WEAR IT OR WEAR THE COST: CURRENT SEATBELT WEARING RATES IN QUEENSLAND

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ABSTRACT

Observational seatbelt wearing studies are a valuable tool for obtaining up-to-date information about rates of use. Given that one quarter of vehicle occupants killed on Queensland roads in recent years were not wearing seatbelts, it is important that authorities are able to identify non-wearers and take steps to increase compliance with seatbelt laws to reduce the severity of crashes and, therefore, the road toll. An observational study of seatbelt use was conducted in metropolitan, regional and rural locations throughout Queensland in May and June, 2010. Trained observers took note of seatbelt use of all occupants of passenger vehicles, noting their gender, approximate age group, seating position, vehicle type, licence type (i.e. visible L or P plates), mobile phone use, and the date, time and location of the observation. Of 19,579 observations, 99.04% (19,391) of occupants were observed wearing seatbelts, as only 0.96% of occupants (188) were not wearing a seatbelt. There were differences in seatbelt wearing rates for a number of study variables, although most were very small. However, seatbelt wearing rates were 3.84% lower for drivers observed using a mobile phone than for those who were not. While compliance with seatbelt laws seems to be very high, it is still concerning that so few non-wearers represent a disproportionately large proportion of road fatalities and serious injuries in Queensland. Road safety authorities must therefore continue to find ways to improve seatbelt use, as small gains in wearing rates will translate into significant fatality reductions.

Keywords

Seatbelts; observational study; safe road users.

INTRODUCTION

Wearing a seatbelt during a crash improves the occupants' chances of survival by minimising the severity of injury. Studies have found that vehicle occupants not wearing seat belts are more likely to be seriously or fatally injured in crashes with 26% to 40% of fatal injuries being unbelted (Austroads, 2009; Transport Canada, 2001; Wundersitz & Anderson, 2009). Seatbelts have been found to be 56% effective in preventing fatal injuries when used by the front seat occupants of passenger cars involved in crashes in Kansas[1] (Dissanayake & Ratnayake, 2007). In the United States, seatbelts are estimated to be about 45% effective in preventing fatal injuries and 60% effective in reducing non-fatal injuries (NHTSA, 2001).

In fatal crashes in the United States between 2003 and 2007, only 2% of occupants wearing seatbelts were ejected from the vehicle, compared to 35.3% of unrestrained occupants (NHTSA, 2009a). Those ejected from vehicles in fatal crashes were 2.3 times more likely to be killed than occupants who were not ejected, and of those ejected, 77.3% were killed, and 15.1% had incapacitating injuries (NHTSA, 2009a). Therefore, any policy approach that

[1] That is, 56% of fatally injured occupants of vehicles who were not wearing a seatbelt at the time of the crash could have survived if they were wearing a seatbelt.

increases seatbelt use is likely to reduce the road toll and assist governments in meeting Safe System (Safe Road Users) targets.

However, analysis of crash data in Queensland shows that, where seatbelts were fitted and use was known[2], approximately one quarter of fatally injured vehicle occupants were not wearing a seatbelt at the time of the crash (see Table 1). However, only five percent of seriously injured vehicle occupants[3] were not wearing a seatbelt at the time of the crash. Seatbelt wearing rates were generally slightly lower for fatally injured drivers than for passengers, although this trend was reversed in 2007. Seriously injured drivers were more likely to be wearing a seatbelt than seriously injured passengers over the five year period.

Table 1: Seatbelt wearing of vehicle occupants in crashes in Queensland 2004 – 2008

	2004	2005	2006	2007	2008	5-year Average
Fatally injured	76.28%	77.33%	70.55%	76.82%	77.37%	75.68%
Driver	74.76%	76.15%	69.79%	78.70%	75.53%	75.10%
Passenger	79.25%	80.49%	72.00%	72.09%	81.40%	76.96%
Seriously injured	94.56%	94.29%	94.72%	94.19%	95.82%	94.74%
Driver	95.72%	95.77%	95.95%	95.58%	96.52%	95.93%
Passenger	91.93%	90.88%	91.64%	90.65%	93.98%	91.85%

Source: WebCrash database maintained by TMR. Data extracted January 5, 2011.

Notes: Restraint wearing is coded as Fitted – Worn, Fitted – Not worn, Fitted – Unknown if worn, Not Fitted, Unknown or Not Applicable (i.e. casualty was riding a bicycle, motorcycle or was a pedestrian). Percentages were calculated by dividing the number of casualties coded as Fitted – Worn by the sum of the Fitted categories.

