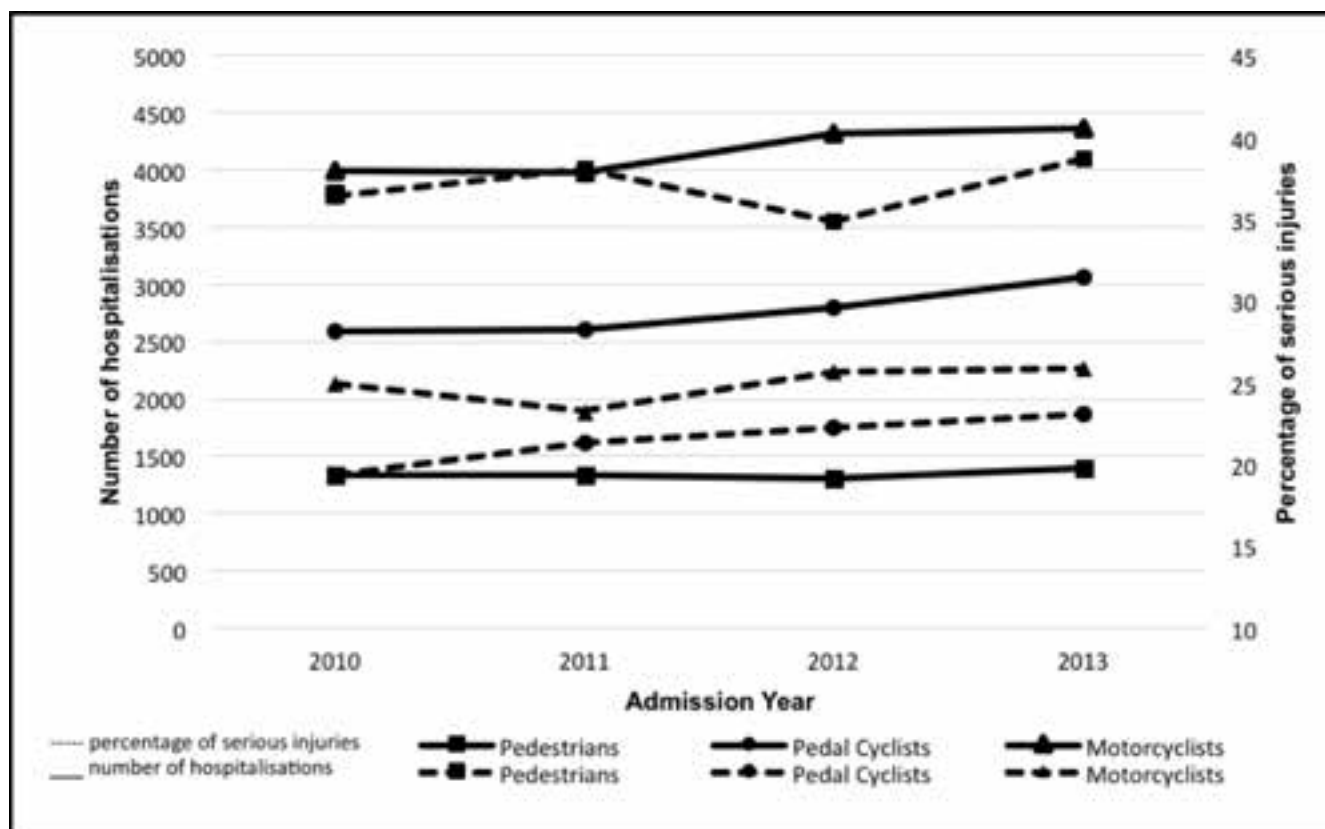


Figure 1. Number of injury hospitalisations and percentage of hospitalised serious injuries of pedestrians, pedal cyclists and motorcyclists in NSW hospitalisation-mortality linked data, 1 January 2010 to 30 December 2013

motorcyclists hospitalised following an injury. The number of hospitalisations due to pedal cycle and motorcycle injuries increased between 2010 and 2013 (Figure 1). In contrast, the number of hospitalisations due to pedestrian injuries decreased slightly between 2010 and 2012, and then increased between 2012 and 2013. The proportion of serious injuries sustained by VRUs remained high for pedestrians compared to other VRUs over the study period.

