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Distraction, Fatigue, Chronobiology, Vigilance, Workload

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JOURNAL ARTICLE

A comparison of the cell phone driver and the drunk driver.Strayer DL, Drews FA, Crouch DJ. *Hum Factors* 2006; 48(2): 381-91.

Correspondence: unavailable

Affiliation: Department of Psychology, 380 South, 1530 East, RM 502, University of Utah, Salt Lake City, UT 84112-0251, USA. david.strayer@utah.edu

DOI: unavailable [What is this?](#)

(Copyright © 2006, Human Factors and Ergonomics Society)

OBJECTIVE: The objective of this research was to determine the relative impairment associated with conversing on a cellular telephone while driving. **BACKGROUND:** Epidemiological evidence suggests that the relative risk of being in a traffic accident while using a cell phone is similar to the hazard associated with driving with a blood alcohol level at the legal limit. The purpose of this research was to provide a direct comparison of the driving performance of a cell phone driver and a drunk driver in a controlled laboratory setting. **METHOD:** We used a high-fidelity driving simulator to compare the performance of cell phone drivers with drivers who were intoxicated from ethanol (i.e., blood alcohol concentration at 0.08% weight/volume). **RESULTS:** When drivers were conversing on either a handheld or hands-free cell phone, their braking reactions were delayed and they were involved in more traffic accidents than when they were not conversing on a cell phone. By contrast, when drivers were intoxicated from ethanol they exhibited a more aggressive driving style, following closer to the vehicle immediately in front of them and applying more force while braking. **CONCLUSION:** When driving conditions and time on task were controlled for, the impairments associated with using a cell phone while driving can be as profound as those associated with driving while drunk. **APPLICATION:** This research may help to provide guidance for regulation addressing driver distraction caused by cell phone conversations.

Language: Eng

JOURNAL ARTICLE

Active prompting to decrease cell phone use and increase seat belt use while driving.Clayton M, Helms B, Simpson C. *J Appl Behav Anal* 2006; 39(3): 341-9.

Correspondence: unavailable

Affiliation: Jacksonville State University, USA. mcclayton@ysu.edu

DOI: unavailable [What is this?](#)

(Copyright © 2006, Society for the Experimental Analysis of Behavior)

Automobile crashes are the leading cause of death for those aged 3 to 33, with 43,005 (118 per day) Americans killed in 2002 alone. Seat belt use reduces the risk of serious injury in an accident, and refraining from using a cell phone while driving reduces the risk of an accident. Cell phone use while driving increases accident rates, and leads to 2,600 U.S. fatalities each year. An active prompting procedure was employed to increase seat belt use and decrease cell phone use among drivers exiting a university parking lot. A multiple baseline with reversal design was used to evaluate the presentation of two signs: "Please Hang Up, I Care"

and "Please Buckle Up, I Care." The proportion of drivers who complied with the seat belt prompt was high and in line with previous research. The proportion of drivers who hung up their cell phones in response to the prompt was about equal to that of the seat belt prompt. A procedure that reduces cell phone use among automobile drivers is a significant contribution to the behavioral safety literature.

Language: Eng

JOURNAL ARTICLE

Acute effects of using a mobile phone on CNS functions.

Hladky A, Musil J, Roth Z, Urban P, Blazkova V. **Cent Eur J Public Health** 1999; 7(4): 165-7.

Correspondence: unavailable

Affiliation: National Institute of Public Health, Prague, Czech Republic.

DOI: unavailable [What is this?](#)

(Copyright © 1999, TIGIS)

Twenty volunteers participated in two experiments exploring the acute effects of using the mobile phone Motorola GSM 8700 on the functions of the CNS. When speaking (5 minutes reading a text from daily newspapers) the electromagnetic fields from the mobile apparatus did not affect the visual evoked potentials. Also a 6-min exposure did not reveal any effect of electromagnetic fields on the results in two tests (memory and attention) performed while speaking into the mobile. On the other hand the phone call itself strongly influenced the performance in a secondary task applying a test of switching attention which is a good model for driving a car. The response and decision speed were significantly worse. This is a proof that even a slight psychological stress involved in calling while driving can be a great risk.

Language: Eng

JOURNAL ARTICLE

Adolescents' seat belt use and car telephones.

Finney JW. **Am J Dis Child** 1986; 140(10): 975.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 1986, American Medical Association)

Abstract unavailable.

JOURNAL ARTICLE

Cell phone regulation.

Pless IB. **Can Med Assoc J CMAJ** 2002; 166(1): 14-5.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2002, Canadian Medical Association)

Abstract unavailable.

JOURNAL ARTICLE

Cell phones and driving: review of research.

McCartt AT, Hellinga LA, Bratiman KA. **Traffic Injury Prev** 2006; 7(2): 89-106.

Correspondence: unavailable

Affiliation: Insurance Institute for Highway Safety, Arlington, Virginia 22201, USA. amccartt@iihs.org

DOI: [10.1080/15389580600651103](https://doi.org/10.1080/15389580600651103) [What is this?](#)

(Copyright © 2006, Taylor and Francis Group)

OBJECTIVE: The research literature on drivers' use of cell phones was reviewed to identify trends in drivers' phone use and to determine the state of knowledge about the safety consequences of such use. **METHODS:** Approximately 125 studies were reviewed with regard to the research questions, type and rigor of the methods, and findings. Reviewed studies included surveys of drivers, experiments, naturalistic studies (continuous recording of everyday driving by drivers in instrumented vehicles), studies of crash risk, and evaluations of laws limiting drivers' phone use. **RESULTS:** Observational surveys indicate drivers commonly use cell phones and that such use is increasing. Drivers report they usually use hand-held phones. Experimental studies have found that simulated or instrumented driving tasks, or driving while being observed, are compromised by tasks intended to replicate phone conversations, whether using hand-held or hands-free phones, and may be further compromised by the physical distraction of handling phones. Effects of phone use on driving performance when drivers are in their own vehicles are unknown. With representative samples of adequate size, naturalistic studies in the future may provide the means to document the patterns and circumstances of drivers' phone use and their effects on real-world driving. Currently, the best studies of crash risk used cell phone company billing records to verify phone use by crash-involved drivers. Two such studies found a fourfold increase in the risk of a property-damage-only crash and the risk of an injury crash associated with phone use; increased risk was similar for males and females, younger and older drivers, and hands-free and hand-held phones. A number of jurisdictions in the United States and around the world have made it illegal for drivers to use hand-held phones. Studies of these laws show only limited compliance and unclear effects on safety. **CONCLUSIONS:** Even if total compliance with bans on drivers' hand-held cell phone use can be achieved, crash risk will remain to the extent that drivers continue to use or switch to hands-free phones. Although the enactment of laws limiting drivers' use of all phones is consistent with research findings, it is unclear how such laws could be enforced. At least in the short term, it appears that drivers' phone use will continue to increase, despite the growing evidence of the risk it creates. More effective countermeasures are needed but are not known at this time.

Language: Eng

JOURNAL ARTICLE

Cell phones and the multi-tasking driver.

Runge JW. *Ann Emerg Med* 1998; 31(2): 279-80.

Correspondence: unavailable

Affiliation: Department of Emergency Medicine, Carolinas Medical Center, Charlotte, NC, USA.

DOI: unavailable [What is this?](#)

(Copyright © 1998, Elsevier Publishing)

Abstract unavailable.

JOURNAL ARTICLE

Cellular mobile radio communications -- current status and future prospect.

Birade K. *IATSS Res* 1987; 11(1): 14-51.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 1987, International Association of Traffic and Safety Sciences)

A cellular mobile radio telephone system, which is an extension of the wired public-switched-telephone-network, can provide high-quality cost-effective public mobile radio telephone service with highly-efficient spectrum utilization to a great number of subscribers with cochannel interference management. With emphasis on the current cellular mobile radio telephone systems in operation, a description is provided of

system architecture, system control, and mobile subscriber six. The directions which future cellular mobile radio communications might take are summarized by taking into account the usage trends and service demands in current systems.

JOURNAL ARTICLE

Cellular phones and fatal traffic collisions.

Violanti JM. **Accid Anal Prev** 1998; 30(4): 519-24.

Correspondence: unavailable

Affiliation: Rochester Institute of Technology, NY 14623, USA. jmvgcj@ritvax.isc.rit.edu

DOI: unavailable [What is this?](#)

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A case-control study was conducted to determine statistical associations between traffic fatalities and the use or presence of a cellular phone, given involvement in a collision. The hypothesis of this study does not imply that cellular phones directly affect fatalities, but that phones increase the risk of certain accident characteristics in fatal collisions more than those same characteristics in non-fatal collisions. Analysis employed data from 223,137 traffic accidents occurring between 1992 and 1995. Information on collision characteristics and cellular phone involvement for each fatality was compared with the same information for each non-fatality (controls). Statistically adjusting for other collision variables (age, gender, alcohol use, speed, inattention and driving left of center), an approximate nine-fold increased risk was found for a fatality given the use of a cellular phone. An approximate two-fold increased risk for a fatality was found given the presence of a cellular phone in the vehicle. Combined effects of reported phone use, driving to the left of center and inattention increased the risk of a fatal collision more than phone use did by itself. This analysis implies a statistical, but not necessarily a causal, relationship. A multitude of factors are involved in any traffic collision, and the exact cause of an accident and its severity level is difficult to disentangle.

JOURNAL ARTICLE

Cellular phones and traffic accidents.

