Mobile telephone use among Melbourne drivers: a preventable exposure to injury risk

David McD Taylor, Dianne M Bennett, Michael Carter and Devinder Garewal

ABSTRACT

Objective: To determine the rate of handheld mobile telephone use among motor vehicle drivers.

Design and setting: Observational study of motor vehicle drivers at three times (10:00–11:00; 14:00–15:00; 17:00–18:00) on three consecutive Fridays in October 2002 at 12 highway sites in metropolitan Melbourne.

Main outcome measures: Rates of mobile phone use overall and by sex and age group, highway site (major metropolitan road, central business district, freeway exit ramp) and time of day (morning, afternoon, evening).

Results: 315 of 17 023 drivers were observed using mobile phones (18.5 users/1000 drivers; 95% CI, 16.5–20.6). Men had a slightly higher rate of use (19.0; 95% CI, 16.5–21.6) than women (17.5; 95% CI, 14.1–20.9), but the difference was not significant. Older drivers (50 years or more) had a significantly lower rate (4.8; 95% CI, 2.5–7.0) than middle-aged (21.9; 95% CI, 18.8–25.1) or young drivers (23.2; 95% CI, 18.9–27.5). Central business district drivers had a slightly, but not significantly, higher rate (20.5; 95% CI, 16.8–24.3) compared with those on major metropolitan roads (16.7; 95% CI, 13.3–20.2) or freeway exit ramps (18.2; 95% CI, 14.8–21.6). The rate of mobile phone use was significantly higher in the evening (23.5; 95% CI, 19.8–27.3) compared with the morning (16.0; 95% CI, 12.6–19.4) and afternoon (15.2; 95% CI, 11.9–18.4).

Conclusion: Mobile phone use is common among Melbourne metropolitan drivers despite restrictive legislation. This issue needs to be further addressed by Victoria Police and public health and education agencies. Similar research is indicated to determine the extent of mobile phone use in other states.

MJA 2003; 179: 140–142

THERE IS INCREASING EVIDENCE that the use of a handheld mobile telephone while driving a motor vehicle increases the risk of a traffic accident.[1-6] The risk of collision while using a mobile phone is increased fourfold,[5] compared with a twofold increased risk when driving with a blood alcohol concentration (BAC) of 0.06%.[7] A case–control study showed that the risk of a fatality is increased ninefold when using a mobile phone.[3]

In 1988, the Victorian government enacted legislation prohibiting the use of handheld mobile phones by motor vehicle drivers.[8] Currently, the fine for conviction is $135 and three demerit points. Despite this regulation, there were 17 944 infringements reported by Victoria Police during 2001, compared with 16 018 drivers charged with a BAC above the legal limit of 0.05% (Chief Inspector David Richardson, Traffic Camera Office, Victoria Police, personal communication).

These statistics represent known infringement rates and will significantly underestimate the true prevalence of mobile phone use. As there are few published reports on the prevalence of this practice worldwide, and only one in Australia (by Horberry and colleagues in Western Australia),[9] the increased risk to the public is not known. We aimed to investigate the rate of mobile phone use among Melbourne drivers and the associations with the driver's sex and age group, and with highway site and time of day. The results will assist the development of targeted intervention strategies to decrease mobile phone use while driving and will act as a baseline against which the effect of these interventions can be measured.

Emergency Department, Royal Melbourne Hospital, Parkville, VIC.
David McD Taylor, MD, FACEM, Director of Emergency Medicine Research;
Dianne M Bennett, RN, BA, Research Assistant;
Michael Carter, Advanced Medical Science Student;
Devinder Garewal, Advanced Medical Science Student.
Reprints will not be available from the authors. Correspondence: Associate Professor David McD Taylor, Emergency Department, Royal Melbourne Hospital, Grattan Street, Parkville, VIC 3050.
david.taylor@mh.org.au