Figure 2 outlines the proportion of principal injury diagnoses by severity category for each VRU category. For pedestrians and pedal cyclists, both serious and moderate injuries were more commonly sustained to the head and neck. Minor injuries were more commonly sustained for the ankle and foot for pedestrians (26.0%) and to the wrist and hand for pedal cyclists (15.8%). For motorcyclists, serious injuries were more commonly sustained to the wrist and hand (25.3%), moderate injuries to the ankle and foot (30%), and minor injuries to the head and neck (23.6%).

Principal injury diagnosis by injury severity

Figure 2 outlines the proportion of principal injury diagnoses by severity category for each VRU category. For pedestrians and pedal cyclists, both serious and moderate injuries were more commonly sustained to the head and neck. Minor injuries were more commonly sustained for the ankle and foot for pedestrians (26.0%) and to the wrist and hand for pedal cyclists (15.8%). For motorcyclists, serious injuries

were more commonly sustained to the wrist and hand (25.3%), moderate injuries to the ankle and foot (30%), and minor injuries to the head and neck (23.6%).

Multivariable logistic regression

For the multivariable analyses, all VRUs ≥ 65 years had higher odds of sustaining a serious compared to a minor injury. Pedestrians were less likely to sustain a serious compared to a minor injury if the injury occurred between 6am-5pm compared to if the incident occurred between 12am-5am. Pedestrians who sustained an injury to the head and neck had almost 9 times the odds (OR:8.87, 95%CI:4.13-19.06, $p < 0.0001$) of sustaining a serious compared to a minor injury. Further, if an injury was sustained to the trunk pedestrians had 10 times the odds (OR:10.01, 95%CI:4.55-22.03, $p < 0.0001$) of sustaining a serious injury compared to minor injury. Compared to females, male pedal cyclists had twice the odds (OR:2.06, 95%CI:1.75-2.42, $p < 0.0001$) of sustaining a serious compared to minor injury. Compared to the weekday, both pedal cyclists and motorcyclists had higher odds of sustaining a serious compared to minor injury on a weekend. For pedal cyclists, the odds of sustaining a serious compared to minor injury was more than three times higher (OR:3.42, 95%CI:1.36-9.58, $p < 0.001$) if the injury was sustained to the trunk. If the collision occurred with a motor-vehicle, all VRUs were more likely to sustain a serious compared to a minor injury (Table 1).