Violanti JM. **Public Health** 1997; 111(6): 423-8.

Correspondence: unavailable

Affiliation: Social and Preventive Medicine, School of Medicine and Biomedical Sciences, State University of New York at Buffalo 14214, USA.

DOI: unavailable [What is this?](#)

(Copyright © 1997, Elsevier Publishing)

Cellular phone use in motor vehicles is becoming an increasing world-wide phenomenon. Using data obtained from traffic accidents reported between 1992 and 1995 in the state of Oklahoma, USA, this study examined statistical rate-ratios of accident characteristics between drivers with or without cellular phones. Rates were calculated between cellular phone involvement and reported accident causes, types of collision, driver actions immediately prior to the accident, location of the accident, the extent of fatalities, and age and gender of drivers. Results indicated a significant increased rate among drivers with cellular phones for inattention, unsafe speed, driving on wrong side of road, striking a fixed object, overturning their vehicle, swerving prior to the accident, and running off the roadway. People with phones stood an increased risk of being killed in an accident over persons without phones. Males with phones had a significantly higher rate than females for many of accident characteristics mentioned above. Rate-ratios of some accident characteristics and fatalities increased as age increased, with the exception of drivers under age 20 yrs, who had the highest fatality rate. Limitations of the study and possible prevention alternatives are discussed.

Language: Eng

JOURNAL ARTICLE

Cellular phones and traffic accidents: an epidemiological approach.

Violanti JM, Marshall JR. **Accid Anal Prev** 1996; 28(2): 265-70.

Correspondence: unavailable

Affiliation: Department of Criminal Justice, Rochester Institute of Technology, NY 14623, USA.

DOI: unavailable [What is this?](#)

(Copyright © 1996, Elsevier Publishing)

Using epidemiological case-control design and logistic regression techniques, this study examined the association of cellular phone use in motor vehicles and traffic accident risk. The amount of time per month spent talking on a cellular phone and 18 other driver inattention factors were examined. Data were obtained from: (1) a case group of 100 randomly selected drivers involved in accidents within the past 2 years, and (2) a control group of 100 randomly selected licensed drivers not involved in accidents within the past 10 years. Groups were matched on geographic residence. Approximately 13% (N = 7) of the accident and 9% (N = 7) of the non-accident group reported use of cellular phones while driving. Data was obtained from Department of Motor Vehicles accident reports and survey information from study subjects. We hypothesized that increased use of cellular phones while driving was associated with increased odds of a traffic accident. Results indicated that talking more than 50 minutes per month on cellular phones in a vehicle was associated with a 5.59-fold increased risk in a traffic accident. The combined use of cellular phones and motor and cognitive activities while driving were also associated with increased traffic accident risk. Readers should be cautioned that this study: (1) consists of a small sample, (2) reveals statistical associations and not causal relationships, and (3) does not conclude that talking on cellular phones while driving is inherently dangerous.

JOURNAL ARTICLE

Cellular phones: are they detrimental?

Salama OE, Abou El Naga RM. **J Egypt Public Health Assoc** 2004; 79(3-4): 197-223.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2004, Egyptian Public Health Association)

The issue of possible health effects of cellular phones is very much alive in the public's mind where the rapid increase in the number of the users of cell phones in the last decade has increased the exposure of people to the electromagnetic fields (EMFs). Health consequences of long term use of mobile phones are not known in detail but available data indicates the development of non specific annoying symptoms on acute exposure to mobile phone radiations. In an attempt to determine the prevalence of such cell phones associated health manifestations and the factors affecting their occurrence, a cross sectional study was conducted in five randomly selected faculties of Alexandria University. Where, 300 individuals including teaching staff, students and literate employee were equally allocated and randomly selected among the five faculties. Data about mobile phone's users and their medical history, their pattern of mobile usage and the possible deleterious health manifestations associated with cellular phone use was collected. The results revealed 68% prevalence of mobile phone usage, nearly three quarters of them (72.5%) were complainers of the health manifestations. They suffered from headache (43%), earache (38.3%), sense of fatigue (31.6%), sleep disturbance (29.5%), concentration difficulty (28.5%) and face burning sensation (19.2%). Both univariate and multivariate analysis were consistent in their findings. Symptomatic users were found to have significantly higher frequency of calls/day, longer call duration and longer total duration of mobile phone usage/day than non symptomatic users. For headache both call duration and frequency of calls/day were the significant predicting factors for its occurrence ($\chi^2 = 18.208$, $p = 0.0001$). For earache, in addition to call duration, the longer period of owning the mobile phone were significant predictors ($\chi^2 = 16.996$, $p = 0.0002$). Sense of fatigue was significantly affected by both call duration and age of the user ($\chi^2 = 24.214$, $p = 0.0000$), while burning sensation was only affected by frequency of calls/day ($\chi^2 = 5.360$, $p = 0.020$). According to the 95% confidence interval of frequency and duration of calls, the study recommended not to increase the call duration more than four minutes and limit their frequency to less than seven calls/day with total duration of exposure less than 22 min./day.

Language: Eng

JOURNAL ARTICLE

Cellular telephone use and fatal traffic collisions: a commentary.

Cher DJ, Mrad RJ, Kelsh M. *Accid Anal Prev* 1999; 31(5): 599.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 1999, Elsevier Publishing)

Abstract unavailable.

JOURNAL ARTICLE

Cellular telephones and driving performance: the effects of attentional demands on motor vehicle crash risk.

Hunton J, Rose JM. *Risk Anal* 2005; 25(4): 855-66.

Correspondence: unavailable

Affiliation: Bentley College, Department of Accountancy, Waltham, MA 02452-4705, USA. JHunton@bentley.edu

DOI: [10.1111/j.1539-6924.2005.00637.x](#) [What is this?](#)

(Copyright © 2005, Blackwell Publishing)

This study examines the effects of conversation mode and split-attention communication training on driving performance. The study is based on an experiment where drivers with and without communication training (pilots vs. nonpilots) completed a simulated driving course while involved in one of three conversation modes: no conversation, conversation with passenger, or conversation on a hands-free cellular telephone. Results indicate that cellular telephone conversations consume more attention and interfere more with driving than passenger conversations. Cell phone conversations lack the nonverbal cues available during close-contact conversations and conversation participants expend significant cognitive resources to compensate for the lack of such cues. The results also demonstrate that communication training may reduce the hazardous effects of cell phone conversations on driving performance.

JOURNAL ARTICLE

Changes in driver behaviour as a function of handsfree mobile phones--a simulator study.

Alm H, Nilsson L. *Accid Anal Prev* 1994; 26(4): 441-51.

Correspondence: unavailable

Affiliation: Swedish Road and Transport Research Institute, Linköping.

DOI: unavailable [What is this?](#)

(Copyright © 1994, Elsevier Publishing)

The effects of a mobile telephone task on drivers' reaction time, lane position, speed level, and workload were studied in two driving conditions (an easy or rather straight versus a hard or very curvy route). It was predicted that the mobile telephone task would have a negative effect on drivers' reaction time, lane position, and workload and lead to a reduction of speed. It was also predicted that the effects would be stronger for the hard driving task. The study was conducted in the VTI driving simulator. A total of 40 subjects, experienced drivers aged 23 to 61, were randomly assigned to four experimental conditions (telephone and easy or hard driving task versus control and easy or hard driving task). Contrary to the predictions, the strongest effects were found when the subjects were exposed to the easy driving task. In the condition where drivers had to perform the easy driving task, findings showed that a mobile telephone task had a negative effect on reaction time and led to a reduction of the speed level. In the condition where drivers had to perform the hard driving task, findings showed that a mobile telephone task had an effect only on the drivers' lateral position. Finally, the mobile telephone task led to an increased workload for both the easy and the

hard driving task. The results are discussed in terms of which subtask, car driving or telephone task, the subjects gave the highest priority. Some implications for information systems in future cars are discussed.

JOURNAL ARTICLE

Characteristics of cell phone-related motor vehicle crashes in North Carolina.

Huang HF, Stutts JC, Hunter WW. *Transp Res Rec* 2003; (1843): 10-19.

Correspondence: unavailable

Affiliation: Univ N Carolina, Highway Safety Res Ctr, Chapel Hill, NC 27599 USA.

DOI: unavailable [What is this?](#)

(Copyright © 2003, Transportation Research Board, National Research Council, National Academy of Sciences USA)

Computerized crash narratives for the period January 1, 1996, through August 31, 2000, were searched to identify 452 cell phone crashes that occurred in North Carolina. The characteristics of these crashes were compared with about 1,080,000 non-cell-phone crashes during the same period. Cell phone crashes were (a) less likely to result in a serious or fatal injury, (b) nearly twice as likely to be rear-end crashes, and (c) somewhat more likely to occur during the mid-day or afternoon hours. Moreover, cell phone crashes were more likely to occur in urban areas, on local streets, and on roads with "no special feature." Drivers who were talking on a cell phone at the time of the crash were more likely to (a) have committed a driving violation, (b) be driving sport utility vehicles, and (c) be going straight. They were more likely to be male and under age 55. All of these cell phone versus non-cell-phone differences were statistically significant. As cell phones continue to proliferate, the number of cell phone crashes will probably increase. The challenge is to minimize the risks associated with cell phone use and driving, while allowing drivers to enjoy the benefits of cell phones.

JOURNAL ARTICLE

Cognitive demands of hands-free-phone conversation while driving.