METHODS

This was an observational study of drivers in metropolitan Melbourne, during October 2002. For consistency, the study design and methodology were similar to those used in the study by Horberry et al in Perth, WA.[9]

Twelve observation sites were chosen to provide a variety of highways geographically spread across the city: four major metropolitan roads, four central business district (CBD) roads, and four freeway exit ramps. Observer safety, traffic speed and volume precluded direct screening of freeway drivers. We defined "cluster" areas as four quadrants of both the city and CBD, and the four major freeways. From within the centre of each cluster area, we physically sought observation sites where screening could be undertaken. Data were collected on three consecutive Fridays. Three observation sessions per day at each site (10:00–11:00, 14:00–15:00, 17:00–18:00) provided a total of 36 hours of observation.

Four research assistants were each assigned one metropolitan road, one CBD road and one freeway ramp. All motor vehicles (except motorbikes), in the lane closest to the curb only, were screened. The total number of vehicles, the number of drivers using a mobile phone, the driver's sex and approximate age group (young [<30 years], middle

age [30–50 years], older [>50 years]) were recorded. Mobile phone use was recorded only if the assistant had a clear view of the mobile phone itself. "Hands-free" mobile phone use was not recorded. Registration numbers or other means of vehicle or driver identification were not recorded.

To assess inter-observer variability, an additional one-hour observation period was undertaken at an additional major metropolitan site. The four research assistants screened the same lane of traffic concurrently and their data were later compared. Communication between observers was not permitted during this period.

A sample size calculation determined that 2351 drivers in each of two variable subgroups (subgroups of driver type, site, time) would need to be screened to show a "clinically significant" twofold rate difference (eg, 10 versus 20 mobiles/1000 drivers) with power of 0.8 and significance level of 0.05.

Data analysis provided an overall rate of mobile phone use and rates for each sex and age subgroup, highway site and time period. Rates are reported as number of mobile phone users/1000 drivers with 95% confidence intervals. The χ^2 test for equal proportions was used for all subgroup comparisons. EpiCalc was used for all analyses.[10]

Rates of mobile phone use as a function of driver subgroups, location and time

	Number of mobile phones observed	Number of drivers	Mobile phones per 1000 drivers (95% CI)
Driver sex			
Male	215	11 299	19.0 (16.5–21.6)
Female	100	5 724	17.5 (14.1–20.9)
Driver age			
Young (< 30 years)	112	4 834	23.2 (18.9–27.5)
Middle (30–50 years)	185	8 436	21.9 (18.8–25.1)
Older (> 50 years)	18	3 753	4.8 (2.5–7.0)
Highway type			
Metropolitan	89	5 316	16.7 (13.3–20.2)
Central business district	114	5 550	20.5 (16.8–24.3)
Freeway exit	112	6 157	18.2 (14.8–21.6)
Time of day			
10:00–11:00	84	5 262	16.0 (12.6–19.4)
14:00–15:00	83	5 473	15.2 (11.9–18.4)
17:00–18:00	148	6 288	23.5 (19.8–27.3)
Overall	315	17 023	18.5 (16.5–20.6)

RESULTS

During the 36 hours of observation, 315 of 17 023 drivers screened (almost 2%) were observed using mobile phones. The Box describes the rates of mobile phone use within the driver subgroups and at the various highway sites and times. Although the rate for men was slightly higher than for women, the difference was not statistically significant. The rates for young and middle-aged drivers were similar. However, the rate for older drivers was significantly lower than the rates for other age groups ($P < 0.001$).

There were no significant differences between the rates of mobile phone use at the various highway sites, although drivers in the CBD had the highest rates and those on major metropolitan roads had the lowest. Rates of mobile phone use during the morning and afternoon periods were similar; however, the rate was significantly higher in the evening (1700–1800) than in the other periods ($P < 0.05$).

