

## Mobile phone use while driving after a new national law in New Zealand

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### Abstract

Mobile phone use while driving leads to impairments in driver performance including slowed reaction times, poor lane keeping and reduced hazard detection. To increase public safety, in 2009 the New Zealand (NZ) Government introduced a ban on the use of hand-held phones while driving. The aim of the current study was to identify the post-law prevalence of phone use while driving. Observers recorded drivers' mobile phone use at or near traffic lights and in moving traffic at three locations (Central Business District, and two suburbs of contrasting area-based deprivation) in Wellington, NZ. A total of 8335 cars at traffic lights and 9520 cars in moving traffic were systematically observed. The use of mobile phones by drivers at these locations were 1.87% (95%CI: 1.60-2.18) and 1.34% (95%CI: 1.13-1.59) respectively. Younger drivers (<25 years) were significantly more likely to use their phones compared to older drivers (e.g., in moving traffic, risk ratio = 2.91, 95%CI=2.00–4.22). Overall, it was much more common for drivers to use their phones in a “non-ear position” (77.8%) than next to their ear, and this was also significantly higher among younger drivers. These data suggest that there has been a decline in phone use when driving as compared to rates of 3.9% reported in a pre-law study (in Auckland). Although these findings are encouraging, phone use while driving is still relatively high. Options such as mass media campaigns, enhanced enforcement, and higher penalties for breaking the law may need to be considered to further address this issue.

### Introduction

Mobile phone use while driving leads to impaired performance including slower reaction times, impaired lane-keeping, decreased visual field awareness and a reduced ability to identify hazards (Barkana, Zadok, Morad, & Avni, 2004; Ishigami & Klein, 2009). Both hands-free and hand-held mobile phone devices have detrimental effects on driver performance, suggesting that the cognitive demands of the conversation, rather than the manual manipulation of the phone, is the primary contributing factor (Horrey & Wickens, 2006; Tornros & Bolling, 2005; Ulleberg & Rundmo, 2003; Zhou, Rau, Zhang, & Zhuang, 2012). There is also evidence that conversations *on the telephone* cause impairment in driving performance rather than conversing *per se* (e.g., to passengers; Charlton, 2009).

In New Zealand, the use of a mobile phone (or other communication device) was reported to be a contributing factor in 25 fatal crashes and 482 injuries between 2003-2008, with a social cost of around \$187.9 million (Ministry of Transport, 2009). In response to the accumulating evidence regarding the effects of mobile phone use on driving performance, the New Zealand Government prohibited the use of hand-held phones while driving from 1<sup>st</sup> November 2009 (Parliamentary Counsel Office, 2012).

Data regarding the success of such legislation in other countries is mixed. In the UK, prior to the introduction of legislation banning the use of hand-held phones, 1.85% of drivers were observed using a cell-phone (Johal, Napier, Britt-Compton, & Marshall, 2005). Shortly after the ban (ten weeks), this rate almost halved to 0.97% but two years later it had increased to 1.63%, almost as

high as pre-legislation levels (Hussain, Al-Shakarchi, Mahmoudi, Al-Mawlawi, & Marshall, 2006). A similar pattern in the rate of mobile phone use was observed when a ban was introduced in New York (McCartt, Braver, & Geary, 2003; McCartt & Geary, 2004). In contrast, in the Washington, D.C. the hand-held phone ban had a longer lasting effect with phone use decreasing by almost 50% immediately following introduction of the legislation, a reduction that was largely maintained a year later (McCartt & Hellinga, 2007). It has been suggested that this difference may be due to ongoing publicity and more stringent enforcement in Washington D.C. (McCartt, Hellinga, & Bratiman, 2006).

In New Zealand prior to the legislation, an observational study in Auckland found that 3.9% of drivers were using mobile phones (Townsend, 2006), a rate similar to a recent study in Melbourne where 3.4% of drivers were observed using hand-held phones (despite legislation banning their use (Young, Rudin-Brown, & Lenne, 2010). Self-report studies also indicate that conversing on a cell phone whilst driving is performed by a majority of drivers. For example, 57-60% of NZ drivers reported conversing on a cell-phone prior to introduction of the legislation (Hallett, Lambert, & Regan, 2011; Sullman & Baas, 2004) even though a significant proportion (84%) rated cell-phone use while driving as at least 'moderately dangerous' (Sullman & Baas, 2004). Self-report data suggest that males use a cell-phone while driving significantly more frequently than females (Sullman & Baas, 2004), but observational studies have failed to find gender differences in rates of cell-phone use (Townsend, 2006; Young, et al., 2010). In general studies suggest that younger drivers use mobile phones while driving more frequently than older drivers (Sullman & Baas, 2004; Young, et al., 2010).