Nunes L, Recarte MA. *Transp Res F Traffic Psychol Behav* 2002; 5(2): 133-144.

Correspondence: unavailable

DOI: [10.1016/S1369-8478\(02\)00012-8](#) [What is this?](#)

(Copyright © 2002, Elsevier Publishing)

In four field experiments the participants drove an instrumented car provided with a hands-free phone and performed several cognitive tasks while driving including phone conversations. The study focussed the cognitive component of the conversations, excluding dialling. The cognitive demands of the conversations were varied and in two of the experiments the same tasks had two versions: by phone and in live conversation with the experimenter in the car. Several dependent measures like visual search behaviour, driving speed, visual detection and response selection capacities and others were analysed. Like in previous experiments of the same authors the more demanding cognitive tasks produced higher interference effects, but when the same tasks performed by phone were compared with its live versions no differences were observed. Once the manual phone operation has been technically suppressed the risk of phone conversations relies on the demands of the message content and its equivalent to talking to a passenger. Implications for safety are discussed.

JOURNAL ARTICLE

Cognitive functions and driving ability of older drivers.

Hansen EA, Hansen BL. *Ugeskr Laeger* 2002; 164(3): 337-40.

Correspondence: unavailable

Affiliation: Syddansk Universitet, Forskningsenheden for Almen Medicin i Odense. eahdoc@dadlnet.dk

DOI: unavailable [What is this?](#)

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INTRODUCTION: The aim of the study was to test older drivers applying for a renewal of their driver's license for cognitive impairment and to examine the outcome of a subsequent driving test. **MATERIAL AND METHODS:** Patients registered with general practitioners (GPs) in the County of Southern Jutland, who applied for a renewal of their driver's license because of age, participated in the study. Data were collected from a questionnaire sent to GPs and from driving license certificates. The test used m-mini mental state (m-MMSE) for registration of cognitive functioning was a short version of MMSE. The number of recommended driving tests and the results of the driving test were compared during a period before and after the test was used, and compared with the result of the m-MMSE. A total of 6,091 elderly participated in the study, 2,631 before and 3,460 after the introduction of the test. In addition a semi-structured telephone interview with a random sample of the participating GPs was carried out. **RESULTS:** The use of m-MMSE resulted in significantly more older drivers being recommended a driving test and significantly fewer having their driver's license renewed. Of the older drivers who were recommended a driving test and did not have their driver's license renewed, 83% and 60% had impaired cognitive functioning. The majority (95%) of the GPs considered the test to be a useful tool in general practice. **DISCUSSION:** The results show that the use of m-MMSE when older drivers apply for renewal of their driver's license because of age, led to fewer older drivers having their driver's license renewed, and that most of them have impaired cognitive functioning. The test is suitable for general practice.

JOURNAL ARTICLE

Cognitive load and detection thresholds in car following situations: safety implications for using mobile (cellular) telephones while driving.

Lamble D, Kauranen T, Laakso M, Summala H. *Accid Anal Prev* 1999; 31(6): 617-23.

Correspondence: unavailable

Affiliation: Department of Psychology, University of Helsinki, Finland. david.lamble@helsinki.fi

DOI: unavailable [What is this?](#)

(Copyright © 1999, Elsevier Publishing)

This study was aimed at investigating drivers' ability to detect a car ahead decelerating, while doing mobile phone related tasks. Nineteen participants aged between 20 and 29 years, (2000-125000 km driving experience) drove at 80 km/h, 50 m behind a lead car, on a 30 km section of motorway in normal traffic. During each trial the lead car started to decelerate at an average of 0.47 m/s² while the participant either looked at the car in front (control), continuously dialed series of three random integers on a numeric keypad (divided visual attention), or performed a memory and addition task (non-visual attention). The results indicated that drivers' detection ability was impaired by about 0.5 s in terms of brake reaction time and almost 1 s in terms of time-to-collision, when they were doing the non-visual task whilst driving. This impairment was similar to when the drivers were dividing their visual attention between the road ahead and dialing numbers on the keypad. It was concluded that neither a hands-free option nor a voice controlled interface removes the safety problems associated with the use of mobile phones in a car.

JOURNAL ARTICLE

Collision and violation involvement of drivers who use cellular telephones.

Wilson J, Fang M, Wiggins S, Cooper P. *Traffic Injury Prev* 2003; 4(1): 45-52.

Correspondence: unavailable

Affiliation: Insurance Corporation of British Columbia, Victoria, British Columbia, Canada. jean.wilson@icbc.com

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The study sample consisted of 3,869 drivers, split approximately 50/50 between observed cell phone users and those observed not using cell phones (labeled "nonusers"). Cell phone use was determined by a snapshot observation made on city streets. The sample represented 54% of those originally observed, for whom a match was obtained for both vehicle license plate and for gender and estimated age group of the observed driver and that of the driver named in the vehicle policy. Data were obtained from records of insurance

claims, police-reported collisions and violations, following a strict protocol to protect individual privacy. The dependent measures were at-fault crash claims and "inattention" violations. A logistic regression model controlled for age, gender, exposure (represented by not-at-fault crash claims), alcohol-related offenses, and aggressive driving offenses. The study also involved a comparison of the contributing factors and collision configurations of police-reported collisions involving the users and "nonusers" in the sample. Drivers observed using cell phones had a higher risk of an at-fault crash than did the "nonusers," although the difference was not significant for males. There was no apparent effect on "inattention" violations. The cell phone users also had a higher proportion of rear-end collisions. The violation pattern of cell phone users suggests that they are, in general, riskier drivers. These differences likely reflect lifestyle, attitude and personality factors. It is essential to control for these factors in assessing the direct risk attributable to cellular telephone use.

JOURNAL ARTICLE

Commentary on "Using Cellular Telephones in Vehicles: Safe or Unsafe?".

Smiley A. **Transp Hum Fact** 1999; 1(1): 57-59.

Correspondence: unavailable

DOI: [10.1207/sthf0101_5](https://doi.org/10.1207/sthf0101_5) [What is this?](#)

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[Abstract unavailable]

JOURNAL ARTICLE

Commentary on Goodman, Tijerina, Bents, and Wierwille, "Using Cellular Telephones in Vehicles: Safe or Unsafe?".

Moray N. **Transp Hum Fact** 1999; 1(1): 43-46.

Correspondence: unavailable

DOI: [10.1207/sthf0101_3](https://doi.org/10.1207/sthf0101_3) [What is this?](#)

(Copyright © 1999, Lawrence Erlbaum Associates)

[Abstract unavailable]

JOURNAL ARTICLE

Commentary: cellular telephones and cars: a mix that is a real handful...with or without the hands.

Vaca F. **Ann Emerg Med** 2002; 39(1): 82-5.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2002, Elsevier Publishing)

Abstract unavailable.

JOURNAL ARTICLE

Comparing headphone and speaker effects on simulated driving.

Nelson TM, Nilsson TH. **Accid Anal Prev** 1990; 22(6): 523-9.

Correspondence: unavailable

Affiliation: Department of Psychology, University of Alberta, Edmonton, Canada.

DOI: unavailable [What is this?](#)

(Copyright © 1990, Elsevier Publishing)

Twelve persons drove for three hours in an automobile simulator while listening to music at sound level 63dB over stereo headphones during one session and from a dashboard speaker during another session. They were required to steer a mountain highway, maintain a certain indicated speed, shift gears, and respond to occasional hazards. Steering and speed control were dependent on visual cues. The need to shift and the hazards were indicated by sound and vibration effects. With the headphones, the driver's average reaction time for the most complex task presented--shifting gears--was about one-third second longer than with the speaker. The use of headphones did not delay the development of subjective fatigue.

JOURNAL ARTICLE

Concurrent mobile (cellular) phone use and driving performance: task demand characteristics and compensatory processes.

Haigney DE, Taylor RG, Westerman SJ. *Transp Res F Traffic Psychol Behav* 2000; 3(3): 113-121.

Correspondence: unavailable

DOI: [10.1016/S1369-8478\(00\)00020-6](https://doi.org/10.1016/S1369-8478(00)00020-6) [What is this?](#)

(Copyright © 2000, Elsevier Publishing)

This paper reports a simulator-based study of the effects of mobile phone use on driving performance. Changes in heart rate indicated that mobile phone use increases the cognitive demand experienced by drivers with, it is argued, consequent reduction in safety margins. However, experimental results also suggested that participants engaged in a process of risk compensation, with driving speed being slower at times of mobile phone conversation while the number of off-road excursions (OFFS) and collisions remained stable. There also was some evidence that the use of a hand-held mobile phone (when compared to a hands-free system) was associated with poorer driving performance. Implications for 'real world' driving are considered.

JOURNAL ARTICLE

Distractions and the risk of car crash injury: the effect of drivers' age.

Lam LT. *J Safety Res* 2002; 33(3): 411-9.