Analysis of self-reported seatbelt use via survey research tends to give higher estimates of wearing rates for the general driving population than for those involved in serious and particularly fatal crashes. For example, 96% of respondents to a regular road safety behaviour and attitudes survey reported always wearing their seatbelt (MCR, 2010). Another recent survey of 293 Queensland drivers who had ever held an Open licence found that the majority (97.4%) of participants reported being likely to wear a seatbelt while driving in the next month (Dovan, 2010). There were no significant differences in self-reported likelihood of seatbelt use when driving alone, with passengers, for only a short distance, or late at night / early morning. There were also no significant differences in intentions to wear a seatbelt as a function of respondent gender, age, employment status, driving exposure, attitudes towards seatbelt use, perceived legitimacy of seatbelt law enforcement, or personality. However, the authors acknowledged that the strong intentions to wear seatbelts and limited variability in these intentions within the sample resulted in restriction in range that made it difficult to detect significant results (Dovan, 2010). Moreover, while intentions have been shown to be one of the strongest predictors of future behaviour (Ajzen, 1991), people's behaviour does not always match their intentions (Sheeran, 2005). Therefore a more objective method of estimating the prevalence of seatbelt use is by direct observation.

Similar to self-report studies, observational studies of seatbelt use also indicate much higher seatbelt wearing rates than those observed in crash data. A review of recent observation studies conducted in jurisdictions within Australia (RACQ, 1998; Wundersitz & Anderson,

[2] Seatbelt use was known for 83.48% of casualties in vehicles where restraints were known to be fitted
[3] Seriously injured is defined as requiring admission to a hospital

2009) and internationally (Alaska Department of Transportation & Public Facilities [ADT&PF], 2009; Department for Transport, 2010; NHTSA, 2009b; Olukoga & Noah, 2005; Transport Canada, 2008) found that most studies estimated seatbelt wearing rates above 90%, with the exception of the studies conducted in the United States (ADT&PF, 2009; NHTSA, 2009b) and South Africa (Olukoga & Noah, 2005). However, in contrast to the above mentioned self-report study, this research has generally found that females are more likely than males to wear seatbelts. There was some variability in wearing rates between metropolitan and rural areas, although these differences were generally small and inconsistent across jurisdictions. Attitudes towards seatbelt use and enforcement of primary versus secondary[4] seatbelt laws may explain some of the jurisdictional differences.

The discrepancy between the seatbelt wearing rates in crash data (approximately 75% for fatalities and 95% for serious casualties) as opposed to observation studies and self-report surveys (generally 90 – 98%) may be due to a number of factors. First, it was acknowledged earlier that seatbelt use by individuals injured in Queensland crashes is not known for all occupants in all crashes. Further, these individuals may not be representative of all vehicle occupants. Second, there may be a social desirability bias associated with self-report data, such that respondents may respond in a way that makes them appear to be a responsible, law-abiding citizen. For example, they may inflate their use of seatbelts by responding "always", when there are occasions where they do not wear a seatbelt (Briggs et al., 2008; Robertson, 1992; Steptoe et al., 2002; Streff & Wagenaar, 1989). Third, it is difficult to conduct observational studies at all times of day and night, and to see the restraint use of occupants of all vehicle types in all seating positions, whereas these may not be limitations on crash data.

While the self-reported intentions to wear seatbelts in the Queensland study (Dovan, 2010) are relatively consistent with the results of recent observational studies described previously, the discrepancy between this estimate of seatbelt wearing and that obtained in crash data, particularly fatalities, is of concern. If less than 2% of Dovan's (2010) participants can be described as non-wearers, but nearly one quarter of fatalities in Queensland were not wearing a seatbelt (see Table 1), then non-use of seatbelts can be described as a crash risk, as non-use is over-represented in fatalities by a factor of approximately 12.

It is possible, albeit unlikely, that the seatbelt wearing estimates obtained in observational studies and self-report surveys differ from seatbelt use in casualty crash data because they are equally biased, or at least are equally non-representative of crash-involved drivers, and are over-estimating seatbelt use. However, it is more likely that this discrepancy is an indication that while seatbelt wearing is generally very high in Australia, people do not wear seatbelts all the time, and that failure to wear a seatbelt puts these people at greater risk of serious injury or death in the event of a crash. Thus the focus for road safety professionals should be on understanding who is at risk of not wearing a seatbelt, and the situations in which they are least likely to wear a seatbelt, in order to develop appropriate interventions targeting these individuals as a Safe Road Users strategy within a Safe System approach.

