

Driver Hand-Held Cellular Phone Use in Minnesota, June and August, 2011

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INTRODUCTION

The reduction of crashes resulting from distracted driving has become a national priority for the United States Department of Transportation (US DOT). The primary focus of this effort has been reducing the use of cell phones for both talking and texting while driving. The Secretary of the US DOT has stated: “Every single time someone takes their eyes or their focus off the road – even for just a few seconds – they put their lives and the lives of others in danger. Distracted driving is unsafe, irresponsible and in a split second, its consequences can be devastating” (NHTSA, 2010).

Serious crashes attributed to distracted driving are frequently reported in the news media, particularly those related to the use of cellular phones. Because of the extraordinary communication abilities cellular phones provide, they have become a part of American culture. More Americans than ever before are using cellular phones, and many are using them while they drive. Use of these phones while driving a motor vehicle is a growing traffic safety concern. To date, 14 states and the District of Columbia have at least partially banned drivers from using cellular phones behind the wheel (Insurance Institute for Highway Safety, IIHS, 2011). Specific localities (usually cities) also ban drivers from using cellular phones in several other states. Thirty states (including Minnesota) and the District of Columbia also specifically ban novice drivers from using cellular phones while driving. Thirty-four states, including Minnesota, ban drivers from texting while driving (IIHS, 2011).

Indeed, use of a cellular phone can distract a person from the primary task of driving. Evidence obtained from simulated driving (e.g., Alm & Nilsson, 1995; de Waard, Brookhuis, & Hernández-Gress, 2001; McKnight & McKnight, 1993; Serafin, Wen, Paelke, & Green, 1993; Strayer & Johnston, 2001) and on-the-road driving (e.g., Brookhuis, deVries, & de Waard, 1991; Tijerina, Kiger, Rockwell, & Tornow, 1995a,b) has shown that use of a cellular phone can lead to decrements in tasks required for safe driving. There is general agreement in the literature that the most distracting activities involving cellular phone use are dialing and receiving phone calls (see e.g., Alm & Nilsson, 2001; Brookhuis, de Vries, & de Waard, 1991; Green, 2000; Tijerina,

Johnston, Parmer, Winterbottom, & Goodman, 2000; Zwahlen, Adams, & Schwartz, 1988). In addition, use of hand-held phones tends to be associated with greater decrements in driving performance than hands-free phones, but the conversations can be equally distracting, especially when the information content is high (see e.g., McKnight & McKnight, 1993; Patten, Kircher, Östlund, & Nilsson, 2004; Strayer & Johnston, 2001).

Evidence is also mounting that the use of cellular phones increases crash risk. In their analysis of the Crashworthiness Data System (CDS) data, Stutts, Reinfurt, and Rodgman (2001) found that cellular phone use or dialing was implicated in about 1.5 percent of distraction-related crashes. One would expect this percentage to increase as the predicted use of cellular phones increases. More recent work in Virginia has found that about 5 percent of distraction-related crashes involve cellular phones (Glaze & Ellis, 2003). Utilizing self-reported data on cell phone crash involvement, Royal (2003) estimates that there are 292,000 drivers in the US who report cell-phone involvement in a crash in the past 5 years. Results from epidemiological studies in which cellular phone use has been linked with crash records, are beginning to support the hypothesis that use of a cellular phone while driving increases crash risk (Koushki, Ali, & Al-Saleh, 1999; Redelmeier & Tibshirani, 1997; Sagberg, 2001; Violanti & Marshall, 1996).

The magnitude of the potential public health problem posed by cellular phone use in motor vehicles is moderated by the amount of exposure to this risk; that is, how frequently cellular phones are used by the motoring public. There are few solid exposure data available. Surveys in which people self report use either gather only general use information (such as whether or not people use their phone in the car), or the results cannot be generalized to a larger population. Cellular phone use derived from police crash records may not accurately reflect exposure since use is often acquired by self-report from the crash-involved driver. Drivers may be reluctant to report this potential distraction because of liability issues.

A less biased way to obtain frequency of mobile phone use is through direct observation on the roadway, where observers stand at intersections and record use of

hand-held cellular phones as vehicles pass by. Past direct observation studies of cellular phone use in Michigan (Eby, Kostyniuk, & Vivoda, 2003; Eby & Vivoda, 2003), North Carolina (Reinfurt, Huang, Feaganes, & Hunter, 2001), Minnesota (Eby & Vivoda, 2004, 2005, 2006, 2007, 2008, 2009, 2010) and nationwide (National Highway Traffic Safety Administration, NHTSA, 2001) have found that about 3-5 percent of the driving population are conversing on a hand-held cellular phone at any given moment during daylight hours.