Correspondence: unavailable

Affiliation: Royal Alexandra Hospital for Children, Locked Bag 4001, Westmead, Sydney, NSW 2145, Australia. lawrenci@chw.edu.au

DOI: unavailable [What is this?](#)

(Copyright © 2002, U.S. National Safety Council, Published by Elsevier)

PROBLEM: Motor-vehicle accidents are one of the major causes of injury in most motorized countries. Driver distractions have been suggested as a contributor to traffic accidents. Moreover, age of the driver seems to have a role in the relationship between distractions and car crashes. But very few studies have investigated the effect of driver's age on this relationship. This exploratory study investigated the association between distractions, both inside and outside the vehicle, and the increased risk of car crash injury among drivers across different ages. **METHOD:** This study used a case series design to analyze data routinely collected by the NSW police in Australia. A special focus of this study was on how drivers' age affects the risk of car crash injury, which was determined by using a well-documented risk estimation methodology. **RESULTS:** The results obtained indicated that drivers of all ages, on the whole, are more susceptible to distractions inside the vehicle than distractions coming from outside. Age was shown to affect the relationship between in-vehicle distraction and the risk of car crash injury. A separate analysis was also conducted on hand-held phone usage while driving with results supplementing previous findings reported in the literature. **IMPACT TO INDUSTRY:** Safety strategies to countermeasure in-vehicle distractions have been suggested and discussed.

JOURNAL ARTICLE

Does acute exposure to the electromagnetic field emitted by a mobile phone influence visual evoked potentials? A pilot study.

Urban P, Lukas E, Roth Z. *Cent Eur J Public Health* 1998; 6(4): 288-90.

Correspondence: unavailable

Affiliation: National Institute of Public Health, Prague, Czech Republic.

DOI: unavailable [What is this?](#)

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To search for a potential negative influence on the central nervous system (CNS) of the electromagnetic field emitted by a mobile phone, the authors performed a pilot experimental study of the influence of a single short acute exposure to the GSM mobile phone Motorola 8700, using visual evoked potentials (VEP) examination as an electrophysiological marker of CNS dysfunction. The study group consisted of 20 healthy volunteers. The duration of exposure was 5 minutes. The output power of the device was 1.5 W when the antenna was pulled up. Five parameters of VEP were evaluated by means of multifactorial ANOVA. Confounding effects of age, sex, and of the call in itself were taken into consideration. No statistically significant influence of the above-described exposure to the electromagnetic field emitted by the mobile phone on latencies or amplitudes of VEP was observed.

Language: Eng

JOURNAL ARTICLE

Driver distraction - Evaluation with event detection paradigm.

Greenberg J, Tijerina L, Curry R, Artz B, Cathey L, Kochhar D, Kozak K, Blommer M, Grant P. *Transp Res Rec* 2003; (1843): 1-9.

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DOI: unavailable [What is this?](#)

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The effects of eight in-vehicle tasks on driver distraction were measured in a large, moving-base driving simulator. Forty-eight adults, ranging in age from 35 to 66, and 15 teenagers participated in the simulated drive. Hand-held and hands-free versions of phone dialing, voicemail retrieval, and incoming calls represented six of the eight tasks. Manual radio tuning and climate control adjustment were also included to allow comparison with tasks that have traditionally been present in vehicles. During the drive the participants were asked to respond to sudden movements in surrounding traffic. The driver's ability to detect these sudden movements or events changed with the nature of the in-vehicle tasks that were being performed. Driving performance measures such as lane violations and heading error were also computed. The performance of the adult group was compared with the performance of the teenage drivers. Compared with the adults, the teens were found to choose unsafe following distances, have poor vehicle control skills, and be more prone to distraction from hand-held phone tasks.

JOURNAL ARTICLE

Driver distraction: The effects of concurrent in-vehicle tasks, road environment complexity and age on driving performance.

Horberry T, Anderson J, Regan MA, Triggs TJ, Brown J. *Accid Anal Prev* 2005; 38(1): 185-191.

Correspondence: unavailable

Affiliation: Accident Research Centre, Monash University, Australia.

DOI: [10.1016/j.aap.2005.09.007](#) [What is this?](#)

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This paper presents the findings of a simulator study that examined the effects of distraction upon driving performance for drivers in three age groups. There were two in-vehicle distracter tasks: operating the vehicle entertainment system and conducting a simulated hands-free mobile phone conversation. The effect of visual clutter was examined by requiring participants to drive in simple and complex road environments. Overall

measures of driving performance were collected, together with responses to roadway hazards and subjective measures of driver perceived workload. The two in-vehicle distraction tasks degraded overall driving performance, degraded responses to hazards and increased subjective workload. The performance decrements that occurred as a result of in-vehicle distraction were observed in both the simple and complex highway environments and for drivers in different age groups. One key difference was that older drivers traveled at lower mean speeds in the complex highway environment compared with younger drivers. The conclusions of the research are that both in-vehicle tasks impaired several aspects of driving performance, with the entertainment system distracter having the greatest negative impact on performance, and that these findings were relatively stable across different driver age groups and different environmental complexities.

JOURNAL ARTICLE

Driver hand-held cellular phone use: A four-year analysis.

Eby DW, Vivoda JM, St Louis RM. *J Safety Res* 2006; 37(3): 261-265.

Correspondence: unavailable

Affiliation: The University of Michigan, Transportation Research Institute, United States.

DOI: [10.1016/j.jsr.2006.02.003](https://doi.org/10.1016/j.jsr.2006.02.003) [What is this?](#)

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INTRODUCTION: The use of hand-held cellular (mobile) phones while driving has stirred more debate, passion, and research than perhaps any other traffic safety issue in the past several years. There is ample research showing that the use of either hand-held or hands-free cellular phones can lead to unsafe driving patterns. Whether or not these performance deficits increase the risk of crash is difficult to establish, but recent studies are beginning to suggest that cellular phone use elevates crash risk. **METHODS:** The purpose of this study was to assess changes in the rate of hand-held cellular phone use by motor-vehicle drivers on a statewide level in Michigan. This study presents the results of 13 statewide surveys of cellular phone use over a 4-year period. Hand-held cellular phone use data were collected through direct observation while vehicles were stopped at intersections and freeway exit ramps. Data were weighted to be representative of all drivers traveling during daylight hours in Michigan. **RESULTS:** The study found that driver hand-held cellular phone use has more than doubled between 2001 and 2005, from 2.7% to 5.8%. This change represents an average increase of 0.78 percentage points per year. The 5.8% use rate observed in 2005 means that at any given daylight hour, around 36,550 drivers were conversing on cellular phones while driving on Michigan roadways. The trend line fitted to these data predicts that by the year 2010, driver hand-held cellular phone use will be around 8.6%, or 55,000 drivers at any given daylight hour. **CONCLUSIONS:** These results make it clear that cellular phone use while driving will continue to be an important traffic safety issue, and highlight the importance of continued attempts to generate new ways of alleviating this potential hazard.

Language: Eng

JOURNAL ARTICLE

Driver hand-held mobile phone use and safety belt use.

Eby DW, Vivoda JM. *Accid Anal Prev* 2003; 35(6): 893-5.

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Affiliation: UMTRI-Social and Behavioral Analysis Division, Transportation Research Institute, University of Michigan, 2901 Baxter Road, Ann Arbor, MI 48109-2150, USA. eby@umich.edu

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The purposes of the study were to identify hand-held mobile phone use trends for Michigan and to compare safety belt use between users and nonusers. Mobile phone and safety belt use was investigated by a direct observation survey of drivers at intersections in Michigan. Data were weighted to calculate mobile phone use and safety belt use rates statewide. The study showed 2.7% of Michigan drivers were using a mobile phone at any given daylight time. Safety belt use of current mobile phone users was significantly lower than those

not using mobile phones.

JOURNAL ARTICLE

Driver risk factors for sleep-related crashes.

Stutts JC, Wilkins JW, Scott Osberg J, Vaughn BV. *Accid Anal Prev* 2003; 35(3): 321-31.

Correspondence: unavailable

Affiliation: Highway Safety Research Center, University of North Carolina, 730 Airport Road, Campus Box 3430, Chapel Hill, NC 27599-3430, USA. jane_stutts@unc.edu

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A population-based case-control study was carried out to examine driver risk factors for sleep-related motor vehicle crashes. Cases included 312 drivers involved in recent North Carolina crashes and identified on police reports as asleep at the time of the crash and 155 drivers identified as fatigued. Controls were 529 drivers also involved in recent crashes but not identified as asleep or fatigued, and 407 drivers not involved in recent crashes. All drivers were contacted for brief telephone interviews. Results showed that drivers in sleep-related crashes were more likely to work multiple jobs, night shifts, or other unusual work schedules. They averaged fewer hours sleep per night, reported poorer quality sleep, were less likely to feel they got enough sleep, were sleepier during the day, drove more often late at night, and had more prior instances of drowsy driving. Compared to drivers in non-sleep-related crashes, they had been driving for longer times, been awake more hours, slept fewer hours the night before, and were more likely to have used soporific medications. Knowledge of specific risk factors for sleep-related crashes is an important first step in reducing the thousands of deaths and injuries each year in the US attributed to drowsy driving.

JOURNAL ARTICLE

Driver workload response to in-vehicle device operations.

Jerome CJ, Ganey HC, Mouloua M, Hancock PA. *Int J Occup Safety Ergonomics* 2002; 8(4): 539-46.

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A central concern of Intelligent Transportation Systems (ITS) is the effect of in-vehicle devices (e.g., cell phones, navigation systems, radios, etc.) on driver performance and safety. As diverse and innovative technologies are designed and implemented for in-vehicle use, questions regarding the presence and use of these devices assume progressively greater importance. Further concerns for advanced driver training require us to develop and validate reliable and effective procedures for assessing such effects. This work examines a number of candidate procedures, in particular the evaluation of change in cognitive workload as a strategy by which such goals might be achieved.

Language: Eng

JOURNAL ARTICLE

Drivers' use of hand-held mobile phones in Western Australia.