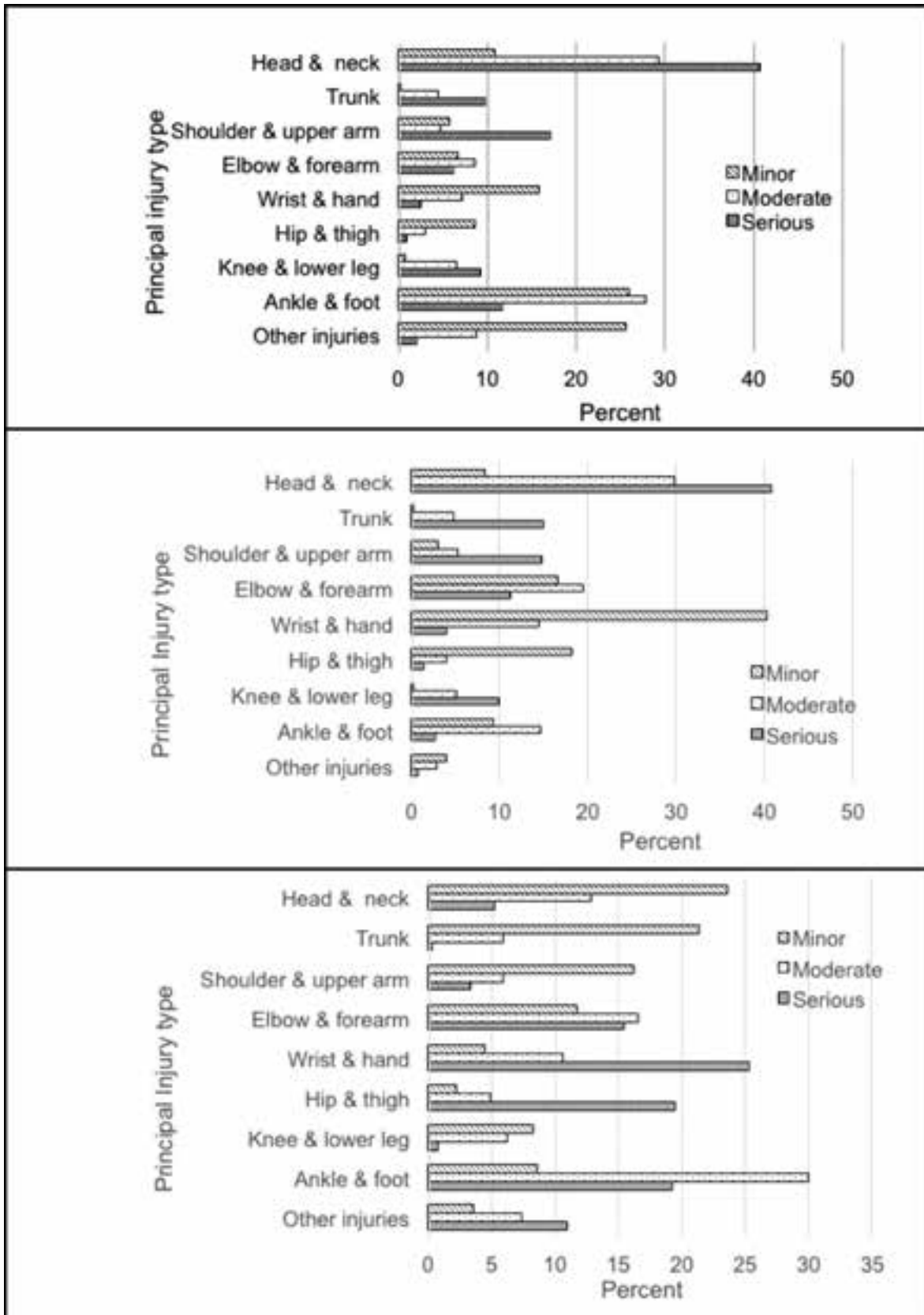


Figure 2. Proportion of principal diagnosis of injury for (a) pedestrians, (b) pedal cyclists, and (c) motorcyclists by injury severity in NSW hospitalisation-mortality linked data, 1 January 2010 to 30 June 2013

Mortality and hospitalisation cost

Thirty-day mortality was higher for pedestrians ($n=174$; 2.9%) than for motorcyclists ($n=99$; 0.5%) and pedal cyclists ($n=45$; 0.4%). Across all injury severity categories, the mean hospitalisation costs were higher for pedestrians than for motorcyclists and pedal cyclists (Table 2). Unsurprisingly, serious injuries incurred higher mean hospitalisation costs than both moderate and minor injuries across all VRUs.

Discussion

During the 4.5-year timeframe, there were 37,428 hospitalised injuries sustained by VRUs in NSW. Across all VRUs, the number of hospitalisations remained relatively consistent, as did the proportion of serious injuries. Injuries sustained by older individuals were more severe. Moreover, all VRUs were at higher odds of sustaining a serious compared to a minor injury if the incident involved a collision with a motor-vehicle. As expected, motorcyclists incurred the highest hospitalisation costs as they sustained the highest proportion of injuries. Despite accounting for the smallest proportion of hospitalised injuries, pedestrians had the highest 30-day mortality. Such findings may be explained by pedestrians sustaining the highest proportion of serious head and neck injuries. Consistent with previous studies, head and neck injuries sustained by pedestrians in a motor vehicle collision often tend to be fatal and severe, with long-term morbidity and higher mortality (Chakravarthy, Lotfipour, & E Vaca, 2007; Martin, Lardy, & Laumon, 2011; Prang, Ruseckaite, & Collie, 2012).