The purpose of the present study was to continue tracking the statewide hand-held cellular phone use rate of drivers in Minnesota in order to better understand the exposure to this distracting activity. Cellular phone use was observed in two surveys. The surveys took place in June and August, 2011.

METHODS

The study utilized a direct observation survey to collect hand-held cellular phone use. As described in detail elsewhere (Eby, Vivoda, & Cavanagh 2004), the sample design was a stratified probability sample of 240 freeway exit ramps and intersections in Minnesota. The sample design allowed for data to be weighted so that it represented the behaviors of Minnesota vehicle occupants traveling in passenger cars, sport utility vehicles, vans/minivans, and pickup trucks. Hand-held cellular phone use data were collected at the same time as safety belt use and vehicle occupant demographics.

Driver cellular phone use rates by vehicle miles of travel (VMT) were calculated by weighting the data for each site by a factor based on the number of vehicles observed and an estimate of traffic volume. Weighted rates and variances for hand-held cellular phone use were calculated using the equations in a previous report (Eby, Vivoda, & Cavanagh 2004), except that cell phone use was substituted for safety belt use.

RESULTS

A total of 8,762 and 8,713 drivers were observed in the two survey waves respectively. Of those, 475 and 439 were using hand-held cellular phones. When weighted by VMT, the study found that 6.8 ± 3.1 and 4.7 ± 1.7 percent of drivers in Minnesota were using a hand-held cellular phone at any given moment during daylight hours. These rates are equal to or higher than what were found in last year's surveys.

Driver hand-held cellular phone use for intersections (7.1 and 4.7 percent) was about the same as the rates of use at exit ramps (6.0 and 4.9 percent). Table 1 shows hand-held cellular phone use rates by the eight strata utilized in the sampling design.

Stratum	Counties	June, 2011 Driver Hand-Held Cellular Phone Use (unweighted N)	August, 2011 Driver Hand-Held Cellular Phone Use (unweighted N)
<i>High Belt Use</i> Stratum 1: intersections Stratum 5: exit ramps	Carver, Dakota, Olmsted, Ramsey, Wright	3.3% (37) 4.5% (54)	4.5% (46) 3.8% (61)
<i>Hennepin</i> Stratum 2: intersections Stratum 6: exit ramps	Hennepin	6.3% (124) 6.6% (65)	6.1% (109) 5.8% (67)
<i>Medium Belt Use</i> Stratum 3: intersections Stratum 7: exit ramps	Beltrami, Blue Earth, Clay, Crow Wing, Freeborn, Goodhue, Kandiyohi, Nicollet, Rice, Scott, Sherburne, St. Louis, Steele, Washington	8.0% (44) 5.8% (45)	3.8% (27) 4.2% (34)
<i>Low Belt Use</i> Stratum 4: intersections Stratum 8: exit ramps	Anoka, Becker, Benton, Brown, Carlton, Cass, Chisago, Douglas, Isanti, Itasca, McLeod, Morrison, Mower, Otter Tail, Polk, Stearns, Winona	7.5% (55) 7.2% (51)	5.3% (58) 5.3% (37)