Since the new law in New Zealand there have been no new observational studies of mobile phone use while driving (to our knowledge). Given this background, we aimed to identify the prevalence of mobile phone use by drivers after the introduction of the year 2009 legislation. We also aimed to explore any associations between mobile phone use by socio-demographic variables and by road setting (i.e., moving vehicles vs those at traffic lights).

## **Methods**

### ***Study location and timing***

The study was conducted within the Greater Wellington region. The suburbs of Karori and Titahi Bay were chosen to represent contrasting levels of deprivation using an area-based measure (NZDep2006) applied to Census Area Units (White, Gunston, Salmond, Atkinson, & Crampton, 2008). On this scale, the suburb of Karori has a decile rating of "1" (least deprived) and Titahi Bay is rated "9" (relatively highly deprived). Based on previous studies around observed smoking in cars in the same city (Martin, et al., 2006; Patel, Thomson, & Wilson, 2013), the assumption was made that cars entering or exiting these two relatively isolated suburbs were generally likely to represent the population demographic of each particular area. The Wellington Central Business District (CBD) was also chosen to facilitate comparisons with a pre-law study conducted in Auckland (Townsend, 2006). Locations were selected to provide sufficient traffic volumes in and out of the suburbs, to ensure good visibility of vehicles, and to ensure observer safety. Intersections with traffic lights were chosen to help ensure good visibility for the observers.

Data were collected at peak commuting times between 0730-0930 h and 1630-1830 h at each location so as to observe commuter traffic heading out of and into the suburbs respectively, and to maximise the sample size and efficiency of data collection. All observations were performed on five weekdays over a seven-day period in September 2012 (early spring with no rain at any of the observation times).

## ***Definitions***

For the purpose of this study, we defined mobile phone use as, “visible mobile phone in the driver’s hand”. This was subdivided into phone held “next-to-ear” and those “away-from-the-ear” (and excluding the use of “hands free” mobile phone kits which are exempted under the relevant law on mobile phones and driving (Parliamentary Counsel Office, 2012). To ensure the visibility of drivers’ hands, the observations were limited to cars; specifically sedans, coupes, hatchbacks and station wagons. The study excluded vans, utility vehicles, sports utility vehicles, buses, trucks, and all two-wheeled vehicles. Where data collectors were at all uncertain about the use of a mobile phone, the event was recorded as “no mobile phone” use.

## ***Observer teams***

Two teams of two observers each were employed at the three locations. In each team, one observer recorded the total number of eligible cars passing, and the other recorded mobile phone use and driver characteristics. At each location one team observed all eligible cars passing through a set of traffic lights within a defined area. A second team observed moving cars approximately 100 m before or after the traffic lights.

An initial inter-observer variation study was carried out at the CBD location during both morning and evening times, at both the traffic lights and the 100 m positions. This involved another team of two people collecting exactly the same data alongside each other but independently. Ethical approval for this study was obtained through the University of Otago ethics approval process (Category B).

A standard template was used for recording data on mobile phone use by drivers. Variables recorded were: gender, approximate age-group (<25, 25-65, and 65+), and if the phone was by the driver’s ear or not.

## **Results**

The main findings are summarised in Table 1. A total of 9520 cars at “traffic lights” and 8335 moving cars “100 m away from traffic lights” were observed. At these respective locations, 1.87% and 1.34% of drivers were observed using mobile phones. There were no statistically significant findings when comparing mobile phone use between “morning” and “evening” sessions (results not shown). Use of mobile phones while driving was significantly higher among young drivers (<25 years) compared to the older age-group, however there was no overall difference in mobile phone use by gender.

It was much more common (77.8%, 221/284) for drivers to use their mobile phones in the “away-from-the-ear” position (e.g., using the phone for texting) than in the “next-to-ear” position. Younger drivers (<25 years) were also significantly more likely to use their phone in the “away from ear” position in moving traffic (2.49% vs 0.77%) and also at the traffic lights (4.49% vs 1.08%) compared to older drivers. Finally, there was no overall difference in mobile phone use by drivers in the suburbs of contrasting socio-economic status (data not shown).