This study found that VRUs ≥ 65 years and incidents involved in a collision with a motor vehicle had higher odds of sustaining a serious injury versus a minor injury. Moreover, injuries sustained to the head and neck were the most serious among both pedestrians and pedal cyclists, whilst injuries sustained to the wrist and hand by motorcyclists were among the most serious. In general, the odds of sustaining a serious injury for all VRUs compared to a minor injury increases with age. Although older people are less involved in transport-related incidents, they tend to experience higher levels of morbidity and mortality compared to their younger counterparts (Welsh, Morris, Hassan, Charlton, & Fildes, 2006). Older people face reduced cognitive and perceptual capabilities with age. This leads to increased difficulties navigating safely in complex traffic conditions, or the ability to react quickly or safely in the event of a traffic emergency (Braver & Trempe, 2004). Moreover, older pedestrians have consistently been found to be at a higher risk of mortality or serious injury following a VRU incident (Chakravarthy et al., 2007; Small, Sheedy, & Grabs, 2006).

Pedestrians had a higher odds of having a serious, compared to minor injury if the injury was sustained to the head and neck. While head injuries sustained by pedestrians depend on crash and vehicle type (Ballesteros, Dischinger, & Langenberg, 2004; Martin et al., 2011), studies from the United States, Australia and India all suggest that head injuries tend to be the most severe (Peng & Bongard,

1999; Pruthi et al., 2012; Small et al., 2006). Overall pedal cyclists had higher odds of sustaining a serious injury to the trunk compared to a minor injury. Injuries to this area has previously been found to common among cyclist-motor vehicle incidents (de Geus et al., 2012; Olds, Bryard, & Langlois, 2015), and also in the event of an acute cycling injury (Schwellnus & Derman, 2005).

Head and neck injuries resulted in 70.5% of moderate or serious injuries. Although the use of helmets has been found to reduce the risk of sustaining a serious head injury, the current study did not have information on whether helmets were worn (Bambach, Mitchell, Grzebieta, & Olivier, 2013). However, in the current study, head and neck injuries were not associated with increased odds of serious injury in pedal cyclists and motorcyclists. It is possible that helmets may have played a role in reducing the severity of head and neck injuries among those who did wear them.

In the current study, both pedal cyclists and motorcyclists had higher odds of sustaining a serious versus minor injury if the transport incident occurred during the weekend. It is possible that the higher odds are due to cycling being used as a leisure activity. In Australia, work related riding has been found to reduce the risk of traffic incidents (Haworth, Smith, Brumen, & Pronk, 1997). Among motorcyclists, data suggests that the number of motorcycle registrations, particularly among older people have increased (Australian Bureau of Statistics, 2015). However, many of these riders, ride for recreation rather than for commuting, which may explain the increased odds of injury during the weekend. Indeed, previous studies have suggested that motorcycling for recreation increased the risk of crashes (Jamson & Chorlton, 2009; Moskal, Martin, & Laumon, 2012).

Transport injuries sustained by VRUs place a heavy social and economic burden on both the individual and society. This includes loss of productivity, potential long-term disability and other negative psychosocial outcomes (Peden et al., 2004; Pointer, 2015). The 'safety in numbers' concept suggests that the likelihood of a pedal cyclist being struck by a motorist decreases with the increasing prevalence of walking and cycling in the local population (Jacobsen, 2003). However, pedal cyclists in large urban areas often tend to be deterred by the perceived dangers of cycling on major roadways (Amr Interactive, 2009). Thus, road safety strategies need to focus on improving and investing in infrastructure that allows for a safe, shared spaces (e.g. more cycle pathways). Continued enforcement of legislation that promotes safe riding, such as helmet wearing, will also likely reduce the risk of sustaining a serious head injury (Schwellnus & Derman, 2005).

