# Mobile Phone Use and Engagement in Other Distracting Activities: An Observational Survey of Melbourne Drivers

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## Abstract

This study aimed to quantify Melbourne drivers' use of hand-held and hands-free mobile phones, as well as their engagement in a range of other non-driving activities that are associated with increased crash risk. The study also aimed to identify the driver, vehicle and location characteristics that are associated with engagement in these activities. A total of 18 roadside observations were conducted at three sites (two suburban and one central business district; CBD) within metropolitan Melbourne during May 2009. Results revealed that 3.4% of the observed drivers were using hand-held phones (including 1.5% who were text messaging), compared to 1.4% who were using hands-free. Driver engagement in non-driving activities other than mobile phone use was prevalent, particularly interaction with passengers (20.4% of drivers observed). Driver engagement in potentially distracting activities was found to be associated with a range of driver, vehicle and location characteristics. In particular, hand-held phone users were predominately young or middle aged drivers who drove cars or 4WDs, and their phone use was more likely to take place in the evening, rather than during the day. In contrast, drivers were more likely to be observed interacting with passengers if they were male, aged over 50 years, and driving a car or 4WD in the afternoon peak period during the week or on the weekend.

**Keywords**
Driver distraction; mobile phones; Driver exposure.

## Introduction

In modern vehicles, drivers have access to a range of on-board and portable entertainment, information, communication and advanced driver assistance systems (e.g., navigation systems). Many of these devices, as well as a host of everyday non-technology based activities, have the potential to distract the driver and compromise safety. There is a growing body of work on the increased risks associated with performing various tasks while driving, particularly the risks pertaining to mobile phone use [1-3].

A number of observational surveys have been conducted that examine drivers' exposure to distracting activities. The majority of these have focused on hand-held mobile phone use and suggest that phone use is widespread among drivers. In Australia, an observational roadside survey by Horberry et al. [4] examined drivers' hand-held mobile phone use in Perth. They found that 1.5% of drivers were using a hand-held mobile phone. These drivers were predominately males aged less than 40 years. The proportion of drivers using hand-held phones did not differ across time of day.

Using a similar methodology, Taylor and colleagues [5] observed drivers' use of hand-held mobile phones on major roads in Melbourne in 2002, where use of hand-held phones while driving has been prohibited since 1988 [6]. Two percent of drivers were using a hand-held mobile phone, and were predominantly aged under 50 years. Hand-held phone usage rates did

not differ significantly by gender, but were higher in the evenings compared to during the day. This study was replicated in October 2006 [7] and found a slightly lower proportion of drivers observed using hand-held phones (1.6%). The 2006 data also showed a significantly higher rate of hand-held mobile phone use for male drivers and in the morning period. Phone use remained significantly higher in younger drivers *vs.* older drivers.

Very few observational studies have examined exposure rates to activities other than using a hand-held phone. A study by Johnson et al. [8] examined drivers' use of mobile phones and their engagement in other potentially distracting activities by examining high-quality photos taken of vehicles and drivers on the New Jersey Turnpike between March and July 2001. Just under 5% of the photos contained drivers who were engaging in non-driving related activities. Mobile phones were the most common source of potential distraction observed, accounting for one-third of potential distractions (1.5% of drivers), followed by interacting with a passenger (0.7%), adjusting controls (0.3%) and finally 'other' distractions (0.3%).

It is important to include these activities in exposure studies in order to put the phone use data in context. Is the prevalence of mobile phone use higher or lower than that of other potentially distracting activities? Such data can be invaluable when considering at what activities to target distraction countermeasures. The current study extends the findings of previous Australian exposure surveys by examining Melbourne drivers' use of hand-held and hands-free phone use, as well as their engagement in a range of other non-driving related activities.