The seatbelt literature suggests that individuals most likely to wear seatbelts are females, the highly educated, and those travelling in newer vehicles (Reinfurt et al., 1996; Williams & Shabanova, 2002). There is also evidence that younger drivers with a history of risky driving behaviour (e.g., drink driving, tailgating, running red lights, and speeding), traffic convictions

[4] Primary seatbelt laws allow police to stop a driver for the purpose of checking seatbelt wearing (such as in use in Australian jurisdictions), while secondary laws only allow seatbelt wearing to be checked in vehicles where the driver has been stopped for another purpose (such as in use in many US jurisdictions).

and crashes (particularly those in which they were culpable) are the least likely to wear seatbelts (Begg & Langley, 2000; Briggs et al., 2008; Hartos et al., 2000; Machin & Sankey, 2008; McCartt & Northup, 2004; Preusser et al., 1991; Reinfurt et al., 1996; Wilson, 1990). Individuals have been found to be less likely to wear seatbelts when a rear seat passenger than when driving or travelling in the front seat (Begg & Langley, 2000). Individuals who score highly on the personality trait of conscientiousness have also been found to be more likely to wear seatbelts (Raynor & Levine, 2009), while non-use of seatbelts has been found to be associated with high scores on sensation seeking and impulsivity (Wilson, 1990). Thus the existing literature suggests that failure to wear a seatbelt is one of a collection of problem behaviours reflected by risky lifestyle choices, deviant personalities, irresponsible attitudes and greater driving risk (Wilson, 1990).

The threat of punishment has been found to influence the decision to wear seatbelts, as 63% of unbelted and 68% of belted New York drivers interviewed by Preusser et al. (1991) reported that demerit points for seatbelt offences would increase the likelihood that they would wear a seatbelt. However, it should be noted that seatbelt legislation alone is not sufficient to maximise use, as the implementation and enforcement of primary and secondary seatbelt laws has been found to affect rates of usage (Steptoe et al., 2002). In contrast to the Queensland research, (where attitudes towards seatbelts was not a significant predictor of use (Dovan, 2010)) and in accordance with theories of planned behaviour (Ajzen, 1991), significant differences in attitudes towards seatbelt use have been found between users and non-users in some studies, suggesting that modification of attitudes through a multi-faceted approach involving public education in addition to legislation and enforcement strategies may be central to increasing seatbelt use (Steptoe et al., 2002). However, this may be more relevant in areas with lower seatbelt wearing rates than those in Australian jurisdictions.

Before such research can be conducted in Queensland to better understand compliance (or more importantly, non-compliance) with seatbelt laws, there is a need to obtain up-to-date, objective estimates of seatbelt wearing. Seatbelt wearing surveys were last undertaken in Queensland by the Royal Automobile Club of Queensland (RACQ) in 1997. This paper describes the results of an observational seatbelt wearing study undertaken across Queensland by Adam Pekol Consulting in 2010, commissioned by Queensland Department of Transport and Main Roads (TMR).

METHODS

Observation sites

At the request of TMR, observation sites were identified across Queensland to ensure that a) a large sample of observations representative of Queensland drivers was obtained and b) comparisons could be made with results of previous surveys. The geographical areas of interest were described as metropolitan, regional and rural. For sampling purposes, the Local Government Areas (LGAs) selected within these areas included:

- Metropolitan: Brisbane; Gold Coast; and Moreton Bay
- Regional: Cairns; Townsville; Rockhampton; and Toowoomba
- Rural: Dalby; Warwick; Emerald; Ingham; and Charters Towers

A number of observation sites within each of these LGAs were selected, and detailed plans were prepared for each site, clearly identifying the location of each intersection to be surveyed, and the positioning of survey staff at the intersection.

We aimed to detect differences of 2% in wearing rates using a significance level of $p < .05$, and having statistical power of at least 95%. Based on the RACQ (1998) observation study, it was determined that 2,490, 3,660, and 4,780 observations would be required at the metropolitan, regional and rural sites respectively, or a total of 10,930 observations. To maximise the representativeness of the sample, observations were conducted across all days of the week, and during morning, afternoon and off-peak periods[5] in May and June, 2010.