Horberry T, Bubnich C, Hartley L, Lambie D. *Transp Res F Traffic Psychol Behav* 2001; 4(3): 213-218.

Correspondence: unavailable

DOI: [10.1016/S1369-8478\(01\)00022-5](#) [What is this?](#)

(Copyright © 2001, Elsevier Publishing)

Using a hand-held mobile phone whilst driving has been linked to an increased risk of being involved in a road

crash. Little research, however, has been done on actual road exposure rates to this potential safety problem. The main aim of this study was therefore to establish the number of drivers who use hand-held mobile phones while driving, and to discover if this number had increased as compared to similar observations obtained one year earlier. 40 roadside observations were made at major roads during daylight hours. On average approximately 1.5% of all vehicle drivers were observed using hand-held mobile phones. No significant difference was found between the percentage of drivers observed to be using phones in an earlier study and this current study. In addition, separate observations were undertaken at four sites at four periods of the 'normal' working day to establish if a possible time of day effect existed. The data found that the level of mobile phone use did not significantly differ during the day, however, as a percentage of vehicle flow, the highest use period was between 11.00 and 12.00. Finally, for the same four sites, supplementary measures were taken to establish personal characteristics of the phone users. It was found that phone users were predominantly male (78%) and less than 40-years old (64%).

JOURNAL ARTICLE

Drivers' use of handheld cell phones before and after New York State's cell phone law.

McCartt AT, Braver ER, Geary LL. *Prev Med* 2003; 36(5): 629-35.

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Affiliation: Insurance Institute for Highway Safety, 1005 North Glebe Road, Arlington, VA 22201-4751, USA.
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(Copyright © 2003, Elsevier Publishing)

BACKGROUND: In response to public concern about driver distraction from cellular telephones, New York became the first state to ban handheld cell phone use while driving. The law, accompanied by considerable publicity, included a warning phase (November 2001), after which violators could be fined. Until March 2002, fines could be waived if motorists provided proof of purchase of hands-free accessories. **METHODS:** Daytime cell phone use among passenger vehicle drivers was observed at controlled intersections 1 month before the law's implementation, after fines could be issued (December 2001), and after waivers were not allowed (March 2002). Use was observed for 37,462 vehicles in four New York communities and 21,315 vehicles in two central Connecticut communities. Driver gender, estimated age, and vehicle type were recorded for cell phone users and a sample of passing motorists. **RESULTS:** The use rate in New York declined significantly from 2.3% before the law to 1.1% after the law ($P < 0.05$). Use rates in Connecticut, an adjacent state without a law, did not change. In both states, use was higher among drivers of sport utility vehicles ($P < 0.05$) and minimal among drivers ages 60 or older. In New York, observed use declined among drivers younger than 60, male and female drivers, and all vehicle types. **CONCLUSIONS:** A well-publicized law restricting drivers' use of handheld cell phones had a strong effect on behavior. Whether compliance will remain high is unknown.

JOURNAL ARTICLE

Driving in Parkinson's disease: Mobility, accidents, and sudden onset of sleep at the wheel.

Meindorfner C, Korner Y, Moller JC, Stiasny-Kolster K, Oertel WH, Kruger HP. *Mov Disord* 2005.

Correspondence: unavailable

Affiliation: Center for Traffic Sciences, Department of Psychology, University of Wurzburg, Wurzburg, Germany.

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Only few studies have addressed driving ability in Parkinson's disease (PD) to date. However, studies investigating accident proneness of PD patients are urgently needed in the light of motor disability in PD and particularly-the report of "sleep attacks" at the wheel. We sent a questionnaire about sudden onset of sleep (SOS) and driving behavior to 12,000 PD patients. Subsequently, of 6,620 complete data sets, 361 patients were interviewed by phone. A total of 82% of those 6,620 patients held a driving license, and 60% of them still participated in traffic. Of the patients holding a driving license, 15% had been involved in and 11% had caused at least one accident during the past 5 years. The risk of causing accidents was significantly increased

for patients who felt moderately impaired by PD, had an increased Epworth Sleepiness Scale (ESS) score, and had experienced SOS while driving. Sleep attacks at the wheel usually occurred in easy driving situations and resulted in typical fatigue-related accidents. Those having retired from driving had a more advanced (subjective) disease severity, higher age, more frequently female gender, an increased ESS score, and a longer disease duration. The study revealed SOS and daytime sleepiness as critical factors for traffic safety in addition to motor disabilities of PD patients. The results suggest that real sleep attacks without any prior sleepiness are rare. However, our data underline the importance of mobility for patients and the need for further studies addressing the ability to drive in PD.

JOURNAL ARTICLE

Driving performance while using cell phones: an observational study.

Rosenbloom T. *J Safety Res* 2006; 37(2): 207-212.

Correspondence: unavailable

Affiliation: Department of Criminology, Bar Ilan University, Ramat Gan 52900, Israel.

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INTRODUCTION: Through spontaneous driving observations, this study sought to examine the impact of using a hands-free cell phone while driving on speed and safe gap keeping behaviors. The study also examined the association between the measure of disturbance created by using a cell phone and the driver's awareness of the disturbance. **METHOD:** Twenty-three male adults were observed while driving for an hour and a half each; drivers were unaware of being observed. During the session, each of the participants received a phone call, initiated by an associate of the observer. The experiment was divided into two periods during which the experimental parameters were monitored: 10 minutes during conversation on a cell phone and 10 minutes of non-conversation on a hands-free cell phone. After the experiment, the driver was questioned concerning the extent to which his/her driving was disturbed by the cell phone conversation. **RESULTS:** T-test for matched samples revealed that the gaps between the drivers' cars and those in front of them diminished when drivers were engaged in the cell phone conversations. Repeated measures ANOVA revealed that drivers that had short conversations did not change their speed, while drivers who were engaged in long (over 16 minutes) conversations drove faster. No effect of drivers' awareness toward cell phone-related disturbance on actual driving behavior monitored in the present study was found.

Language: Eng

JOURNAL ARTICLE

Effect of cellular telephone conversations and other potential interference on reaction time in a braking response.

Consiglio W, Driscoll P, Witte M, Berg WP. *Accid Anal Prev* 2003; 35(4): 495-500.

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This experiment studied the effect of phone conversations and other potential interference on reaction time (RT) in a braking response. Using a laboratory station which simulated the foot activity in driving, 22 research participants were requested to release the accelerator pedal and depress the brake pedal as quickly as possible following the activation of a red brake lamp. Mean reaction time was determined for five conditions: (a) control, (b) listening to a radio, (c) conversing with a passenger, (d) conversing using a hand-held phone, and (e) conversing using a hands-free phone. Results indicated that conversation, whether conducted in-person or via a cellular phone caused RT to slow, whereas listening to music on the radio did not.

JOURNAL ARTICLE

Effects of a controlled auditory-verbal distraction task on older driver vehicle control.

Rizzo M, Stierman L, Skaar N, Dawson JD, Anderson SW, Vecera SP. **Transp Res Rec** 2004; (1865): 1-6.

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Affiliation: Univ Iowa, Dept Psychol, Iowa City, IA 52242 USA.

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Engaging in conversation diverts attention from cognitive processes associated with driving. Drivers tend to commit errors that may lead to crashes when their attention is focused away from the driving task. The interference occurs at the level of central attentional processes that are especially susceptible to aging. The current study assessed the effects of a controlled auditory-verbal processing load induced by the Paced Auditory Serial Addition Task (PASAT) on vehicle control by 160 legally licensed older drivers. Of these drivers, 78 were neurologically normal (mean age of 71 years) and 82 (mean age of 75 years) had impairments of selective attention but no diagnosable neurological disease. Measurements aboard the instrumented vehicle Automobile for Research in Ergonomics and Safety showed that performing the PASAT reduced speed and steering control of the older drivers relative to baseline (no-task) driving conditions and was associated with greater counts of at-fault safety errors. Yet, driving performance did not differ significantly between neurologically normal and attention-impaired older drivers between PASAT and no-PASAT (baseline) conditions. It may be that the PASAT, which involves auditory-verbal and working-memory, sustained-attention, and executive-function components, commands different resources than driving on uneventful highways, which might rely on overlearned, automatic cognitive processes. Interference produced by PASAT, like that of cell phone operation, might become more evident during demanding driving conditions, as exist at busy, traffic intersections. Relevant studies in these potentially unsafe circumstances can be conducted in a driving simulator, as in our ongoing research on older drivers.

JOURNAL ARTICLE

Effects of Fexofenadine and Hydroxyzine on brake reaction time during car-driving with cellular phone use.

Tashiro M, Horikawa E, Mochizuki H, Sakurada Y, Kato M, Inokuchi T, Ridout F, Hindmarch I, Yanai K. **Hum Psychopharmacol** 2005; 20(7): 501-9.

Correspondence: unavailable

Affiliation: Department of Pharmacology, Graduate School of Medicine, Tohoku University, Japan.