## Method

Roadside observations were conducted in metropolitan Melbourne during May 2009. Three sites were used, one in the CBD and two suburban sites (South Yarra and Coburg). Selection of the sites made use of the sampling criteria and sites used in an earlier observational study, the 2001 Benchmarking study [9]. Each site had to be comprised of an intersection with traffic lights; be located in a 60km/h speed zone; allow clear, unobstructed visibility of traffic; and exclude features that might risk observer safety.

All three sites were observed on six separate occasions between the hours of 8:00am and 5:30pm. The observation times were selected to capture phone use across morning and afternoon peak and non-peak traffic times on weekdays, and weekends. Each observation session lasted one hour, to yield a total of 18 hours of observations.

Data at each site were collected by three trained observers. The observers screened vehicles stopped at the intersection and recorded basic driver and vehicle details, as well as whether the driver was using a hand-held or hands-free phone or engaging in some other form of non-driving activity. Thus, driver and vehicle characteristics were recorded for all vehicles regardless of whether the driver was performing a non-driving activity or not. Registration plate and other details that could identify the vehicle or driver were not recorded. Observations were made of all vehicle types (except motorcycles) in a single direction of traffic flow and all lanes were screened (apart from right turning lanes). Driver engagement in mobile phone use or other activities was only recorded in cases where the observer had a clear view of the driver.

The suitability of the data collection method was pilot tested prior to the main data collection. Ethics approval was granted by the Monash University Human Research Ethics Committee. Inter-observer reliability was assessed by having each observer record details for the same vehicles during two of the observation periods. Inter-observer reliability was then calculated using the single measure intraclass correlation coefficient (ICC). Inter-rater reliability in almost all categories was high, ranging from 100% (gender and seat belt use) to ICC = .67 (other distracting activities).

## Results

### *Mobile Phone Use*

During the 18 hours of observations, 292 (5%) of the 5,813 drivers screened were using a mobile phone. Table 1 presents the proportion of drivers who were engaged in the seven different mobile phone activities recorded. Text messaging was the most common phone activity, with 1.5% of drivers engaged in this task. This was followed by talking on a hand-held phone (1.3%) and talking into a headset (1.1%).

**Table 1** Number and percentage of drivers engaging in various mobile phone activities

| Phone Activity | No. Drivers | % Drivers |
|---|---|---|
| Talking (hand-held) | 73 | 1.3 |
| Talking (headset) | 64 | 1.1 |
| Talking (speaker) | 17 | 0.3 |
| Dialling/Answering | 13 | 0.2 |
| Text messaging | 88 | 1.5 |
| Holding phone | 21 | 0.4 |
| Don't know | 16 | 0.3 |
| **TOTAL:** | **292** | **5.0** |

In order to examine the characteristics associated with using a mobile phone, the seven phone categories were collapsed into two variables: *hand-held* (talking, dialling/answering, text messaging and holding phone) and *hands-free* (talking using a headset or loud speaker) phone use. The rates of hand-held and hands-free mobile phone use (per 100 drivers) within the driver, site, time, and vehicle sub-groups are displayed in Table 2.

Two binary logistic regressions were performed to examine which driver, vehicle and site/time characteristics predict, or are associated with, hand-held and hands-free mobile phone use when driving. Eight predictor variables were included in each regression model: gender, age-group, site, time of day, time of week, vehicle type, vehicle age and registration plate. An alpha = .05 significant level was adopted. The variables of vehicle type, vehicle age and plate were re-coded into the smaller number of categories shown in Table 4.2, due to small numbers in some categories.

Although the use of hand-held and hands-free phones differed slightly across male and female drivers, these differences were not statistically significant. The use of *hands-free* phones did not differ significantly across drivers from different age groups. However, compared to drivers aged over 50 years, the odds of drivers aged under 30 years using a *hand-held* mobile phone were over five times greater (OR=5.4; 95%CI=2.6-11.3, p<.001), while the odds of drivers aged 30 to 50 years using a *hand-held* phone were three and half times greater than drivers over 50 years (OR=3.5; 95%CI=1.8-6.9, p<.001). The young and middle age groups did not differ in use of hand-held phones while driving.

