Phone use and crashes while driving: a representative survey of drivers in two Australian states

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ABSTRACT

Objective: To explore the use and effects of using mobile phones while driving.

Design: Cross-sectional survey.

Setting: New South Wales and Western Australia, 20 October to 7 November 2003.

Participants: 1347 licensed drivers aged 18 to 65 years. Data were weighted to reflect the corresponding driving population in each state.

Main outcome measures: Mobile phone use while driving (hand-held, hands-free and text messaging); adverse effects of use.

Results: While driving, an estimated 57.3%±1.5% of drivers have ever used a mobile phone and 12.4%±1.0% have written text messages. Men, younger drivers and metropolitan residents were more likely to use a phone while driving and to report a higher frequency of use. Enforcement of hand-held phone restrictions was perceived to be low (69.0%±1.5%) and an estimated 39.4%±2.1% of people who phone while driving use a hand-held phone. Half of all drivers (50.1%±1.6%) did not agree with extending the ban to include hands-free phones. Among drivers aged 18–65 years in NSW and WA, an estimated 45 800±16 466 (0.9%±0.3%) have ever had a crash while using a mobile phone and, in the past year, 146 762±26 856 (3.0%±0.6%) have had to take evasive action to avoid a crash because of their phone use.

Conclusions: Phone use while driving is prevalent and can result in adverse consequences, including crashes. Despite legislation, a significant proportion of drivers continue to use hand-held mobile phones while driving. Enhanced enforcement is needed.

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Since the introduction of mobile phones into Australia in 1987, there has been concern about the effect on road safety of mobile phone use while driving.[1] Today, the number of mobile phone connections exceeds the number of landlines, and more than 80% of Australians own or use a mobile phone.[2] Throughout Australia, hand-held mobile phone use while driving is illegal, but drivers who wish to use a mobile phone may do so with a hands-free device.[3]

Nevertheless, an observational survey conducted in Melbourne in 2002 found that, at any given time, about 2% of drivers were using a hand-held phone while driving.[4] Moreover, the purported safety benefit conferred by hands-free devices remains questionable. Experimental research has shown that both hand-held and hands-free phone use can impair driving performance, as measured by reaction time and situational awareness.[5-7] In young drivers, using a mobile phone to send text messages has been shown to degrade driving performance in a simulator.[8] Epidemiological research has found that mobile phone use while driving is associated with a fourfold increase in crash risk, irrespective of whether a hands-free device is used.[9,10]

To assess the effect of phone use while driving in order to inform public health initiatives, several other factors require investigation. These include an estimate of the prevalence of mobile phone use while driving, the current pattern and frequency of phone use while driving, the extent to which drivers continue to use hand-held phones while driving, the attitudes of drivers to the risk of crashing conferred by phone use, and the effect of mobile phone use on road safety as measured by the self-reported adverse outcomes resulting from phone use.

We addressed these matters by conducting a representative survey of drivers in New South Wales and Western Australia.

METHODS

Study population

Participants were required to hold a current drivers licence, be aged between 18 and 65 years, reside in either NSW or WA, have driven in the past month, and mainly drive a motorised vehicle other than a motorcycle on public roads. Drivers were excluded if they had hearing or English language difficulties. Based on data from the NSW Roads and Traffic Authority (RTA) and the WA Department of Planning and Infrastructure (DPI), this population was 4.9 million in July 2003.

Sample selection

The sampling frame was the residential section of the Electronic White Pages in NSW and WA (Brylar's Australia on Disc, May 2003). Households were stratified by state and area of residence as defined by postcodes. Four pools of phone numbers were randomly selected (Sydney, regional NSW, Perth, and regional WA). Individuals were stratified by age group (18–30, 31–49 and 50–65 years old) and sex. Small groups (for example, regional residents) were oversampled, and the overall sample size was calculated to take into account the stratification.