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Antihistamines are a mainstay treatment for allergic rhinitis; however, many older agents cause adverse events, including sedation and central nervous system (CNS) impairment. Research has shown sedating effects of antihistamines on driving; currently, no known study has examined whether cellular phone usage while driving further compounds impairment in individuals administered antihistamines. The aim of this study was to examine this endpoint. In a randomized, double-blind, placebo-controlled, three-way crossover study, healthy volunteers received fexofenadine HCl 120 mg, hydroxyzine HCl 30 mg and placebo. Brake reaction time (BRT) was used to examine driving performance across four conditions: driving only; driving while completing simple calculations; complex calculations; and conversing on a cellular phone. Subjective sedation assessments were also conducted. Brake reaction time with and without cellular phone usage in fexofenadine-treated subjects did not differ significantly from placebo in any condition. In contrast, hydroxyzine-treated subjects were significantly more sedated and had slower BRTs, suggesting slower hazard recognition and brake application, compared with the fexofenadine and placebo groups in all conditions. Importantly, cellular phone operation was an additive factor, increasing BRTs in hydroxyzine-treated volunteers. Fexofenadine did not impair CNS function in subjects involved in a divided attention task of driving and cellular phone operation.

JOURNAL ARTICLE

Effects of naturalistic cell phone conversations on driving performance.

Rakauskas ME, Gugerty LJ, Ward NJ. **J Safety Res** 2004; 35(4): 453-64.

Correspondence: Michael E. Rakauskas, Department of Mechanical Engineering, University of Minnesota, 111 Church Street SE, Minneapolis, MN 55455, USA; (Email: mickr@me.umn.edu)

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Problem: The prevalence of automobile drivers talking on cell phones is growing, but the effect of that behavior on driving performance is unclear. Also unclear is the relationship between the difficulty level of a phone conversation and the resulting distraction. **Method:** This study used a driving simulator to determine the effect that easy and difficult cell phone conversations have on driving performance. **Results:** Cell phone use caused participants to have higher variation in accelerator pedal position, drive more slowly with more variation in speed, and report a higher level of workload regardless of conversation difficulty level. **Conclusions:** Drivers may cope with the additional stress of phone conversations by enduring higher workloads or setting reduced performance goals. **Impact on Industry:** Because an increasing number of people talk on the phone while driving, crashes caused by distracted drivers using cell phones will cause disruptions in business, as well as injury, disability, and permanent loss of personnel.

JOURNAL ARTICLE

Effects of passenger and cellular phone conversations on driver distraction.

Laberge J, Scialfa C, White C, Caird J. **Transp Res Rec** 2004; (1899): 109-116.

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Affiliation: Univ Minnesota, ITS Inst, Human Program 1, Minneapolis, MN 55455 USA. Univ Calgary, Percept and Cognit Aging Lab, Calgary, AB T2N 1N4, Canada. Univ Calgary, Cognit Ergonom Res Lab, Calgary, AB T2N 1N4, Canada. Univ Calgary, Dept Psychol, Calgary, AB T2N 1

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The distracting effects of a simulated conversation with passengers and those of a conversation over a hands-free cellular phone were compared. The conversation was also analyzed to determine if passengers modulated their conversations as driving demands changed. Eighty participants were randomly assigned to one of three conditions: driving alone, driving with a passenger, and driving with a cellular phone. Drivers drove through residential and urban traffic environments in a fixed-based driving simulator in which a variety of events occurred, such as pedestrian activity, oncoming vehicles, and intersections. The results indicated that lane and speed maintenance were influenced by increased driving demands. Response times to a pedestrian incursion increased when the driver was driving and talking compared with those detected when the driver was not talking at all. Contrary to what some researchers have assumed, there was little practical evidence that passengers adjusted their conversations to changes in the traffic environment. The workload was rated higher when the driver was driving and talking and was also rated higher by drivers than by nondrivers. The discussion focuses on future research and implications for driver safety and training.

REPORT

Effects of practice on interference from an auditory task while driving: a simulation study.

Compton R, Berning A. **National Highway Traffic Safety Administration**. Washington, DC: National Highway Traffic Safety Administration, 2005.

Correspondence: unavailable

(Copyright 2005, National Highway Traffic Safety Administration)

Background: National survey data (2002) for the United States indicates that more than 60 percent of drivers have a cellular phone and 30 percent report that they use their phones while driving. An observational study in 2000 indicated that 3 percent of drivers are using a hand-held cell phone at any given time.

From an information processing perspective, using a phone while driving requires a driver to divert at least

some attention away from the driving task, and the level of distraction involved has not been well understood. Prior to this study, we did not know whether there are 'practice effects' -- that is, whether people improve with practice at attending to the driving task while talking on a cell phone.

Methods: The researchers used a computer based driving simulator. For this study, the simulated roadway was relatively straight two-lane highway with few turns and little traffic. The thirty subjects were all drivers who had previously used cell phones while driving. Subjects were broken down into three age categories (18-22, 30-33, and 60-71 years old) to examine a possible age effect.

To simulate the cognitive demands of a hands-free cellular phone conversation, subjects participated in discussions with an experimenter who was outside the room. All conversations were through a speaker on the simulator's dashboard. Two kinds of conversations were conducted: 1) the drivers were presented with a sequence of single digit numbers and asked to perform a series of simple arithmetical calculations; and 2) emotionally-involving discussions.

As part of the background interview, the subject was asked about school or work, social habits, and interests. Based upon these discussions, questions were developed to generate conversations that would be emotionally challenging for each driver. For example, if the driver was an avid sports fan of a particular team, then a conversation could be about that team's recent loss.

As in a real phone conversation, the experimenter could not see the driver or the driving environment during the conversation; thus the experimenter led the pace of the conversation. Each subject participated in 5 sessions over several days. The sessions consisted of three levels of conversations: no conversation, arithmetical computation conversations, or an emotionally-involving conversation. The sessions also involved three different 'speed conditions' for the driver to follow: 1) driving while maintaining a constant 50 miles per hour; 2) driving while trying to maintain a constant 65 miles per hour; and 3) driving while following a car whose speed varied between 50 and 65 miles per hour. Data were collected on the driver's ability to keep the vehicle in the center of the lane, steering variability, the vehicle's average speed and speed variance with other vehicles, number of 'crashes', and reaction time to a secondary detection task.

Results: In general, performance measures were poorest when drivers were required to maintain a 65 mph speed rather than 50 mph. The math conversation was a significant distraction. The interference from the emotionally-involving conversation was less distracting, and -- depending upon the specific measure of performance -- sometimes not significantly different from the no-distraction performance. The older driver group performed worse than the two groups of younger drivers. The interference from the conversations decreased somewhat with practice.

Conclusion: Driving and conversing can be distracting when both tasks are demanding. However, even then there is evidence of learning to combine the two tasks. The actual amount of learning and its implications for actual driving remain to be determined.

JOURNAL ARTICLE

Effects of practice, age, and task demands, on interference from a phone task while driving.

Shinar D, Tractinsky N, Compton R. *Accid Anal Prev* 2005; 37(2): 315-26.

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Affiliation: Department of Industrial Engineering and Management, Ben Gurion University of the Negev, Beer Sheva 84105, Israel.

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Experimental research on the effects of cellular phone conversations on driving indicates that the phone task interferes with many driving-related functions, especially with older drivers. Unfortunately in past research (1) the dual task conditions were not repeated in order to test for learning, (2) the 'phone tasks' were not representative of real conversations, and (3) most often both the driving and the phone tasks were experimenter-paced. In real driving drivers learn to time-share various tasks, they can pace their driving to accommodate the demands of a phone conversation, and they can even partially pace the phone conversation to accommodate the driving demands. The present study was designed to better simulate real driving conditions by providing a simulated driving environment with repeated experiences of driving while carrying two different hands-free 'phone' tasks with different proximities to real conversations. In the course of five sessions of driving and using the phone, there was a learning effect on most of the driving measures. In addition, the interference from the phone task on many of the driving tasks diminished over time as expected. Finally, the interference effects were greater when the phone task was the often-used artificial math operations task than when it was an emotionally involving conversation, when the driving demands were greater, and when the drivers were older. Thus, the deleterious effects of conversing on the phone are very real initially, but may not be as severe with continued practice at the dual task, especially for drivers who are not old.

JOURNAL ARTICLE

Effects of prolonged wakefulness combined with alcohol and hands-free cell phone divided attention tasks on simulated driving.

Iudice A, Bonanni E, Gelli A, Frittelli C, Iudice G, Cignoni F, Ghicopulos I, Murri L. *Hum Psychopharmacol* 2005; 20(2): 125-32.

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Simulated driving ability was assessed following administration of alcohol, at an estimated blood level of 0.05%, and combined prolonged wakefulness, while participants were undertaking divided attention tasks over a hands-free mobile phone. Divided attention tasks were structured to provide a sustained cognitive workload to the subjects. Twenty three young healthy individuals drove 10 km simulated driving under four conditions in a counterbalanced, within-subject design: alcohol, alcohol and 19 h wakefulness, alcohol and 24 h wakefulness, and while sober. Study measures were: simulated driving, self-reported sleepiness, critical flicker fusion threshold (CFFT), Stroop word-colour interference test (Stroop) and simple visual reaction times (SVRT). As expected, subjective sleepiness was highly correlated with both sleep restriction and alcohol consumption. The combination of alcohol and 24 h sustained wakefulness produced the highest driving impairment, significantly beyond the alcohol effect itself. Concurrent alcohol and 19 h wakefulness significantly affected only driving time-to-collision. No significant changes of study measures occurred following alcohol intake in unrestricted sleep conditions. CFFT, SVRT and Stroop results showed a similar trend in the four study conditions. Thus apparently 'safe' blood alcohol levels in combination with prolonged wakefulness resulted in significant driving impairments. In normal sleep conditions alcohol effects on driving were partially counteracted by the concomitant hands-free phone based psychometric tasks.