The inter-observer observation trial revealed variability between the four research assistants. The number of vehicles reported as screened ranged from 330 to 338. Three of the four assistants observed five mobile phone users and the other observed four. The number of male and female drivers observed ranged from 238 to 239 and 91 to 99, respectively. Greater variability was evident in their assessment of driver age. The number of drivers in the young, middle and older age groups ranged from 85 to 118, 154 to 169 and 61 to 83, respectively.

DISCUSSION

The risks of collision and fatality when using a mobile phone while driving are similar to those of driving with a BAC just exceeding the Victorian legal limit of 0.05%.[3,5,7,11] Mobile phone use diverts the driver's attention from the tasks of driving.[1,2,5,6,12,13] Inattention is a contributing factor in 35% of accidents, and police reports indicate that significantly higher rates of accidents related to driver inattention (unsafe speed, driving on the wrong side of the road) are found among drivers using mobile phones.[2] One study has demonstrated that brake reaction time and calculated time-to-collision are impaired while dialling a phone. Furthermore, unrestrained conversation using a mobile phone results in a two-fold increase in failure to detect simulated traffic signals, and slower reaction times.[13]

Accident reports from Japan and the United States suggest that inattention also occurs during conversation,[1,5] particularly intense or business conversations.[4,6] Paradoxically, mobile phone use when the tasks of driving are easy has a greater negative effect on a driver's ability than when the tasks are difficult. It has been postulated that drivers allocate more attention to the phone and less to the task of driving when the driving is easy.[12]

Our finding that almost 2% of drivers were using a mobile phone is of concern, and some perspective is useful. At one major metropolitan road site, 33 mobile phone users were observed in 1967 vehicles screened in one lane over three hours. As mobile phone use and alcohol intoxication (BAC 0.05%) increase the risk of collision and fatality by a similar amount,[3,5] this approximates the equivalent of 2.2 (95% CI, 1.5–3.1) intoxicated drivers passing through the intersection *per minute*. This calculation assumes that mobile phone use and traffic volumes were similar in the intersection's 12 lanes. Although these assumptions are questionable, the finding indicates the potential gravity of mobile phone use.

The overall rate of mobile phone use in our study (1.85%) is greater than that found in Perth (1.5%).[9] However, the

two studies observed different populations and were undertaken about three years apart. Recent increases in mobile phone popularity may explain, at least in part, the apparent increase. About 65% of Australians now own mobile phones (Office of External Affairs, Telstra Mobile, personal communication).

The rate for older drivers was significantly lower than for the other age groups. These findings are consistent with those from Perth.[9] Any comparison of driver subgroups assumes that mobile phone ownership rates are similar within the subgroups. This assumption may not be valid, and the low rate for older drivers may be partly explained by low mobile phone ownership within this group.

The trend for mobile phone use to be more common within the CBD supports a previous finding that mobile phone use is significantly higher on city street locations.[2] It is possible that communication requirements of CBD drivers, and the slower driving speed, increase the rate of phone use. Similarly, although it is not possible to definitively explain the high evening rate, this period is associated with peak traffic density, slower speed, and the transition, for many, from workplace to home. It is noteworthy that our high evening rate differs from the findings in Perth, where the highest rate of mobile phone use was during the morning.[9]

Our study has several limitations. Observation was limited to 3 hours, on three consecutive Fridays, at 12 observation sites. Accordingly, the findings may not be representative of the true rates of mobile phone use among Melbourne drivers. During each observation period, we attempted to screen every consecutive vehicle in a designated traffic lane. However, some vehicles (about 2%) were missed because of high traffic flow or inability to observe the driver (windscreen reflections or tinted windows). Although this marginally decreased the number of cars screened, there is unlikely to be differential selection bias between screened and unscreened vehicles.