## **Discussion**

The aim of the study was to identify the prevalence of mobile phone use by drivers after the introduction of the year 2009 legislation. We also aimed to explore any associations between mobile phone use by socio-demographic variables and by road setting (i.e., moving vehicles vs those at traffic lights). The results suggest that mobile phone use by drivers is lower than found in the pre-law study in Auckland (Townsend, 2006)

**Table 1: Main results for mobile phone use by drivers at traffic lights and in moving traffic (100 m away from traffic lights): Age-group and gender**

Population group*	Moving traffic (n=9520 cars)			At traffic lights <sup>i</sup> (n=8335 cars)		
	N	%	Risk ratio (RR) (95% CI)	N	%	RR (95% CI)
<b>Total using mobile phones</b>	128	1.34 (95%CI: 1.13-1.59)	–	156	1.87 (95%CI: 1.60-2.18)	–
<25 year olds <sup>ii</sup> (n=1247 in MT; n=1092 at TL)	39	3.13	2.91 (2.00-4.22), p<0.001	54	4.95	3.51 (2.54-4.85), p<0.001
25+ years <sup>iii</sup> (n=8273 in MT; n=7243 at TL)	89	1.08	1.0 (reference)	102	1.41	1.0 (reference)
Females <sup>iv</sup> (n=4065 in MT; N=3559 at TL)	55	1.35	1.01 (0.71-1.43), p=0.948	73	2.05	1.18 (0.86-1.61), p=0.298
Males (n=5455 in MT; n=4776 at TL)	73	1.34	1.0 (reference)	83	1.74	1.0 (reference)

MT – moving traffic; TL – traffic lights

i. Includes moving and stationary traffic

ii. Denominator data for analysis was based on a travel survey (Ministry of Transport) which showed the proportion of <25 drivers to be 13.1%, and 25+ to be 86.9%. Percentages indicate the % of drivers under age 25 years who were using their phones.

iii. As there were only three cases of mobile phone use in drivers over 65-years-old, this group was combined into the 25-to-65-year-old group to make a single “25+ group”.

iv. Denominator data: estimated proportion of female drivers = 42.7%, males 57.3%. (Ministry of Transport)

The latter study found a prevalence of 3.9% while this post-law study found a prevalence of 1.57% in the relatively comparable Wellington CBD and 1.34% in moving traffic. These findings are consistent with the law change successfully reducing mobile phone use while driving. This would be consistent with some findings from the US, where long-term reductions have been observed in States where the law has been stringently enforced (McCartt & Hellinga, 2007). There are however other possible explanations for these differences than the new law. These include variation in mobile phone use between cities (Auckland and Wellington), and differences in study methods (e.g., the sites observed, time of day, and the types of vehicles observed).

Drivers were significantly more likely to use their mobile phone at or near traffic lights compared to moving traffic 100 m away from traffic lights (1.87% vs. 1.34% respectively). This may be due to a perception of decreased risk (and the risk of being fined) from mobile phone use while the vehicle is stationary or moving slowly. The possible greater difficulty in study observers identifying phone use with greater vehicle speed could also have contributed to this finding however inter-observer reliability results were good, suggesting that this was not the case.

In terms of driver characteristics, younger drivers used mobile phones whilst driving more frequently than older drivers and there were no overall differences in mobile phone use between males and females. These findings are consistent with earlier studies (Sullman & Baas, 2004; Townsend, 2006; Young, et al., 2010) and suggest that future public education and law enforcement campaigns be directed towards younger drivers.

While the phone usage by drivers appears to be lower than reported prior to the new law, further changes may need to be made to reduce this further. Possible options include: (i) stronger enforcement of the current law; (ii) increasing the size of fines for infringements of the law; and (iii) additional mass media campaigns. It has been suggested that development of a technological solution may be the most effective way forward (Coben & Zhu, 2013), for example, requiring that mobile phones become disabled when their internal GPS sensor identifies acceleration above a certain speed.