JOURNAL ARTICLE

Effects of remote and in-person verbal interactions on verbalization rates and attention to dynamic spatial scenes.

Gugerty L, Rakauskas M, Brooks J. *Accid Anal Prev* 2004; 36(6): 1029-43.

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This study focused on how teams allocated attention between a driving-related spatial task and a verbal task, and how different kinds of verbal interactions affected performance of the driving-related task. In Experiment 1, 29 two-person teams performed an interactive verbal task while one team member also performed a simulated driving task. Of the team members performing only the verbal task, half could see their partner's spatial situation, as a car passenger can (in-person condition), and half were remotely located, similar to someone speaking to a driver using a cell-phone. Teams interacted verbally at an overall slower rate during remote than in-person interactions, suggesting that remote verbal interactions are more difficult than in-person interactions. Verbal interactions degraded situation awareness for driving-related information while performing the spatial task; and this degradation was not greater during remote than in-person interactions. Experiment 2 used a faster-paced verbal task and found greater degradation of situation awareness due to the verbal task. These findings are potentially relevant to the issue of how passenger and cell-phone conversations affect driving performance.

JOURNAL ARTICLE

Effects of Taiwan in-vehicle cellular audio phone system on driving performance.

Liu Yc. *Safety Sci* 2003; 41(6): 531-542.

Correspondence: unavailable

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A low cost, fixed-base driving simulator was used to investigate the impact of a new car cellular audio phone system on driver behavior. Twelve subjects drove a 30-min simulated driving scenario with a low driving load and another twelve subjects drove a 30-min scenario with a high driving load. Participants were instructed to follow traffic and speed rules, and while driving, participants also had to conduct telephone communications of different lengths and complexities as well as perform a detection task. Results showed that in the low driving load environment, and when telephone communications were short, reaction time and accuracy for the detection task and several objective measures of driving performance (i.e. mean lane position, and variances in lane position, lateral acceleration and steering wheel angle) were all relatively good. However, these good performance results were evidently achieved because the short conversations increased the workload and thus the arousal level; when arousal levels were already high (i.e. in the high driving load condition), the short conversations were associated with a degradation in performance measures, presumably because attentional resources of the subjects' become over-stretched and thus the subjects adopt a different attention allocation strategy.

JOURNAL ARTICLE

Effects of voice technology on test track driving performance: implications for driver distraction.

Ranney TA, Harbluk JL, Noy YI. *Hum Factors* 2005; 47(2): 439-54.

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DOI: unavailable [What is this?](#)

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This work compares the degradation in driving performance associated with secondary tasks performed with voice-based and visual/manual interfaces, including radio tuning, phone dialing, and more complex tasks involving a sequence of interactions with an in-vehicle computer system. Twenty-one participants drove an instrumented vehicle while performing a combination of car-following, peripheral target detection, and secondary tasks on a closed test track. Drivers compensated for increased task demands associated with secondary tasks by increasing their following distance. Performing secondary tasks also resulted in significant decrements to vehicle control, target detection, and car-following performance. The voice-based interface

helped reduce the distracting effects of secondary task performance. Modest improvements were observed for measures of vehicle control and target detection but not for car following. The results indicated that performing in-vehicle tasks required diversion of both peripheral (visual and manual) and attentional (cognitive) resources from driving. The voice-based interface reduced the peripheral impairment but did not appreciably reduce the attentional impairment. Actual or potential applications of this research include improvements to the design of invehicle information systems and the development of evaluation protocols to assess their distraction potential.

JOURNAL ARTICLE

Effects of Washington, D.C. law on drivers' hand-held cell phone use.

McCartt AT, Hellinga LA, Geary LL. [Traffic Injury Prev](#) 2006; 7(1): 1-5.

Correspondence: unavailable

Affiliation: Insurance Institute for Highway Safety, Arlington, Virginia, USA.

DOI: [10.1080/15389580500412853](#) [What is this?](#)

(Copyright © 2006, Taylor and Francis Group)

Objective. To assess the effects of Washington, D.C. law prohibiting drivers' use of hand-held cell phones on such use. **Methods.** Daytime observations of drivers were conducted at signalized intersections in D.C. in March 2004, several months before the law took effect on July 1, 2004, and again in October 2004. As a comparison, observations also were conducted in areas of Virginia and Maryland located close to the D.C. border. Maryland and Virginia placed no limitations on drivers' phone use. Use was observed for 36,091 vehicles in D.C., 25,151 vehicles in Maryland, and 28,483 vehicles in Virginia. **Results.** The rate of talking on hand-held cell phones among drivers in D.C. declined significantly from 6.1% before the law to 3.5% after. Phone use declined slightly in Maryland and increased significantly in Virginia so that, relative to the patterns of hand-held phone use in the two states, phone use in D.C. declined 50%. Hand-held phone use in D.C. declined comparably among drivers of vehicles registered in all three jurisdictions. D.C. police issued 2,556 citations and 1,232 warnings for cell phone violations during July-November 2004. There were spates of media coverage when the law was passed and when it took effect. **Conclusions.** D.C.'s law prohibiting drivers' hand-held phone use had a strong effect on such use among drivers in D.C. Without ongoing publicized enforcement of the law, long-term compliance may be difficult to achieve.

JOURNAL ARTICLE

Engrossed in conversation: The impact of cell phones on simulated driving performance.

Beede KE, Kass SJ. [Accid Anal Prev](#) 2005; 38(2): 415-421.

Correspondence: unavailable

Affiliation: University of West Florida, Department of Psychology, 11000 University Parkway, Pensacola, FL 32514, USA.

DOI: [10.1016/j.aap.2005.10.015](#) [What is this?](#)

(Copyright © 2005, Elsevier Publishing)

The current study examined the effects of cognitively distracting tasks on various measures of driving performance. Thirty-six college students with a median of 6 years of driving experience completed a driving history questionnaire and four simulated driving scenarios. The distraction tasks consisted of responding to a signal detection task and engaging in a simulated cell phone conversation. Driving performance was measured in terms of four categories of behavior: traffic violations (e.g., speeding, running stop signs), driving maintenance (e.g., standard deviation of lane position), attention lapses (e.g., stops at green lights, failure to visually scan for intersection traffic), and response time (e.g., time to step on brake in response to a pop-up event). Performance was significantly impacted in all four categories when drivers were concurrently talking on a hands-free phone. Performance on the signal detection task was poor and not significantly impacted by the phone task, suggesting that considerably less attention was paid to detecting these peripheral signals. However, the signal detection task did interact with the phone task on measures of average speed, speed variability, attention lapses, and reaction time. The findings lend further empirical support of the dangers of drivers being distracted by cell phone conversations.

JOURNAL ARTICLE

Extent and variations in mobile phone use among drivers of heavy vehicles in Denmark.

Troglaier T, Hels T, Christens PF. *Accid Anal Prev* 2005; 38(1): 105-111.

Correspondence: unavailable

Affiliation: Danish Transport Research Institute, Department of Safety and Risk, Knuth-Winterfeldts Alle, Building 116 West, DK-2800 Lyngby, Denmark.

DOI: [10.1016/j.aap.2005.07.008](https://doi.org/10.1016/j.aap.2005.07.008) [What is this?](#)

(Copyright © 2005, Elsevier Publishing)

A substantial body of research has shown that use of mobile phones while driving can impair driving performance and increase the risk of being involved in accidents. Similarly, mobile phone use seems to be an increasing activity thus representing a relevant traffic safety issue. This paper investigates the extent and variations in mobile phone use among drivers of heavy vehicles in Denmark. The data was collected through written questionnaires and had a response rate of 58%. It was found that more than 99% of the drivers used mobile phones while driving. Despite a prohibition of hand-held mobile phone use while driving 31% of the drivers reported to do so. Analysis of the variations in usage found a positive significant relationship between driving hours and phone use. A negative linear effect was found between age and phone use. Similarly, a positive significant association was found between the number of stops and the amount of phone use. 0.5% reported that their use of mobile phones had contributed to an accident, while 6% had experienced their mobile phone use causing a dangerous situation. However, 66% reported experiencing dangerous situations because of others road users' mobile phone use. Various implications of the findings are discussed particularly in relation to the drivers with high exposure.

JOURNAL ARTICLE

Factors influencing the use of cellular (mobile) phone during driving and hazards while using it.

Poysti L, Rajalin S, Summala H. *Accid Anal Prev* 2005; 37(1): 47-51.

Correspondence: unavailable

Affiliation: Liikenneturva (Central Organization for Traffic Safety in Finland), P.O. Box 29, 00421 Helsinki, Finland.

DOI: [10.1016/j.aap.2004.06.003](https://doi.org/10.1016/j.aap.2004.06.003) [What is this?](#)

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This study addressed the strategic decisions on not using a mobile phone at all while driving, and phone-related driving hazards among those drivers who do use one, reflecting tactical and operational level processes. A representative sample of 834 licensed drivers who own a mobile phone were interviewed on their phone use and hazards, background factors, and self-image as a driver. Logistic regression models indicated that older age, female gender, smaller amount of driving, and occupation promoted not using a phone at all while driving. Additionally, low skill level and high safety motivation contributed to this decision. Among those who used a phone while driving, exposure to risk in terms of higher mileage and more extensive phone use increased phone-related hazards, as also did young age, leading occupational position, and low safety motivation. Neither gender nor driving skill level had any effect on such self-reported hazards. This study clearly indicates that potential risks of mobile phones are being controlled at many levels, by strategic as well as tactical decisions and, consequently, phone-related accidents have not increased in line with the use of the mobile phones.