As pedestrians are not offered the same protection as other VRUs, appropriate infrastructure in terms of safe and clear walkways and road crossings are imperative. Moreover, educational initiatives that promote safe crossing are also recommended. This includes limiting mobile phone use when crossing streets, and not jaywalking at busy intersections. Stronger enforcement of road rules that aims to prevent motorists from running red lights or not stopping before turning, and slowing down in residential and school

areas will also serve to protect pedestrians from motorists (Cinnamon, Schuurman, & Hameed, 2011). Reinforcing safe crossing methods, and greater road awareness in conjunction with environmental changes through traffic calming methods (e.g. speed bumps) are potential ways to reduce the risk of serious pedestrian injuries. With an increasing ageing population, it is expected that the number of older road users will also increase. Elderly road users, such as pedestrians, can often have difficulty seeing and reacting quickly enough to oncoming traffic and navigating complex intersections (Oxley, Corben, Fildes, & Charlton, 2005). Future initiatives that will meet the needs of older pedestrians will require strategies that encompass both convenient and accessible road environments for walking. Finally, strategies that may help reduce motorcycle collisions include, improved licensing staging and possible skill and risk awareness training for both motorcyclist motor-vehicle drivers (Begg, Stephenson, Alsop, & Langley, 2001). Countermeasures to reduce injury severity include advocating the use of protective clothing designed to protect both the upper body and the lower limbs in conjunction with helmet use (de Rome et al., 2011).

Limitations

There are several limitations to the current study. The time of hospitalisation was used as a proxy of the time of when the injurious event occurred. It is possible that the time of the incident may have occurred earlier than what was recorded. The classification of urban/rural locations were based on the residence of the injured person. Thus, it may not necessarily reflect the location of the injurious incident. The validity of hospitalisation data was not assessed. Thus, it is possible that there was some misclassification of hospital records. In addition, some of the confidence intervals for the regression analyses were relatively wide and should be interpreted with caution. Finally, detailed circumstances of each VRU's transport-related injury and protective equipment worn, such as helmets, were not available and this limited the type of risk factors able to be examined. These limitations should be taken into consideration when interpreting the findings of this study. Future studies should endeavour to use linked police crash data that contain information on crash characteristics and hospitalisation records to overcome some of these limitations.

Conclusions

Whilst many transport incidents are preventable, results from the current study do not indicate that the number of hospitalisations and proportion of serious injuries from transport injuries among VRUs in NSW has decreased over the study period. The current findings also suggest that VRUs are susceptible to sustaining serious injuries if a collision occurs with a motor-vehicle. Thus, injury preventive initiatives such as improved infrastructure, stronger enforcement of traffic safety laws, and educational initiatives encouraging road safety, are advocated.

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Appendix

Table 1. Multivariable logistic regression models of transport-related injury for pedestrians, pedal cyclists and motorcyclists in NSW, hospitalisation-mortality linked data, 1 January 2010 to 30 June 2014