Survey questionnaire and administration

The questionnaire contained items to ascertain the demographic features and driving characteristics of the sample; the frequency and pattern of mobile phone use while driving; the use of hands-free devices; perceptions of the risk of phone use while driving; and adverse incidents relating to phone use, including crash involvement. Phone use referred to making and answering calls and sending and checking text messages. This was part of a broader survey that collected data on the prevalence and perceived risks of driver distraction.[11]

Telephone interviews were conducted between 20 October and 7 November 2003 by trained professional interviewers in the Survey Research Centre at the University of Western Australia. Up to eight calls were made to each residential number. Once contact was established, the interviewer provided an explanation for the call and determined the eligibility of household members for the survey. If multiple household members were eligible, the individual with the most recent birthday was interviewed. A computer assisted telephone interview system was used to manage call-backs and to enter and check data to allow only valid responses, such as

1 Survey response breakdown

	NSW	WA
Screened out*	789	582
Respondents	676	671
Refusals		
Household	439	352
Respondent	385	236
Passive refusal†	6	14
Terminations‡	3	5
Total	1509	1278

* Ineligible individuals (no drivers licence; motorcycle riders; outside the age range; English language or hearing difficulties).
† Eight calls to a household without establishing contact. ‡ Interview commenced, but terminated before completion. ◆

2 Demographic and driving characteristics of mobile phone and non-mobile phone users

Factor	Uses phone while driving (Weighted %*)	No phone use while driving (Weighted %*)	*P*
Sex			< 0.001
Male	417 (33.5%)	269 (18.4%)	
Female	309 (23.8%)	352 (24.4%)	
State of residence			0.40
New South Wales	381 (44.0%)	295 (32.1%)	
Western Australia	345 (13.3%)	326 (10.6%)	
Age group (years)			< 0.001
18–30	302 (18.5%)	138 (7.7%)	
31–49	269 (27.8%)	196 (18.5%)	
50–65	155 (10.9%)	287 (16.6%)	
Regular driving routine			0.13
Yes	514 (42.1%)	422 (29.6%)	
No	212 (15.2%)	199 (13.2%)	
Primary location of driving			< 0.001
Mainly metropolitan	434 (40.2%)	281 (23.5%)	
Mainly regional centres	156 (9.7%)	199 (12.4%)	
Mainly rural (open road)	136 (7.3%)	141 (6.9%)	
Distance driven (kilometres per year)			< 0.001
< 2000	16 (1.5%)	59 (4.5%)	
2000–4999	79 (6.0%)	111 (8.2%)	
5000–9999	110 (9.4%)	103 (7.0%)	
10 000–19 999	194 (16.4%)	169 (11.2%)	
⩾ 20 000	327 (24.0%)	179 (11.8%)	
Average driving frequency			0.002
Once a week or less	7 (0.7%)	14 (1.3%)	
2–3 days per week	36 (3.2%)	56 (4.0%)	
4–6 days per week	72 (5.8%)	98 (6.4%)	
Daily	611 (47.6%)	453 (31.1%)	
Time driven on average day (min)			< 0.001
⩽ 30	118 (8.3%)	187 (12.2%)	
31–60	252 (20.4%)	228 (16.0%)	
61–120	219 (17.1%)	136 (9.6%)	
> 120	137 (11.4%)	70 (5.0%)	

* Weighted percentage totals may not sum to 100% because of rounding. ◆

within-range replies. Automatic rotation of categories was used where relevant to minimise response bias.

The Human Research Ethics Committees at the University of Western Australia and the University of New South Wales approved the study.

Survey analysis

The total numbers of licensed drivers in each of the 24 strata were obtained from the RTA and the DPI. These were used to calculate the appropriate weightings so as to produce population estimates (and their standard errors). The data were analysed using Stata version 8 (StataCorp, College Station, Tex, USA). Percentages are presented as weighted percentages (±SE), unless otherwise stated. In certain rural strata, small numbers prevented the calculation of a weighted estimate for the adverse effects resulting from mobile phone use while driving during the previous week; unweighted percentages are given in these instances.