There were no significant differences in hand-held or hands-free mobile phone use across the CBD or two suburban sites. The odds of drivers using a hand-held phone in the evening (4:30-5:30pm) were, however, up to 2.3 times higher compared to any of the other three observation times (OR=2.3; 95%CI=1.4-3.8, p<.01). Hands-free phone use did not differ significantly across the observation times, but the odds of drivers using a hands-free phone on a weekday were over two times higher compared to the odds of using the phone on the weekend (OR=2.1; 95%CI=1.2-3.6, p<.01). Hand-held phone use did not differ significantly across time of week.

Hand-held mobile phone use did not differ significantly across vehicle age or vehicle plate status (Learner, Green or red P plate, or none). However, drivers in cars (OR=2.7; 95%CI=1.2-6.2, p<.05) and 4WDs (OR=3.1; 95%CI=1.2-7.6, p<.05) had up to three times greater odds of being observed using a hand-held phone than drivers in 'other' vehicles (e.g. taxi, bus, trucks). Finally, the odds of drivers in newer cars (2000 – present) using a hands-free phone were over two times greater than drivers in pre 2000 model cars (OR=2.1; 95%CI=1.1-4.1, p<.05).

**Table 2** Rates of hand-held and hands-free mobile phone use as a function of driver, vehicle and site characteristics

| | | Hand-Held | | Hands-Free | |
|---|---|---|---|---|---|
| | No. of drivers | No. of hand-held phones observed | Hand-held use per 100 drivers | No. of hands-free phones observed | Hands-free use per 100 drivers |
| **Gender** | | | | | |
| Male | 4004 | 126 | 3.15 | 61 | 1.52 |
| Female | 1795 | 69 | 3.84 | 20 | 1.11 |
| **Age** | | | | | |
| Young (< 30 yrs) | 864 | 46 | 5.32 | 10 | 1.16 |
| Middle (30-50 yrs | 4030 | 140 | 3.47 | 62 | 1.54 |
| Older (> 50 yrs) | 908 | 9 | 0.99 | 9 | 0.99 |
| **Site** | | | | | |
| CBD | 2016 | 70 | 3.47 | 29 | 1.44 |
| South Yarra | 1627 | 61 | 3.75 | 20 | 1.23 |
| Coburg | 2170 | 64 | 2.95 | 32 | 1.47 |
| **Time (day)** | | | | | |
| 8:00-9:00 | 899 | 25 | 2.78 | 7 | 0.78 |
| 10:00-11:00 | 1975 | 61 | 3.09 | 29 | 1.47 |
| 2:00-3:00 | 2059 | 55 | 2.67 | 33 | 1.60 |
| 4:30-5:30 | 880 | 54 | 6.14 | 12 | 1.36 |
| **Time (week)** | | | | | |
| Weekday | 3813 | 145 | 3.80 | 61 | 1.60 |
| Weekend | 2000 | 50 | 2.50 | 20 | 1.00 |
| **Vehicle Type** | | | | | |
| Car | 4030 | 145 | 3.60 | 50 | 1.24 |
| 4WD | 694 | 27 | 3.89 | 13 | 1.87 |
| Ute/commercial van | 578 | 17 | 2.94 | 10 | 1.73 |
| Other | 500 | 6 | 1.20 | 8 | 1.60 |
| **Vehicle Age** | | | | | |
| 2000-now | 4307 | 147 | 3.41 | 70 | 1.63 |
| Pre 2000 | 1503 | 48 | 3.19 | 11 | 0.73 |
| **Plate** | | | | | |
| Present | 171 | 10 | 5.85 | 2 | 1.17 |
| None | 5618 | 184 | 3.28 | 78 | 1.39 |
| **Overall:** | **5813** | **195** | **3.35** | **81** | **1.39** |

### *Other Distracting Activities*

A total of 1,801 (30.9%) of the 5813 drivers observed were engaged in one or more potentially distracting activity other than mobile phone use (Table 3). By far, the most common of these activities was interacting with passengers (20.4% of drivers), followed by smoking (2.4%), eating (1.8%) and drinking (1.5%).