Survey Procedure

The survey instrument used in this study was developed based on the RTA guide for conducting seatbelt and child restraint wearing surveys (Preece, Johansen & Norrish, 1993) and the requirements of TMR. Slight amendments were made to the survey form after pilot testing at one of the metropolitan sites, and the final survey instrument is presented in Appendix A. The survey instructions distributed to all staff to ensure a consistent approach to the data collection phase of this project are included as Appendix B.

Details were recorded regarding the:

- site location, day and time
- vehicle type (car, taxi, or utility – heavy / emergency service vehicles were excluded)
- presence of L or P plates (L, P or none)
- occupant gender
- approximate apparent age of occupant as judged by observer (child 0 – 16[6]; young adult 17 – 25; adult 26 – 64; senior 65+)
- wearing seatbelt (yes / no)
- driver using mobile phone (yes / no)

These details were recorded separately for all vehicle occupants (i.e., driver, front passenger and rear passengers). Surveyors also noted the weather conditions and any incidents (i.e., crashes or road works). Due to lower than expected vehicles observed per hour during the piloting phase, observation shifts were increased from 45 to 90 minutes. The survey was completed in hard copy rather than with a voice recorder because the trial of these procedures in the piloting phase revealed that the quality of the voice recordings were extremely poor due to road noise, and the pen and paper approach was more conducive to later data entry.

Statistical analysis

As noted previously, a significance level of $p < .05$ was adopted for all tests. Descriptive statistics in the form of frequencies and percentages were calculated for all variables. Pearson's chi-square tests for independence were conducted to compare seatbelt wearing rates of different categories. The null hypothesis was that seatbelt wearing is independent of the variable, so significant results (i.e., those where $p < .05$) indicate that seatbelt wearing rates are dependent on the variable. That is, seatbelt wearing rates vary significantly between categories of the variable being tested. Significant tests were further described by interpreting adjusted standardised residuals (d_{ij}) like z (standardised) scores, where residuals of 1.96 or more were interpreted as being significant at $p < .05$, while those of 2.58 or more were significant at $p < .01$, and those of 3.29 or more were significant at $p < .001$.

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[5] The morning peak period was defined as 7 – 9am; and the afternoon peak period was 4 – 6pm.
[6] Children were only coded as being unrestrained if they were not wearing any form of restraint. It was beyond the scope of this study to code whether or not the restraint used was appropriate for the child's weight and age.

RESULTS

Although the target number of observations to be conducted was 10,930, more observations were actually conducted across all geographical locations, such that a total of 13,664 vehicles carrying 19,742 occupants were observed. A total of 19,579 occupant observations (99.17%) were valid in that all fields were complete. The remaining 163 observations (0.83%) were incomplete due to poor lighting conditions or dark window tinting preventing survey staff from observing some details. Of the 19,579 valid occupant observations, 19,391 (99.04%) were wearing seatbelts, as only 188 (0.96%) were not observed to be wearing a seatbelt. Differences in seatbelt wearing rates as a function of the variables observed in this study were examined. The results of the analyses, or associations with seatbelt use, are reported separately for these temporal, spatial, occupant and vehicle factors.

Temporal factors

Table 2 shows that seatbelt wearing rates differed significantly as a function of day of week, explaining 3.6% of variability in seatbelt wearing rates when examined for all days, and 1.6% of variability when analysed dichotomously (i.e., weekdays vs. weekends). The proportion of people wearing seatbelts on Mondays and Wednesdays was significantly lower than the average wearing rate for the total sample, although these differences were slight at 0.60% and 0.93% respectively. The seatbelt wearing rate on Saturdays was 0.29% higher than average. The 0.33% difference in wearing rates between weekdays and weekends was significant.