### Author information

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### References

- Barkana, Y., Zadok, D., Morad, Y., & Avni, I. (2004). Visual field attention is reduced by concomitant hands-free conversation on a cellular telephone. *American Journal of Ophthalmology*, 138(3), 347-353.
- Charlton, S. G. (2009). Driving while conversing: cell phones that distract and passengers who react. *Accident Analysis & Prevention*, 41(1), 160-173.
- Coben, J. H., & Zhu, M. (2013). Keeping an eye on distracted driving. *JAMA - Journal of the American Medical Association*, 309(9), 877-878.
- Hallett, C., Lambert, A., & Regan, M. A. (2011). Cell phone conversing while driving in New Zealand: prevalence, risk perception and legislation. *Accident Analysis & Prevention*, 43(3), 862-869.
- Horrey, W. J., & Wickens, C. D. (2006). Examining the impact of cell phone conversations on driving using meta-analytic techniques. *Human Factors*, 48(1), 196-205.
- Hussain, K., Al-Shakarchi, J., Mahmoudi, A., Al-Mawlawi, A., & Marshall, T. (2006). Mobile phones and driving: A follow up. *Journal of Public Health*, 27, 395-396.
- Ishigami, Y., & Klein, R. M. (2009). Is a hands-free phone safer than a handheld phone? *Journal of Safety Research*, 40(2), 157-164.
- Johal, S., Napier, F., Britt-Compton, J., & Marshall, T. (2005). Mobile phones and driving. *Journal of Public Health*, 27(1), 112-113.
- Martin, J., George, R., Andrews, K., Barr, P., Bicknell, D., Insull, E., et al. (2006). Observed smoking in cars: A method and differences by socioeconomic area. *Tobacco Control*, 15(5), 409-411.
- McCartt, A. T., Braver, E. R., & Geary, L. L. (2003). Drivers' use of handheld cell phones before and after New York State's cell phone law. *Preventive Medicine*, 36(5), 629-635.
- McCartt, A. T., & Geary, L. L. (2004). Longer term effects of New York State's law on drivers' handheld cell phone use. *Injury Prevention*, 10(1), 11-15.
- McCartt, A. T., & Hellinga, L. A. (2007). Longer-term effects of Washington, DC, law on drivers' hand-held cell phone use. *Traffic Injury Prevention*, 8(2), 199-204.
- McCartt, A. T., Hellinga, L. A., & Bratiman, K. A. (2006). Cell phones and driving: Review of research. *Traffic Injury Prevention*, 7(2), 89-106.

Ministry of Transport. New Zealand Household Travel Survey 2008-2011: Driver travel.  
Wellington: Ministry of Transport, 2012.  
<http://www.transport.govt.nz/research/Documents/Driver%20travel%20-%20March%202012.pdf>.

- Ministry of Transport. (2009). Regulatory Impact Statement Land Transport Rule: Road User Amendment Rule 2009.  
[http://www.transport.govt.nz/about/functions/Documents/Regulatory%20Impact%20Statement\\_Road%20User%20Amendment%20Rule%202009.pdf](http://www.transport.govt.nz/about/functions/Documents/Regulatory%20Impact%20Statement_Road%20User%20Amendment%20Rule%202009.pdf).
- Parliamentary Counsel Office. (2012). Land Transport (Road User) Rule 2004 [with amendments]. Wellington: Parliamentary Counsel Office, 2012.  
<http://www.legislation.govt.nz/regulation/public/2004/0427/latest/whole.html>
- Patel, V., Thomson, G., & Wilson, N. (2013). Objective measurement of area differences in 'private' smoking behaviour: Observing smoking in vehicles. *Tobacco Control*, 22(2), 130-135.
- Sullman, M., & Baas, P. (2004). Mobile phone use amongst New Zealand drivers. *Transportation Research Part F*, 7:95-105.
- Tornros, J. E., & Bolling, A. K. (2005). Mobile phone use-effects of handheld and handsfree phones on driving performance. *Accident Analysis & Prevention*, 37(5), 902-909.
- Townsend, M. (2006). Motorists' use of hand held cell phones in New Zealand: an observational study. *Accident Analysis & Prevention*, 38(4), 748-750.
- Ulleberg, P., & Rundmo, T. (2003). Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers. *Safety Science*, 41, 427-443.
- White, P., Gunston, J., Salmond, C., Atkinson, J., & Crampton, P. (2008). *Atlas of Socioeconomic Deprivation in New Zealand NZDep2006*. Wellington: Ministry of Health.
- Young, K. L., Rudin-Brown, C. M., & Lenne, M. G. (2010). Look who's talking! A roadside survey of drivers' cell phone use. *Traffic Injury Prevention*, 11(6), 555-560.
- Zhou, R., Rau, P. L. P., Zhang, W., & Zhuang, D. (2012). Mobile phone use while driving: Predicting drivers' answering intentions and compensatory decisions. *Safety Science*, 50(1), 138-149.