Vehicle and driver factors may have contributed to measurement bias. As mobile phone use was only recorded if the phone was clearly visible, the number recorded is probably an underestimate. A cupped hand held to the ear may well have contained a mobile phone, yet could not be recorded as such. The same factors that caused some vehicles to be missed are also likely to have affected the accuracy of determining mobile phone use and driver characteristics. Furthermore, driver complexion, body weight, hairstyle and colour, and ethnicity could all have adversely affected accuracy.

These difficulties are likely to explain some of the inter-observer variability. This variability was small for objective data (phone use, vehicle counts), but increased as the data became more subjective (driver sex, age). Although bias and observer variability will have affected the accuracy of the rates reported, it is unlikely that they seriously affected our conclusions regarding patterns of mobile phone use.

It is not clear why some drivers elect to use mobile phones. Some may be unaware that the practice is illegal. Also, the extent of the increased risk may not be appreciated. This is supported by a Finnish poll, which found that only 42% of drivers felt they had increased their risk of an accident while using a mobile phone.[1] The emerging culture of unlimited communication access may, for some, transcend the risks involved. Each of these possibilities should be addressed in future research aimed at more clearly defining driver knowledge and attitudes toward this practice.

Further action should be taken to decrease the rate of mobile phone use among drivers. Driver education is clearly of great importance. Consideration should be given to increased surveillance of drivers, periodic "blitzes" and increased deterrence. It is commendable that the Victoria Police launched an education campaign shortly after our data collection.

CONCLUSION

The rate of mobile phone use among drivers in metropolitan Melbourne is high. This is likely to represent a preventable cause of injury, as mobile phone use causes driver inattention and increases accident rates. Similar research is indicated to determine the extent of mobile phone use by drivers in other states. Research is also required to determine why many drivers continue this practice despite fines and demerit points. Further interventions aimed at decreasing mobile phone use among drivers should be considered.

COMPETING INTERESTS

None identified.

REFERENCES

1. Lamble D, Kauranen T, Laakso M, Summala H. Cognitive load and detection thresholds in car following situations: safety implications for using mobile (cellular) telephones while driving. *Accid Anal Prev* 1999; 31: 617-623.
2. Violanti JM. Cellular phones and traffic accidents. *Public Health* 1997; 111: 423-428.
3. Violanti JM. Cellular phones and fatal traffic collisions. *Accid Anal Prev* 1998; 30: 519-524.
4. Violanti JM, Marshall JR. Cellular phones and traffic accidents: an epidemiological approach. *Accid Anal Prev* 1996; 28: 265-270.
5. Redelmeier DA, Tibshirani RJ. Association between cellular-telephone calls and motor vehicle collisions. *N Engl J Med* 1997; 336: 453-458.
6. McKnight AJ, McKnight AS. The effect of cellular phone use upon driver attention. *Accid Anal Prev* 1993; 25: 259-265.
7. Brick J. Intoxicated driving. Yardley, Penn: Intoxikon International, 1996. Available at: http://members.aol.com/intoxikon/intoxicated.driving.html (accessed Feb 2003).
8. Road Safety (Traffic) Regulations 1988 (Vic), section 1505.
9. Horberry T, Bubnich C, Hartley L, Lamble D. Drivers' use of hand-held mobile phones in Western Australia. *Transportation Res Part F* 2001; 4: 213-218.
10. Gilman J, Myatt M. EpiCalc 2000 [computer program]. Version 1.02. Available at: http://www.myatt.demon.co.uk/epicalc.htm (accessed Jul 2003).
11. Zador PL. Alcohol-related relative risk of fatal driver injuries in relation to driver age and sex. *J Studies Alcohol* 1991; 52: 302-310.
12. Alm H, Nilsson L. Changes in driver behaviour as a function of handsfree mobile phones — a simulator study. *Accid Anal Prev* 1994; 26: 441-451.
13. Strayer DL, Johnston WA. Driven to distraction: dual-task studies of simulated driving and conversing on a cellular phone. *Psych Sci* 2001; 12: 462-466.

(Received 17 Feb 2003, accepted 19 Jun 2003) ❑