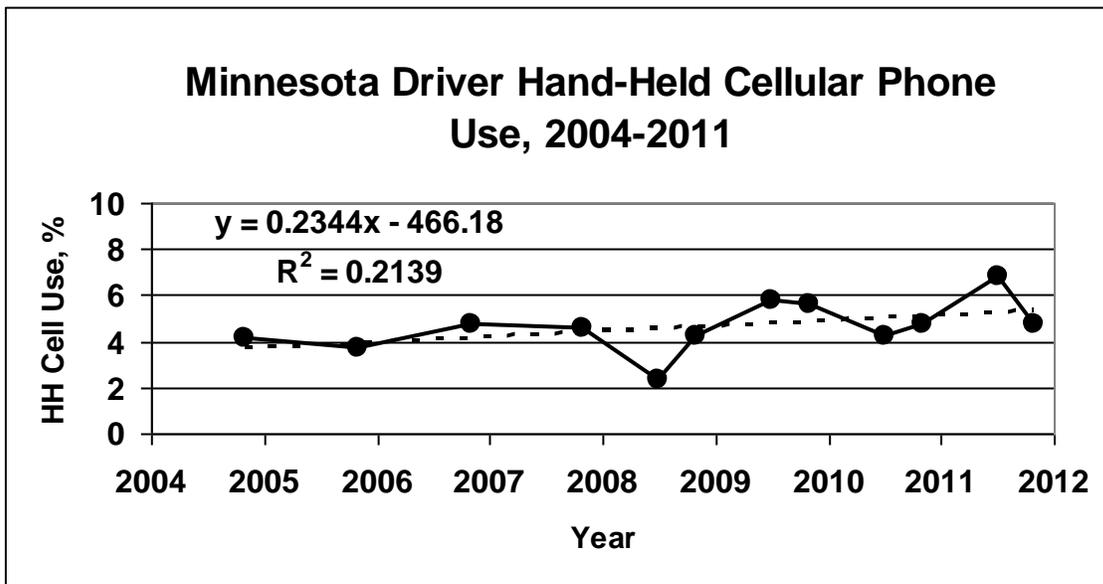


Figure 1: Driver Hand-Held Cellular Phone Use in Minnesota from 2004-2011.

The current surveys mark the 11th and 12th statewide waves in which driver hand-held cellular phone use was measured. Figure 1 shows the statewide use rates over the past 7 years and the best fitting trend line. These data show that hand-held cellular phone use by drivers in Minnesota has slightly increased between 2004 and 2011.

DISCUSSION

This study measured hand-held cellular phone use for drivers in Minnesota by VMT. We found that at any given daylight time in Minnesota, 6.8 percent of drivers in June and 4.7 percent of drivers in August were engaged in a conversation over a hand-held cellular phone. The June rate is the highest ever recorded in Minnesota. The August rate is similar to the rates in Minnesota for the past several years.

There are approximately 4.5 million registered passenger cars, sport utility vehicles, vans/minivans and pickup trucks in Minnesota (Federal Highway Administration, FHWA, 2004) using the most recent data available. Following NHTSA's (2001) reasoning, if we assume that these vehicles are being used for an average of one hour during daylight times, then there would be about 375,000 vehicles on the road in Minnesota at any given daylight hour. If 6.8 percent of these vehicles are being driven by people using hand-held cellular phones, there would be approximately 25,500 drivers in Minnesota conversing on cellular phone at any given daylight hour in June, 2011.

While this number is small compared to the total number of drivers in Minnesota, it is important to keep in mind two facts related to cellular phone use. First, cellular phone use may begin increasing dramatically in Minnesota. Michigan estimates show that hand-held cellular phone use increased at a rate of nearly one percentage point per year over a five year period (Eby, Vivoda, & St. Louis, 2006). Second, studies have shown that cellular phone use is linked to a lack of safety belt use (Eby, Kostyniuk, & Vivoda, 2003; Eby & Vivoda, 2003). Whether this finding results from the tendency of cellular phone users to engage in risky driving behaviors more often than nonusers, or whether the use of a cellular phone interferes with the use of a safety belt is unknown. What is known is that not only are those who are conversing on cellular phones potentially more likely to be in a motor vehicle crash, but due to the lower safety belt use of this population they are also more likely to sustain greater injury should a crash occur.

REFERENCES

- Alm, H. & Nilsson, L. (1995). The effects of a mobile telephone task on driver behaviour in a car following situation. *Accident Analysis & Prevention*, **27**, 707-715.
- Alm, H. & Nilsson, L. (2001). The use of car phones and changes in driver behaviour. *International Journal of Vehicle Design*, **26**, 4-11.
- Brookhuis KA, deVries G, de Waard D. (1991). The effects of mobile telephoning on driving performance. *Accident Analysis & Prevention*, **23**, 309-316.
- Eby, D.W. Kostyniuk, L.P., & Vivoda, J.M. (2003). Risky driving: The relationship between cellular phone and safety belt use. *Transportation Research Record*, **No. 1843**, 20-23.
- Eby, D.W. & Vivoda, J.M. (2003). Driver hand-held mobile phone use and safety belt use. *Accident Analysis & Prevention*, **35**, 893-895.
- Eby, D.W. & Vivoda, J.M. (2004). *Driver Hand-Held Cellular Phone Use in Minnesota, Fall 2004*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2005). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2005*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2006). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2006*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2007). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2007*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2008). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2008*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2009). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2009*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W. & Vivoda, J.M. (2010). *Driver Hand-Held Cellular Phone Use in Minnesota, August 2010*. St. Paul, MN: Office of Traffic Safety.
- Eby, D.W., Vivoda, J.M., & Cavanagh, J. (2004). *Direct Observation of Safety Belt Use in Minnesota: August, 2004*. St, Paul, MN: Minnesota Office of Traffic Safety.
- Eby, D.W., Vivoda, J.M., & St. Louis, R. M. (2006). Driver hand-held cellular phone use: A Four-Year Analysis. *Journal of Safety Research*, **37**, 261-265.
- Federal Highway Administration. (2004). State motor vehicle registrations-2002. *Highway Statistics 2002*. Washington, DC: Federal Highway Administration.
- Glaze, A.L. & Ellis, J.M. (2003). *Pilot Study of Distracted Drivers*. Virginia Commonwealth University: Richmond, VA.
- Green, P. (2000). Crashes induced by driver information systems and what can be done to reduce them. In *Proceedings of the 2000 International Congress on Transportation Electronics*. Society of Automotive Engineers: Warrendale, PA.
- Insurance Institute for Highway Safety. (2010). *Cellphone Laws*. Retrieved September, 2011. URL: <http://www.iihs.org/laws/cellphonelaws.aspx>
- Koushki, P.A., Ali, S.Y., & Al-Saleh, O.I. (1999). Driving and using mobile phones: Impacts on road accidents. *Transportation Research Record*, **1694**, 27-33.
- McKnight, A.J. & McKnight, A.S. (1993). The effects of cellular phone use upon driver attention. *Accident Analysis & Prevention*, **25**, 259-265.
- National Highway Traffic Safety Administration. (2001). *Passenger Vehicle Driver Cell*