Table 2: Seatbelt wearing rates by temporal study variables (*N* = 19,579)

Variable	Wearing (%)	Statistics	
Total sample	19,391 (99.04%)		
Day of week **	**$\chi^2(6) = 25.66$, $p = .003$, Cramer's $V = .036$**		
Monday **	1,708 (98.44%)	$d_{ij} = –2.67$	$p < .01$
Tuesday	1,272 (99.14%)	$d_{ij} = 0.39$	$p > .05$
Wednesday ***	1,507 (98.11%)	$d_{ij} = –3.88$	$p < .001$
Thursday	3,856 (99.20%)	$d_{ij} = 1.16$	$p > .05$
Friday	3,941 (99.09%)	$d_{ij} = 0.40$	$p > .05$
Saturday *	4,274 (99.33%)	$d_{ij} = 2.18$	$p < .05$
Sunday	2,833 (99.13%)	$d_{ij} = 0.51$	$p > .05$
Dichotomous day of week *	**$\chi^2(1) = 5.04$, $p = .025$, $\Phi = .016$**		
Weekday (M – F) *	12,284 (98.92%)	$d_{ij} = –2.25$	$p < .05$
Weekend (Sa + Su) *	7,107 (99.25%)	$d_{ij} = 2.25$	$p < .05$
Shift time	**$\chi^2(2) = 5.82$, $p = .054$, $\Phi = .017$**		
Morning peak period	4,902 (98.77%)		
Afternoon peak period	6,868 (99.21%)		
Off-peak	7,621 (99.06%)		
Study ***	**$\chi^2(1, N = 33{,}579) = 1{,}080.65$, $p < .001$, $\Phi = .179$**		
RACQ 1997 study ***	12,880 (92.00%)	$d_{ij} = –32.87$	$p < .001$
Current study ***	19,391 (99.04%)	$d_{ij} = 32.87$	$p < .001$

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$

The relationship between seatbelt use and observational shift time was not significant. When seatbelt rates observed in this study were compared to those of the previous Queensland study conducted by RACQ in 1997, it was found that wearing rates had increased by a statistically significant 7.04%[7]. However, it is important to note that direct comparisons between study results should be interpreted with caution, given that the studies were conducted by different organisations, using different methodologies, although both studies conducted observations across Queensland. The Phi (Φ) effect size statistic indicates that this was a large effect, with the different studies explaining 17.9% of the variability in seatbelt wearing rates.

Spatial factors

There were statistically significant differences in seatbelt wearing as a function of the geographic location of the observation sites, although the Cramer's *V* statistic indicates that the geographic location explained a slight amount of variability (2.3%) in seatbelt use. As shown in Table 3, seatbelt wearing rates were 0.23% higher than the total sample average in regional areas and 0.27% lower in rural areas.

Table 3: Seatbelt wearing rates by spatial study variables (*N* = 19,579)

Variable	Wearing (%)	Statistics	
Total sample	19,391 (99.04%)		
Geographic location **	**$\chi^2(2)$ = 10.76, *p* = .005, Cramer's *V* = .023**		
Metropolitan areas	4,197 (99.17%)	d_{ij} = 1.00	$p >$ .05
Regional areas *	7,051 (99.27%)	d_{ij} = 2.47	$p <$ .05
Rural areas ***	8,143 (98.77%)	d_{ij} = –3.24	$p <$ .001
LGAs ***	**$\chi^2(11)$ = 38.45, *p* < .001, Cramer's *V* = .044**		
Metropolitan areas			
Brisbane	1,552 (99.42%)	d_{ij} = 1.62	$p >$ .05
Gold Coast	1,050 (98.50%)	d_{ij} = –1.86	$p >$ .05
Moreton Bay	1,595 (99.38%)	d_{ij} = 1.45	$p >$ .05
Regional areas			
Cairns	1,345 (98.61%)	d_{ij} = –1.70	$p >$ .05
Townsville ***	2,121 (99.72%)	d_{ij} = 3.40	$p <$ .001
Rockhampton	1,591 (98.88%)	d_{ij} = –0.68	$p >$ .05
Toowoomba *	1,994 (99.55%)	d_{ij} = 2.47	$p <$ .05
Rural areas			
Dalby	1,052 (99.06%)	d_{ij} = 0.06	$p >$ .05
Warwick	1,331 (98.96%)	d_{ij} = –0.31	$p >$ .05
Emerald	2,357 (98.95%)	d_{ij} = –0.48	$p >$ .05
Ingham	1,747 (98.64%)	d_{ij} = –1.79	$p >$ .05
Charters Towers **	1,656 (98.34%)	d_{ij} = –3.09	$p <$ .01

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$

[7] The RACQ (1998) report only included percentages of wearing rates rather than numbers of observations. The number of occupants wearing seatbelts was calculated by the authors by multiplying 92% by the total number of observations (14,000) in the report.