Of the 1,801 drivers engaged in 'other' activities, 57 (3.2%) were engaging in two activities at once. Three quarters of these drivers were interacting with passengers while also performing another task, most commonly smoking, drinking, or reaching for an object.

**Table 3** Number and percentage of drivers engaging in 'other' potentially distracting activities

| Phone Activity | No. Drivers | % Drivers |
|---|---|---|
| Passengers | 1185 | 20.4 |
| Smoking | 138 | 2.4 |
| Eating | 102 | 1.8 |
| Drinking | 89 | 1.5 |
| Reading | 74 | 1.3 |
| Grooming | 52 | 0.9 |
| Reaching for object | 39 | 0.6 |
| Radio | 37 | 0.6 |
| Writing | 19 | 0.3 |
| Earphone (music) | 19 | 0.3 |
| Searching handbag/wallet | 14 | 0.2 |
| Satellite Navigation | 6 | 0.1 |
| Heating / cooling system (HVAC) | 3 | 0.1 |
| Other | 24 | 1.3 |
| **TOTAL:** | **1801** | **30.9** |

The driver, vehicle and site/time characteristics associated with driver engagement in the three most common 'other' activities observed were examined in three binary logistic regressions, using the same predictor variables as those for mobile phone use. Again, an alpha = .05 significant level was adopted. The rates of driver engagement in passenger interaction, smoking and eating within the driver, vehicle and site/time sub-groups are displayed in Table 4.

For passenger interaction, the odds of male drivers interacting with passengers were 1.3 times higher than for female drivers (OR=1.3; 95%CI=1.1-1.4, p<.01). As well, the odds of drivers aged 50 years and over being observed interacting with passengers were one and a half times greater than drivers aged under 30 years (OR=1.5; 95%CI=1.2-1.9, p<.01). No other influences of age on any of the 'other' activities were found.

In terms of site characteristics, drivers passing the Coburg site had greater odds of being observed interacting with passengers than the drivers in the CBD (OR=1.3; 95%CI=1.1-1.5, p<.01). The odds of drivers interacting with passengers were greater in the afternoon peak compared to the morning peak period (OR=1.5; 95%CI=1.1-1.9, p<.05) and on a weekend, compared to a weekday (OR=2.4; 95%CI=2.1-2.8, p<.001). The odds of drivers in cars (OR=1.7; 95%CI=1.3-2.2, p<.001) and 4WDs (OR=2.0; 95%CI=1.5-2.7, p<.001) interacting with passengers were up to twice as much as drivers in 'other' vehicles (e.g. taxi, bus, trucks) interacting with passengers. Finally, drivers of vehicles displaying no Learner (L) or

Probationary (P) plates had greater odds of being observed interacting with passengers than drivers of vehicles with a L, green P or red P plate displayed (OR=0.5; 95%CI=0.4-0.8, p<.01).

**Table 4** Rates of driver engagement in the top three 'other' activities as a function of driver, vehicle and site characteristics