	Pedestrians			Pedal cyclists			Motorcyclists				
	Moderate injury ^a		Serious injury ^a	Moderate injury ^a		Serious injury ^a	Moderate injury ^a		Serious injury ^a		
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	
Sex											
Male	-		-	1.30*	1.16-1.46	2.06*	1.75-2.42	0.83***	0.73-0.95	1.16**	0.98-1.38
Female	-		-	1		1		-		-	
Age group											
<17	1		1	1		1		1		1	
18-25	0.95	0.73-1.23	0.79	1.41*	1.20-1.66	2.69*	2.15-3.36	1.13****	1.02-1.26	1.66*	1.43-1.92
26-64	1.14	0.59-1.06	1.06	2.38*	2.15-3.36	6.89*	5.92-8.02	1.45*	1.31-1.59	2.78*	2.43-3.16
65+	1.62*	1.27-2.06	3.10*	2.69*	2.09-3.46	14.78*	11.12-19.64	1.91*	1.43-2.54	4.90*	3.54-6.79
Time											
12am-5am	1		1	1		1		1		1	
6am-11 am	0.72****	0.52-0.99	0.42*	0.60**	0.44-0.80	0.53**	0.38-0.76	0.41*	0.32-0.51	0.22*	0.17-0.29
12pm-5pm	0.95	0.69-1.31	0.57**	0.91	0.68-1.23	0.85	0.60-1.20	0.87	0.69-1.10	0.69***	0.53-0.90
6pm-11 pm	1.08	0.78-1.50	0.89	1.16	0.85-1.57	1.04	0.72-1.49	1.07	0.84-1.36	0.81	0.62-1.06
Day											
Weekday	1		1	1		1		1		1	
Weekend	1.09	0.92-1.29	0.94	1.04	0.94-1.15	1.14****	1.00-1.30	1.14****	1.05-1.23	1.23*	1.11-1.36
Area	1.03	0.85-1.24	1.16	-	0.94-1.44	-	-	1.09****	1.01-1.17	1.07	0.97-1.18
Urban	1.03	0.85-1.24	1.16	-	0.94-1.44	-	-	1.09****	1.01-1.17	1.07	0.97-1.18
Rural	1		1	-		-	-	1		1	
Principal injury											
Head and neck	1.86****	1.01-3.40	8.90*	0.61	0.30-1.27	2.25	0.91-5.60	0.33*	0.20-0.54	0.62	0.37-1.05
Trunk ^a	1.06	0.56-2.01	10.03*	0.47****	0.22-0.98	3.42***	1.36-8.58	0.41**	0.25-0.68	1.20	0.71-2.02
Upper extremities ^b	0.44	0.25-0.80****	0.75	0.08*	0.04-0.16	0.08*	0.03-0.20	0.08*	0.05-0.13	0.04*	0.03-0.07
Lower extremities ^c	0.57	0.32-1.02	1.03	0.25**	0.12-0.51	0.34****	0.14-0.85	0.18*	0.11-0.29	0.08*	0.05-0.13
Other injuries	1		1	1		1		1		1	
Type of collision											
Conveyance ^d /other pedal cyclists	0.85	0.57-1.26	0.57****	-	0.35-0.93	-	-	-	-	-	-
Pedal cyclists, pedestrian or animal	-		-	1.60*	1.30-1.98	2.15*	1.66-2.77	1.88**	1.36-2.61	2.44*	1.69-3.53
Motor vehicles ^e	1.89*	1.44-2.49	2.20*	1.98*	1.71-2.30	2.37*	1.99-2.83	1.72*	1.55-1.91	2.52*	2.23-2.85
Other/unspecified vehicles ^f	1		1	1		1		1		1	

^a Minor injury=reference group. ^bThis includes thorax, Abdomen, lower-back, lumbar spine and pelvis ^cThis includes shoulder and upper arm, elbow and forearm, wrist and hand. ^dThis includes hip and thigh, knee and lower leg, ankle and foot. ^eThese include pedestrians on foot injured in collision with roller-skaters, skateboarders, non-powered and powered scooters, non-powered and powered wheelchairs, and or otherwise specified. ^fThese include cars, pick-up trucks or vans, heavy transport vehicles or bus. ^gThese include railway train or railway vehicle, collision with fixed or stationary objects or non-collision transport incidents. *p<0.0001, **p<0.001, ***p<0.01, ****p<0.05.

Table 2. Total hospitalisation costs of individuals with a road transport-related injury hospitalisation by injury severity for pedestrians, pedal cyclists and motorcyclists in NSW, linked hospitalisation and mortality data, 2010-2014

Injury severity	Pedestrians (n=6,007)				Pedal cyclists (n=12,619)				Motorcyclists (n=18,802)			
	n ^b	Mean (\$)	Median (\$)	Total (\$)	n ^b	Mean (\$)	Median (\$)	Total (\$)	n ^b	Mean (\$)	Median (\$)	Total (\$)
Minor (ICISS ≤ 0.99)	990	5,214	2,211	5,162,287	4,683	3,330	2,523	15,589,725	5,564	3,944	2,875	21,944,845
Moderate (ICISS 0.942-0.99)	2,788	7,835	1,239	21,845,642	5,192	3,721	2,103	19,316,748	8,559	5,583	2,293	47,814,550
Serious (ICISS <0.942)	2,229	36,849	11,100	82,136,600	2,744	12,794	4,400	35,105,809	4,679	21,564	6,357	100,898,342

^a Total costs include both acute and non-acute costs. ^bWhere valid AR-DRG was present

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