To better understand the effects of geographical location, we also examined seatbelt wearing rates by LGA. As expected given the significant variability by geographic location, the relationship between seatbelt wearing rates and LGA was also statistically significant, explaining 4.4% of variability in seatbelt wearing. Table 3 shows that wearing rates in Townsville and Toowoomba (regional areas) were significantly higher than the total sample average by 0.68% and 0.51% respectively, while the wearing rate for Charters Towers (a rural area) was 0.70% significantly below average.

Occupant factors

Table 4 shows that gender and mobile phone use of drivers were the only occupant factors that demonstrated a statistically significant association with seatbelt wearing. The seatbelt wearing rate for females was 0.50% higher than that for males. This represented a small effect, with gender explaining 2.5% of variability in seatbelt wearing.

Table 4: Seatbelt wearing rates by occupant study variables (N = 19,579)

Variable	Wearing (%)	Statistics	
Total sample	19,391 (99.04%)		
Gender ***	**χ^2(1, N = 19,479) = 12.57, p < .001, Φ = .025**		
Male ***	10,391 (98.81%)	d_{ij} = –3.55	p < .001
Female ***	8,901 (99.31%)	d_{ij} = 3.55	p < .001
Age group	**χ^2(3) = 4.99, p = .172, Cramer's V = .016**		
Child (0 – 16)	1,554 (98.54%)		
Young adult (17 – 25)	3,753 (99.18%)		
Adult (26 – 64)	12,582 (99.06%)		
Senior (65+)	1,502 (99.01%)		
Seating position	**χ^2(2) = 5.18, p = .075, Cramer's V = .016**		
Driver	13,450 (99.11%)		
Front passenger	4,494 (99.01%)		
Rear passenger	1,447 (98.50%)		
Mobile phone use ***	**χ^2(1, N = 13,571) = 14.08, p < .001, Φ = .032**		
Yes ***	81 (95.29%)	d_{ij} = –3.75	p < .001
No ***	13,369 (99.13%)	d_{ij} = 3.75	p < .001
Novice drivers	**χ^2(2) = 1.44, p = .486, Cramer's V = .009**		
L plate	137 (100.0%)		
P plate	539 (98.90%)		
None	18,715 (99.04%)		

Notes: * p < .05, ** p < .01, *** p < .001

The seatbelt wearing rate for drivers observed talking on a mobile phone was 3.84% lower than that for drivers not using a phone. This small effect explained 3.2% of variability in seatbelt use. No statistically significant association was found between seatbelt use and the apparent age group of occupants, their seating position or their novice driver status (as indicated by the presence of L or P plates).

Vehicle factors

There were statistically significant differences in seatbelt wearing by vehicle type (i.e., car vs. taxi vs. utility), $\chi^2(2, N = 19{,}579) = 39.18$, $p < .001$, Cramer's $V = .045$, although this represented a small effect, explaining 4.5% of variability in seatbelt wearing rates. This represents the greatest amount of variance explain by any of the observed variables. Adjusted standardised residuals revealed that this difference was caused by significantly higher than expected seatbelt wearing rates for occupants of cars (99.24%, $z = 5.84$, $p < .001$), and lower than expected wearing rates for occupants of taxis (96.79%, $z = -3.43$, $p < .001$) and utilities (98.31%, $z = -5.05$, $p < .001$).

Summary of factors associated with seatbelt use

This study found that seatbelt wearing in Queensland is extremely high, and more than seven percent higher than the most recent observation study conducted by RACQ in 1997. It was found that day of week, geographic location (including LGA), vehicle type, gender and mobile phone use were significantly associated with seatbelt wearing. However, although these analyses were significant at $p < .05$, these differences represented very small effects, explaining only small proportions of variance in seatbelt wearing, with differences between categories of less than one percent. Thus it may be more appropriate to interpret the findings in terms of practical significance rather than statistical significance as the large sample size appears to have inflated the Type I error rate (i.e. the probability of concluding that there is a significant difference in seatbelt wearing rates when in reality, there is not).

It was noted in the Methods section that we aimed to detect differences in seatbelt wearing rates of two percent or more. The only variable that met this threshold was mobile phone use, where we found that drivers talking on a mobile phone (albeit with a small cell size) had a seatbelt wearing rate that was 3.84% less than that for drivers who were not observed using a phone. No other variables showed seatbelt wearing rate differences greater than two percent.

Observation process issues

Although seatbelt use is very high in Queensland, non-use of seatbelts is still a concerning road safety issue, and studies such as this should be repeated over time to monitor seatbelt use and the success of this fundamental road safety initiative. In this regard, methodological issues encountered in this study can inform future observational research of this nature.