| | | Passengers | | Smoking | | Eating | |
|---|---|---|---|---|---|---|---|
| | No. of drivers | No. of drivers interacting with passengers | Passenger interaction per 100 drivers | No. of smoking drivers observed | Smoking per 100 drivers | No. of eating drivers observed | Eating per 100 drivers |
| **Gender** | | | | | | | |
| Male | 4004 | 852 | 21.28 | 97 | 2.42 | 60 | 1.50 |
| Female | 1795 | 328 | 18.27 | 41 | 2.28 | 42 | 2.34 |
| **Age** | | | | | | | |
| Young (< 30 yrs) | 864 | 161 | 18.63 | 19 | 2.20 | 18 | 2.08 |
| Middle (30-50 yrs | 4030 | 825 | 20.47 | 100 | 2.48 | 75 | 1.86 |
| Older (> 50 yrs) | 908 | 196 | 21.59 | 19 | 2.09 | 9 | 0.99 |
| **Site** | | | | | | | |
| CBD | 2016 | 362 | 17.96 | 46 | 2.28 | 30 | 1.49 |
| South Yarra | 1627 | 360 | 22.13 | 30 | 1.84 | 32 | 1.97 |
| Coburg | 2170 | 463 | 21.34 | 62 | 2.86 | 40 | 1.84 |
| **Time (day)** | | | | | | | |
| 8:00-9:00 | 899 | 92 | 10.23 | 23 | 2.56 | 20 | 2.22 |
| 10:00-11:00 | 1975 | 450 | 22.78 | 46 | 2.33 | 33 | 1.67 |
| 2:00-3:00 | 2059 | 519 | 25.21 | 40 | 1.94 | 29 | 1.41 |
| 4:30-5:30 | 880 | 124 | 14.09 | 29 | 3.30 | 20 | 2.27 |
| **Time (week)** | | | | | | | |
| Weekday | 3813 | 537 | 14.08 | 106 | 2.78 | 82 | 2.15 |
| Weekend | 2000 | 648 | 32.40 | 32 | 1.60 | 20 | 1.00 |
| **Vehicle Type** | | | | | | | |
| Car | 4030 | 856 | 21.24 | 80 | 1.99 | 78 | 1.94 |
| 4WD | 694 | 170 | 24.50 | 15 | 2.16 | 10 | 1.44 |
| Ute/commercial van | 578 | 80 | 13.84 | 33 | 5.71 | 6 | 1.04 |
| Other | 500 | 75 | 15.00 | 10 | 2.00 | 8 | 1.60 |
| **Vehicle Age** | | | | | | | |
| 2000-now | 4307 | 877 | 20.36 | 89 | 2.07 | 71 | 1.65 |
| Pre 2000 | 1503 | 307 | 20.43 | 49 | 3.26 | 31 | 2.06 |
| **Plate** | | | | | | | |
| Present | 171 | 46 | 26.90 | 3 | 1.75 | 6 | 3.51 |
| None | 5618 | 1136 | 21.09 | 132 | 2.46 | 94 | 1.82 |
| **Overall:** | **5813** | **1185** | **20.39** | **138** | **2.37** | **102** | **1.75** |

No significant differences in drivers' engagement in smoking were observed across gender, age, site, time of day or week or plate status. Drivers of utes and commercial vans had three times greater odds of being observed smoking than drivers of 'other' vehicles (OR=2.9; 95%CI=1.4-5.9, p<.01). Similarly, drivers of pre-2000 model vehicles had one and a half times greater odds of being observed smoking than drivers of more recent vehicles (2000 to now) (OR=1.5; 95%CI=1.1-2.2, p<.05).

With regard to eating while driving, no significant differences were observed across gender, age, site, time of day, vehicle type or age and plate status. The odds of drivers being observed eating on a weekday was, however, more than twice as high as being observed eating on the weekend (OR=2.2; 95%CI=1.3-3.7, p<.01).

## Discussion

Despite legislation being in place, 3.4% of drivers were observed using a hand-held phone. Among the hand-held phone activities observed, text messaging was the most common (1.5% of drivers), followed by talking (1.3%). Hand-held phone use was more prevalent among drivers aged less than 50 years than among those aged over 50 years, a finding that is consistent with much of the previous research in this area [4,7,10,11]. Hand-held phone use was also more prevalent in the evening (4:30 – 5:30pm) than during the day, and a greater number of drivers of cars and 4WDs were observed using a hand-held phone than were drivers of vehicles such as trucks, buses and taxis.

This study represents the first observational survey, known to the authors, to examine Australian drivers' hands-free phone use. While it is acknowledged that there are difficulties obtaining data on this mode of phone use given the often inconspicuous nature of this activity, it is important to collect such data in order to put the hand-held usage rates into context. We found that use of hand-free phones was lower than that of hand-held phones (1.4% *vs.* 3.4%). The use of hands-free phones did not differ significantly across gender, age-group, vehicle type, observation site or time of day. Drivers were, however, more likely to use hands-free phones on a weekday. This may be due to a higher proportion of the calls made on weekdays being work-related and to the added pressures from employers to use hands-free phones in these circumstances.