Weighted univariate χ^2 tests and weighted χ^2 tests for linear trends were used, where indicated. A multiple logistic regression model was used to test for independent effects in relation to potential factors associated with reported phone use while driving. A weighted proportional odds model was used to compare risk-taking habits (each expressed on a five-point ordinal scale) between those who did and did not use phones while driving, with and without adjustment for sex, age group, and area of residence.[12] As there were no significant differences between the states for any of the key measures, including mobile phone ownership and mobile phone use while driving, results were pooled: thus, population estimates (pop est) refer to the population of drivers aged 18–65 years in NSW and WA.

RESULTS

There were 1347 respondents across the two states. The overall response rate was 48.3% (1347/2787; NSW, 44.8%; WA, 52.5%). Box 1 shows the breakdown of screened households and individuals. There were 1114 mobile phone users (85.1% ± 1.1%). Of these, 726 reported using a mobile phone while driving (57.3% ± 1.5% of all drivers). This means that almost 2.8 million drivers aged between 18 and 65 years in NSW and WA will have used a phone while driving (pop est ±SE, 2 787 518 ± 74 287). These drivers are more likely to be male, young (18–30 years), drive in metropolitan areas, and drive more frequently (as measured by distance driven annually, average driving

3 Drivers' perception of the crash risk conferred by various distracting and other risk behaviours

Human factor while driving†	N‡	Estimated increase in crash risk (row %)*					P
		Nil	Small	Moderate	High	Extreme	
Hand-held mobile phone use							< 0.001
Phone use	722	2.4%	9.8%	24.5%	37.1%	26.1%	
No phone use	604	0.4%	3.2%	17.7%	39.6%	39.2%	
Hands-free mobile phone use							< 0.001
Phone use	715	18.6%	33.9%	37.7%	7.7%	2.1%	
No phone use	596	9.5%	24.6%	42.1%	16.2%	7.6%	
Writing and sending a text message							< 0.001
Phone use	718	0.6%	2.8%	12.4%	34.1%	50.1%	
No phone use	596	0	0.4%	6.0%	33.0%	60.6%	
80 km/h in 60 km/h zone							0.005
Phone use	721	4.0%	10.0%	33.3%	37.9%	14.9%	
No phone use	611	2.8%	7.3%	26.6%	40.0%	23.2%	
Blood alcohol concentration 0.05 g/dL							< 0.001
Phone use	702	6.5%	11.5%	27.8%	26.9%	27.4%	
No phone use	591	3.0%	9.8%	19.5%	35.4%	32.3%	
Blood alcohol concentration 0.08 g/dL							0.10
Phone use	705	1.5%	3.6%	14.6%	33.9%	46.4%	
No phone use	591	0	3.6%	11.8%	34.1%	50.5%	

* Weighted row percentages may not sum to 100% because of rounding. † Respondents were asked to estimate crash risk while vehicle was in motion. The list of human factors was given in random order for each respondent at the time of interview. "Phone use" refers to respondents who reported using a phone while driving. ‡ Number responding, remainder were "Don't know". ◆

frequency and average time driven daily), compared with drivers who did not (Box 2). In the multiple regression model, adjusting for distance driven annually, males, young drivers and metropolitan drivers were each independently associated with reported phone use while driving. Importantly, in the model, young drivers were almost five times more likely than older drivers to report phone use while driving (50–65 years, referent group; odds ratio, 4.8; 95% CI, 3.4–6.9; $P < 0.001$).

Perceived crash risk, legislation and enforcement

Drivers who used a phone while driving considered mobile phone use (both hands-free and hand-held), writing and sending text messages, exceeding the speed limit (80 km/h in a 60 km/h zone), and driving with a blood alcohol concentration (BAC) of 0.05 g/dL as significantly less dangerous than drivers who did not use a phone while driving (Box 3). There was no significant difference in perceived crash risk between the groups for driving with a BAC of 0.08 g/dL. After adjusting for sex, age group and area of residence, differences by user group (phone use versus no phone use while driving) remained significant, except for text messaging while driving ($P = 0.11$).