For example, some surveyors experienced difficulty conducting observations after 4:45pm due to reduced natural light. Afternoon peak period surveys therefore commenced at 4pm so a full shift could be conducted, but it is recommended that future observational studies are conducted in summer months to maximise natural light for afternoon peak period observations. This issue highlights a major limitation to these types of studies: the inability to observe road user behaviour during the evenings, when reduced compliance is likely to increase as a result of (or in conjunction with) other associated high risk behaviours such as impaired driving. Also, it was noted in the Methods section that occupants of heavy vehicles were not observed, nor were high speed roads, as observations were conducted at intersections when traffic had come to a stop, and occupants needed to be visible to survey staff. These practical constraints may influence the estimated wearing rates obtained, and explain some of the difference between the results of this study and other methods.

To allow comparisons between estimates of seatbelt wearing rates over time, it is recommended that the same procedure (as outlined in the Appendices) is followed in future observational studies. Finally, it is important to pilot test the survey procedure at all sites to establish survey rates (i.e., vehicles observed per hour) and identify other potential operational issues that may need to be addressed.

CONCLUSION

The aim of this study was to obtain an up-to-date estimate of seatbelt use in Queensland. The most recent study of this nature was conducted at various locations across Queensland by RACQ in 1997, and found that of the 14,000 occupants observed, 92% were wearing a seatbelt (RACQ, 1998). The current study found that 99.04% of the 19,579 occupants observed were wearing a seatbelt. Although these studies are not directly comparable as they were conducted using different methodologies, it would appear that the already high use of seatbelts in Queensland has increased by approximately 7% in the last 13 years.

Although a number of the variables measured in this study were significantly associated with seatbelt wearing rates, only mobile phone use was associated with a difference in wearing rates of more than two percent, as drivers using mobile phones had a seatbelt wearing rate that was 3.84% less than that for drivers who were not using a mobile phone when observed. This is consistent with the seatbelt literature that has shown that failure to wear a seatbelt is associated with other risky driving behaviours (e.g., Begg & Langley, 2000; Briggs et al., 2008; Hartos et al., 2000; Machin & Sankey, 2008; McCartt & Northup, 2004; Preusser et al., 1991; Reinfurt et al., 1996; Wilson, 1990). It is suggested that risky drivers (i.e. traffic offenders and unbelted occupants in crashes) should be the target of education campaigns about the risks and penalties associated with non-use of seatbelts.

The main strength of this study was that it has provided a current estimate of compliance with an important Safe Road Users initiative in Queensland. The seatbelt wearing rate is higher than any of the rates observed in the previous observation studies cited in this paper, and can be considered evidence of the combined effectiveness of the ongoing policy, education and enforcement practices in Queensland and Australia that have targeted seatbelt wearing. Observation studies such as this have the advantage of being more objective than self-report measures of seatbelt use, which have been found to inflate rates of use (Briggs et al., 2008; Robertson, 1992; Steptoe et al., 2002; Streff & Wagenaar, 1989). However, a disadvantage of this method was that we were only able to measure seatbelt use at a snapshot in time, when we know from self-report surveys of seatbelt use and crash statistics that some people can be described as "occasional" wearers of seatbelts, which was not able to be captured in a study of this nature. Further, we did not observe heavy vehicles, or conduct observations after dark or on high speed roads. It is possible that wearing rates calculated including heavy vehicle occupants, sampling at night and on highways would be slightly lower than that found in this study. Some high risk behaviours are more common at night (e.g., drink driving), and the literature suggests that non-use of seatbelts is more common among drivers who engage in other high-risk road user behaviours. However, there are practical constraints on sampling heavy vehicles, conducting observations at night and in moving traffic that may be difficult and expensive to overcome in future observational research.

While it is encouraging that this study found that compliance with seatbelts laws is high, the small proportion of occupants who travel without wearing a seatbelt, and those who crash without wearing a seatbelt, represent significant road safety issues. Seatbelts are one of the most effective initiatives within the Safe System framework, in terms of their success in reducing the severity of injury and, ergo, the road toll. It is therefore imperative that road safety professionals continue to monitor compliance with seatbelt laws and conduct research to better understand who is at risk of travelling without a seatbelt, and the specific situations in which this unsafe behaviour occurs. Given that non-belted occupants are over-represented in serious injury and fatal crashes, any increases in seatbelt wearing rates are likely to reduce the road toll, and assist governments in meeting Safe System road safety targets.