Given the growing body of evidence that links mobile phone use while driving (particularly specific activities such as texting) to impaired driving performance and increased crash risk, these findings are concerning. Why such a high proportion of drivers choose to use hand-held, rather than hands-free, phones is unclear, but is likely due to a combination of factors. These include a perception that drivers are unlikely to get caught by police, over-estimation of individual driving ability and underestimation of the crash risk associated with this activity, and perceived ease of using the phone in hand-held mode compared to setting it up in hands-free mode.

The present study found that driver engagement in activities other than mobile phone use is also common, with just over 30% of drivers observed to be performing a non-driving activity. Of these 'other' activities, the most common was interacting with passengers (20.4% of drivers observed), followed by smoking (2.4%) and eating (1.8%). Of particular note is that, apart from interacting with passengers, mobile phone use was more prevalent than any of the other activities observed, a finding that supports continued efforts by road safety authorities to limit the distraction potential of mobile phones. A range of driver, vehicle and site characteristics were associated with engagement in the top three 'other' activities. Interacting with passengers was most prevalent among drivers who were male, aged over 50 years, and driving a car or 4WD in the afternoon peak period during the week or on the weekend. Eating was an activity

also more prevalent on a weekday compared to a weekend, while drivers of utes, commercial vans or pre-2000 model vehicles had greater odds of being observed smoking.

This study had a number of limitations that must be considered when interpreting the findings. This survey was targeted towards a limited number of sites in Melbourne, which are not representative of all metropolitan roads. Also, observers only reported driver engagement in activities if their behaviour was evident, and not obscured by tinted windows or other visual obstructions. Thus, it is possible that the rates of driver engagement in some of the activities, particularly those that are less conspicuous (e.g. hands-free phone use) may be underestimates. A related issue is that some activities that are difficult to observe could have been miscoded. For example, drivers who were recorded as text messaging may have been performing similar activities such as accessing the internet or looking through photos on their phone. Finally, only vehicles that were stopped at traffic lights were observed and this could have increased the rates of the distracting activities that were observed. Indeed, in a recent survey by Young and Lenné [12] over 90 percent of drivers reported that they are more likely to engage in distracting activities when stopped at traffic lights. In future studies, consideration should be given to examining the feasibility of collecting similar types and amounts of data in moving vehicles to see if the rates are lower than those obtained when stationary.

The data obtained in this survey can be combined with data from other exposure surveys to develop a greater understanding of driver engagement in potentially distracting activities and the factors that motivate this engagement. This information would be invaluable for developing countermeasures targeted towards those distracting activities that drivers most often engage in. Clearly, hand-held mobile phone use among drivers is still a major road safety concern, particularly for young and middle age drivers. Given the significant level of observed hand-held phone use in this survey and in others conducted in the previous six years, it is clear that current countermeasures are only partially successful in addressing this issue and it is important to examine why the mobile phone message is not getting through to many drivers. The effectiveness of other strategies to decrease usage rates, such as increased education, active blocking of mobile phone signals, surveillance, traffic 'blitzes', and the use of tougher penalties, should also be considered. It is encouraging to note that, in Victoria, much has been done recently to clarify the existing mobile phone laws and to increase enforcement. The fines for hand-held mobile phone use were increased on 1st July 2009 to $234. Three demerit points also apply. Finally, in November 2009 new mobile phone rules were introduced in Victoria to further clarify the law surrounding hand-held phones while driving.

The data presented here highlight driver groups, vehicles, locations and times that were associated with the highest observed hand-held usage rates in Melbourne. As such, the data obtained are very useful for further defining, targeting and evaluating distraction countermeasures for this and other regions.

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