Most drivers (97.8% ±0.5%) were aware of the ban on hand-held mobile phone use while driving and agreed with it (93.6% ±0.8%). Half of all drivers (50.1% ±1.6%) did not agree with extending the ban to include hands-free phones. Drivers who used their phones while driving were less likely to agree with an extension to the ban than those who did not (35.5% versus 65.4%, respectively, $P < 0.001$).

Most drivers felt that it was unlikely that they would be caught for using a hand-held phone while driving in their local area (not likely or low likelihood, 69.0% ±1.5%). This perception was not significantly influenced by whether a driver had used a phone while driving ($P = 0.14$).

Patterns of phone use and text messaging while driving

Almost 40% of drivers who use a phone while driving (pop est, 1 097 146 ±66 263; 22.5% ±1.4% of all drivers) did not have a hands-free device. Among the 421 drivers who had a hands-free device, 221 (55.1% ±2.7%) used an earpiece, 153 (33.9% ±2.5%) used a fully installed car kit, 37 (8.9% ±1.6%) used a headset and 10 (2.0% ±0.7%) used another type of hands-free device.

Extrapolating to the population of drivers represented by the survey, more than 600 000 drivers (602 939 ±48 283; 12.4% ±1.0%) have written and sent text messages while driving, and 78 211 ±16,524 (1.6% ±0.3%) do so during at least half of their driving trips. Young drivers (18–30 years; 31.4%) were significantly more likely to write and send text messages than older drivers ($P < 0.001$); there were no significant differences by sex or area of residence.

The frequency of mobile phone use while driving is shown in Box 4. Drivers who used their phones during more than 50% of trips spent a median of 8.3% of their daily driving time on the phone (or 10 minutes per day). Drivers who used their phones on 10% to 50% of trips spent a median of 3.6% of their

4 Frequency of mobile phone use while driving

Frequency	N	Uses phone while driving (weighted % ± SE)*	All drivers (weighted % ±SE)	Population estimate† (± SE)
> 50% of trips	105	15.3% ± 1.6%	8.8% ± 0.9%	426 941 ± 45 683
10%–50% of trips	105	14.9% ± 1.5%	8.5% ± 0.9%	414 005 ± 44 437
1%–9% of trips	437	60.9% ± 2.1%	34.8% ± 1.5%	1 696 701 ± 75 251
< 1% of trips	79	9.0% ± 1.2%	5.1% ± 0.7%	249 866 ± 33 093
Never use	621	—	42.7% ± 1.5%	2 081 177 ± 74 287
Total	1347			4 868 695

* Weighted percentages may not sum to 100% because of rounding. † From the New South Wales and Western Australian driving population aged 18–65 years. Numbers do not sum precisely to the population total because of rounding. ◆

daily driving time on the phone (or 3 minutes per day). Frequent users (use during 10% or more of driving trips) were significantly more likely to be male, young and live in metropolitan areas than less frequent and non-mobile phone users ($P < 0.001$). Among frequent users, more than a quarter (27%) did not have a hands-free device.

Adverse effects of phone use while driving

Four hundred and twenty-four drivers had used their phone while driving in the previous week (61.3% ±2.1% of drivers who use a phone while driving; 35.1% ±1.5% of all drivers). Of these, 314 (74.1%; unweighted) reported at least one adverse effect on their driving resulting from the most recent phone use. The effects included taking eyes off the road (237; 55.9%), slowing down (164; 38.7%), lack of concentration (162; 38.2%), failing to indicate (21; 5.0%), drifting between lanes (16; 3.8%), sudden braking (12; 2.8%), missing a turn-off (9; 2.1%), and near misses (3; 0.7%).