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APPENDIX A

TMR SEATBELT WEARING SURVEY
OBSERVATION RECORDING FORM

Site Location: ______________________________

Date: ____________ Start Time: ____________ End Time: ____________

Weather: ____________ Surveyor: ____________

Veh	Type	L/P Plate	Driver			Front Passenger			Rear Passenger #1			Rear Passenger #2			Using Phone
			M/F	Age	Wearing	M/F	Age	Wearing	M/F	Age	Wearing	M/F	Age	Wearing	
					☐			☐			☐			☐	☐
					☐			☐						☐	☐
					☐			☐			☐			☐	☐
					☐			☐			☐			☐	☐

<u>Type:</u>
- <u>C</u>ar (pax veh, vans, 4wd)
- <u>T</u>axi
- <u>H</u>eavy Veh

<u>Age:</u>
- <u>C</u>hild (0-16)
- <u>Y</u>oung Adult (17-25)
- <u>A</u>dult (26-64)
- <u>S</u>enior (65+)

Note: Do not record any details for heavy vehicles

<u>Wearing:</u>
- ✓ Yes - correctly
- × No

<u>Incidents (eg crashes or road works):</u>

<u>Data Entry:</u>
- Once ________
- Twice ________
- Checked ________

APPENDIX B

Preliminaries

- Survey staff are to wear enclosed shoes, hat, sunscreen and high visibly vest
- Survey all cars, utes, 4wd's, vans and taxis
- Do not survey trucks, buses, police cars, ambulances or fire service vehicles
- If there are more than two rear seat passengers, add the additional passenger details in the following row. In this circumstance, place a dash (-) in the Veh Column.
- If the whole queue at an intersection does not clear, continue surveying from the next vehicle in the queue. Do not record the same vehicles details twice.

Positioning

- Staff are to position themselves as per the Surveyor Positioning for each intersection
- Staff will walk along the nominated section of footpath / median and record details only from the nominated traffic lane

Recording Data

- Veh: The vehicle number surveyed. NOTE: enter a dash (-) in this column if there are more than two rear seat passengers in a vehicle.
- Type: Enter the vehicle type:
  - "C" for car (car, 4wd)
  - "T" for a taxi (sedan, maxi taxi)
  - "U" for a ute
- L/P : Enter the following:
  - "L" for a L-plate
  - "P" for a P-plate
  - Leave blank if there are no visible plates.
- M/F: Enter whether the person is Male (M) or Female (F)
- Age: Enter the approximate age category:
  - "C" for child (ie 0-16 years old)
  - "Y" for Young adult (ie 17-25 years old)
  - "A" for adult (ie 26-64 years old)
  - "S" for senior (ie 65+ years old)
- Wearing: Enter a tick (√) if the occupant is wearing a seatbelt. Enter a cross (x) if the occupant is not wearing a seatbelt
- Using Phone: This relates to the vehicle driver only. Tick this column if the driver of the vehicle has a mobile phone in their hand.

Signalised Intersections

- Begin the survey at the location marked on the Surveyor Positioning sheet
- When the traffic is stopped at a red light, begin recording the details of the <u>second</u> car back from the traffic lights in the nominated lane
- Only the details for stationary vehicles are to be recorded
- Work back along the lane and collect the data for every vehicle in order – regardless of the difficulty of collecting the data.
- Once the light has turned green, return to the original position to repeat the process when the light next turns red.

Priority Intersections (i.e., give way, stop, and roundabout)

- Stand and remain at the position indicated on the Recommended Surveyor Positioning sheet
- Collect the data as vehicles pass – and enter all data in its entirety
- Survey the next vehicle which passes immediately upon completion of data entry of the previous vehicle.
- Concentrate only on completing the data entry for the current vehicle, before recording the next vehicle. This means, finish recording the details of one vehicle, even if you miss the details for other vehicles that pass, before commencing on the next vehicle.

Weather Response

- In case of drizzle or intermittent rain – continue surveying.
- In case of a short intense period of rain (say up to 30 minutes in duration), pause surveying, seek shelter from the rain and then re-commence surveying when it stops raining.
- In case of a prolonged intense period of rain (say more than 30 minutes in duration), stop the survey and re-schedule for another day/time.