- Phone Use Results from the Fall 2000 National Occupant Protection Use Survey.* Report No. DOT-HS-809-293. Washington, DC: US Department of Transportation. National Highway Traffic Safety Administration (2010). *Distraction.gov*. URL: <http://www.distraction.gov/#>. Accessed September, 2010.
- Patten, C.J.D., Kircher, A., Östlund, J. & Nilsson, L. (2004). Using mobile telephones: Cognitive workload and attention resource allocation. *Accident Analysis & Prevention*, **36**, 341-350.
- Redelmeier D.A. & Tibshirani R.J. (1997). Association between cellular-telephone calls and motor vehicle collisions. *The New England Journal of Medicine*, **336(7)**, 453-458.
- Reinfurt, D.W., Huang, H.F., Feaganes, J.R., & Hunter, W.W. (2001). *Cell Phone Use While Driving in North Carolina*. The University of North Carolina Highway Safety Research Center.
- Royal, D. (2003). *National Survey of Distracted and Drowsy Driving Attitudes and Behaviors: 2002, Volume 1-Findings Report*. Washington, DC: The Gallup Organization.
- Sagberg, F. (2001). Accident risk of car drivers during mobile telephone use. *International Journal of Vehicle Design*, **26**, 57-69.
- Serafin, C., Wen, C., Paelke, G., & Green, P. (1993). *Development and Human Factors Tests of Car Phones*. Report No. UMTRI-93-17. University of Michigan Transportation Research Institute: Ann Arbor, MI.
- Strayer, D.L. & Johnston, W.A. (2001). Driven to distraction: Dual-task studies of simulated driving and conversing on a cellular telephone. *Psychological Science*, **12**, 642-466.
- Stutts, J.C., Reinfurt, D.W., & Rodgman, E.A. (2001). The role of driver distraction in crashes: An analysis of 1995-1999 Crashworthiness Data System data. In *45th Annual proceedings Association for the Advancement of Automotive Medicine*. (pp 287-301). AAAM: Des Plaines, IA.
- Tijerina, L., Johnston, S., Parmer, E., Winterbottom, M.D., & Goodman, M. (2000). *Driver Distraction with Wireless Telecommunications and Route Guidance Systems*. Report No. DOT-HS-809-069. US Department of Transportation: Washington, DC.
- Tijerina L, Kiger S, Rockwell TH, Tornow C. (1995a). *Final Report-Workload Assessment of In-Cab Text Message System and Cellular Phone Use by Heavy Vehicle Drivers on the Road*. Report No. DOT-HS-808-467. Washington, DC: US Department of Transportation.
- Tijerina, L., Kiger, S.M., Rockwell, T.H., & Tornow, C., (1995b). Workload assessment of in-cab text message system and cellular phone use by heavy vehicle drivers on the road. In *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting*. (pp 1117-1121). Human Factors and Ergonomics Society: Santa Monica, CA.
- Violanti, J.M. & Marshall, J.R. (1996). Cellular phones and traffic accidents: An epidemiological approach. *Accident Analysis & Prevention*, **28**, 265-270.
- de Waard, D., Brookhuis, K., & Hernández-Gress, N. (2001). The feasibility of detecting phone-use related driver distraction. *International Journal of Vehicle Design*, **26**, 83-95.
- Zwahlen, H.T., Adams, C.C.Jr., & Schwartz, P.J. (1988). Safety aspects of cellular telephones in automobiles. In *Proceedings of the 18th International Symposium on Automotive Technology and Automation*. ISATA: Croyden, UK.