Eleven drivers (1.6% ±0.6% of drivers who use a phone while driving; 0.9% ±0.3% of all drivers) had ever had a crash while using a mobile phone. This suggests that 45 800 ±16 466 drivers aged 18–65 years in NSW and WA have had a similar experience. Thirty-eight drivers (5.3% ±1.0% of drivers who phone while driving; 3.0% ±0.6% of all drivers; 24 drivers had hands-free devices) could recall having to take evasive action to avoid a collision in the previous 12 months because they were using their mobile phones. This equates to 146 762 ±26 856 drivers aged 18–65 years in NSW and WA. Among all respondents, 304 drivers (pop est, 1 181 827 ±68 804; 24.3% ±1.4%) could recall having to take evasive action to avoid a collision in the previous 12 months because another driver was using a mobile phone.

DISCUSSION

The prevalence of mobile phone use while driving is high: almost 60% of drivers have used a mobile phone while driving at least occasionally, and a third will have done so in the preceding week. Young drivers, particularly young men, are most likely to use a phone while driving and to report a higher frequency of use — these are the groups who are over-represented in crash statistics.[13] More than 30% of young drivers have written and sent text messages while driving. Notably, a number of international surveys have demonstrated that younger drivers,[14-17] men,[15,16] and metropolitan residents[15,16] are more likely to use a phone while driving or have higher levels of phone use.

Those who use a phone while driving considered phone use, speeding and driving with a BAC of 0.05 g/dL to be significantly less risky than those who do not use a phone, even after adjusting for sex, age group and area of residence. Thus, drivers who use a phone while driving may have more permissive attitudes to a range of risk-taking behaviours on the road.

Hand-held phone use while driving remains prevalent (22.5% of all drivers) and almost 70% of drivers felt that enforcement of the ban on hand-held mobile phone use while driving is low. Some respondents volunteered that they were unsure about whether text messaging is included in the current ban, so increased driver awareness about this is required.

Our findings highlight the potential dangers of mobile phone use while driving in relation to near misses and crashes. About 1% of all drivers have crashed while using a mobile phone. By way of comparison, in a survey of predominantly male, heavy vehicle drivers in Denmark,[14] five drivers (0.5%) had crashed as a result of phone use and 6% had experienced dangerous situations on account of their phone use in the previous year. Two-thirds had been in dangerous situations in the previous year because of phone use by other road users. In Finland, 50% of surveyed drivers had experienced dangerous situations arising from their phone use.[17]

Our study has limitations. First, random digit dialling was not undertaken, because it is a more costly and less efficient method. Instead, phone numbers were randomly selected from the residential Electronic White Pages. Consequently, respondents were sampled from households with a landline and a phone book listing. Importantly, there is evidence to suggest that using the Electronic White Pages as the sampling frame for population health surveys does not introduce significant bias.[18] Second, the overall response rate approached 50%. As part of the introduction, potentially eligible respondents were told that this was a survey about driving safety. Mobile phone use was one component and was not mentioned specifically in the introduction. Although selection bias due to the response rate cannot be ruled out, its effect is expected to have been low, as a decision to participate would not have been based on opinions about mobile phone use per se. Finally, data were self-reported, and it is possible that drivers who use a phone while driving, especially those who use a hand-held mobile phone, may have been reticent to admit to such behaviour or its untoward effects. However, there is evidence that social desirability does not significantly influence self-reported driving behaviour.[19] Any resultant bias would tend to underestimate the extent of the problem, not overestimate it.

CONCLUSIONS

To date, information on phone use while driving in Australia has been limited to industry surveys (Telstra. National summary: Drive Safe Phone Safe survey. April 2003). Our study has demonstrated that phone use while driving is prevalent, and adverse consequences, including crashes, occur. Increased enforcement and media campaigns to raise drivers' awareness about the ban on text messaging and the risks of phone use (hand-held or hands-free) while driving are needed. As young drivers are particularly likely to use phones while driving, targeted education of novice drivers is warranted. Importantly, a ban on all phone use among novice drivers is to be introduced in Victoria.[13] However, our data suggest that any proposal to impose further restrictions on phone use while driving for more experienced drivers would require increased public support. As the prevalence of mobile phone use and other in-vehicle distractions is only likely to increase, investment to investigate, monitor and minimise the harm is required to maintain road safety and reduce consequent injury.

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COMPETING INTERESTS

None identified.

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