JOURNAL ARTICLE

HMI aspects of the usability of Internet services with an in-car terminal on a driving simulator.

Kamp J-F, Marin-Lamellet C, Forzy J-F, Causeur D. *IATSS Res* 2001; 25(2): 29-39.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2001, International Association of Traffic and Safety Sciences)

An experiment on the usability assessment of various control interfaces of an in-vehicle Internet browser, was carried out on the Renault driving simulator with a fictional web site that offers services such as: district map, route planning, electronic messaging, leisure programs, and phone directory. Twenty seven subjects aged from 26 to 69 years carried out this experiment; while performing a car-following task they manipulated an in-car web site by using three control devices: a keyboard, a touchpad, and a voice command. In the quantitative part of the experiment, subjects performed tasks such as writing names, selecting items and moving a cursor on a map, using the keyboard or the touchpad. In the qualitative part, subjects used the in-vehicle web service in a realistic scenario and were allowed to choose the control devices they wanted (voice, touchpad or keyboard). Assessment criteria were speed, distance to the target vehicle, lane position, visual activity, action on the system, operating time, error rate and post trial questionnaire. Based on these criteria, the results showed that browsing while driving seems to remain both complicated and dangerous even when using a simplified browser. However, the results also indicated that, depending on the type of tasks, the different control modes did not have the same efficiency.

JOURNAL ARTICLE

How Long-Haul Motor Carriers Determine Truck Driver Work Schedules: The Role of Shipper Demands.

Braver ER, Preusser CW, Ulmer RG. *J Safety Res* 1999; 30(3): 193-204.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 1999, U.S. National Safety Council, Published by Elsevier)

Tight delivery schedules have been blamed for widespread violations of hours-of-service rules by interstate tractor-trailer drivers. The purpose of the present study was to identify determinants of drivers' schedules, particularly delivery requirements of shippers. Long-haul drivers were surveyed at weigh stations in Wyoming and Tennessee and asked who had arranged their current loads. The arranger, usually a motor-carrier dispatcher, then was interviewed by telephone. Interviews were conducted with 270 of 309 identified dispatchers. Revenue was the most frequently cited factor (75%) in decisions to accept or reject loads from shippers. Delivery deadlines (24%) and the hours-of-service status of the nearest driver (9%) were cited much less. Dispatchers reported that shippers ask for sufficient time for drivers to adhere to both speed limits and hours-of-service rules. Trip mileage is reported as the key determinant of trip schedule assignments (58%); however, other factors also are considered, including speed limits (27%) and past experience with particular routes (13%). About two-thirds of the dispatchers reported using rule-of-thumb average travel speeds. Overall, 14% of dispatchers reported that they expected drivers to travel at an average speed in excess of 60 mph. Tight delivery schedules and hours-of-service violations can occur if rule-of-thumb average speeds above 60 mph are the primary basis for assigned trip times. This survey suggests that tight schedules cannot be attributed solely to shipper demands.

JOURNAL ARTICLE

In-car cell phone use and hazards following hands free legislation.

Rajalin S, Summala H, Poysti L, Anteroinen P, Porter BE. *Traffic Injury Prev* 2005; 6(3): 225-9.

Correspondence: unavailable

Affiliation: Liikenneturva (Central Organization for Traffic Safety in Finland), Helsinki, Finland.

DOI: [10.1080/15389580590969166](#) [What is this?](#)

(Copyright © 2005, Taylor and Francis Group)

Objective. A new law took effect in Finland at the beginning of 2003 which prohibits the handheld use of mobile phones while driving a motor vehicle. The purpose of this study was to assess the impact of the law on phone usage and self-reported safety during the first few months and 16 months later to determine whether the initial level of compliance with the law had been sustained. Methods. Data were collected by Gallup home poll before (spring 2002) and after legislation took effect (spring 2003 and 2004). A representative sample of

drivers who owned a cell phone (n = 836 to 966) was interviewed each time. On-road observations were also collected in four cities for 2003 and 2004. Results. Just after the law, 97% of drivers were aware of the new hands free legislation. In sharp contrast to the pre-law rate of 16%, 43% reported not using the phone while driving immediately after the law and 41% one year later. The occasional users especially reduced their use of phones while driving. The law was correlated to reductions in self-reported handheld use of cell phones while driving, from 55.6% pre-law to 15.2% immediately after passage. In spite of this change, however, the hands free legislation did not reduce self-reported involvement of Finnish drivers in phone-related hazards. Handheld usage was still lower in 2004 than pre-law (20,0%), but the 32% increase from 2003 was significant. Observational data collected in Finland in 2003 and 2004 showed an even higher upward trend in handheld use (87% increase, from 3.1% to 5.8%; pre-law data were not available), and matched a similar increase reported by McCartt and Geary (2004) in their observational evaluation of New York's handheld mobile phone law. Conclusion. The self-reports indicate that the hands-free law reduced handheld phone use, among occasional users especially, but did not reduce phone-related hazards. The effect of the law on phone use substantially declined within one year.

JOURNAL ARTICLE

In-vehicle distraction and fatal accidents in England and Wales.

Stevens A, Minton R. *Accid Anal Prev* 2001; 33(4): 539-45.

Correspondence: unavailable

Affiliation: Transport Research Laboratory, Crowthorne, Berkshire, UK. astevens@trl.co.uk

DOI: unavailable [What is this?](#)

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The paper describes the coding and analysis of a database of police fatal accident reports to investigate the extent to which in-vehicle distraction is a contributory factor in vehicle crashes. A particular focus has been the involvement of mobile telephones and entertainment systems. Analysis of accidents occurring over the period 1985-1995 shows that in-vehicle distraction is reported as a contributory factor in about 2% of fatal accidents (although this figure may be a conservative estimate). Specific examples of distraction attributed to entertainment systems and telephones have been identified. Electronic driver information systems are also of particular interest, but have not featured in the available data. Work is progressing, on an annual cycle, to obtain, code and analyse further data and this is expected to provide an invaluable source of information for accident researchers.

JOURNAL ARTICLE

In-vehicle workload assessment: Effects of traffic situations and cellular telephone use.

Liu BS, Lee YH. *J Safety Res* 2006; 37(1): 99-105.

Correspondence: unavailable

Affiliation: Department of Industrial Engineering and Management, St. John's University, No. 499, Sec. 4, Tam King Road, Tamsui, Taipei 25135, Taiwan.

DOI: [10.1016/j.jsr.2005.10.021](https://doi.org/10.1016/j.jsr.2005.10.021) [What is this?](#)

(Copyright © 2006, U.S. National Safety Council, Published by Elsevier)

Problem: Assessment of drivers' on-road workload is an important traffic safety consideration. This study was conducted to examine the effects of cellular phone communication on driving performance, with particular emphasis on variations in task demand in different traffic situations. Method: Twelve participants were asked to drive on urban roads and motorways with or without concomitant mathematical-addition tests relayed via cellular phone. Measurements included task and driving performance, physiological responses, and compensatory behavior. Results: Analysis of task performance revealed that mean response time was markedly increased (11.9%) for driving on urban roads compared to motorways. The mean driving speed only decreased 5.8% in the presence of phone tasks in comparison to normal driving without distractions. In addition, overall physiological workload increased through compensatory behavior in response to the phone tasks. Conclusions: Driving with phone use in different traffic environments induced measurable variations in driver workload. Impact on Industry: When faced with heavy traffic, a greater safety margin is typically adopted, with more lowered driving speed and restricted phone use, and it can be assumed that there is a

general trade-off between tasks to preserve driving safety.

JOURNAL ARTICLE

Influence of mobile phone use while driving: the experience in Taiwan.

Woo TH, Lin J. *IATSS Res* 2001; 25(2): 15-19.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2001, International Association of Traffic and Safety Sciences)

Many recent investigations and reports revealed that mobile phone use while driving may seriously affect traffic safety. The increase rate of mobile phone ownership in Taiwan was the first among Asian countries for year 2000, with about 4 sets per 5 persons. A study was initiated by the Ministry of Transportation and Communications to examine and investigate the influence of mobile phone use while driving in order to determine the legislation needs. Data were collected in four areas: driving reaction test using a simulator, accident reports, questionnaires to drivers involving an accident, and a general public opinion survey. It was found from the driving simulator test that the reaction time for drivers using mobile phones is significantly longer. Age and gender were also found to affect the reaction time. For a four-month period in three selected cities, 3,075 accident reports were examined to reveal that either involved driver carried a mobile phone in 676 cases, and either involved driver was using it in 133 cases. Unsurprisingly, drivers who do not own mobile phones are more inclined to support the ban of using mobile phones while driving. Although the majority of the general public is aware of the adverse effects of using a mobile phone while driving, only 44.2 percent of the responders support a legislative ban. Based on the conclusions of this study, the Legislative Yuan of Taiwan passed a law to ban the use of handheld mobile phones while driving in January 2, 2001. For a compulsory three-month campaign, the regulation will be in force from September 1, with a violation fine of NT\$3,000 (approximate to US\$90) for drivers and NT\$1,000 for motorcyclists.

JOURNAL ARTICLE

Information processing in an urban fire department communication system.

Siegel J, Weitzman DO. *Appl Ergonomics* 1975; 6(3): 132-8.

Correspondence: unavailable

Affiliation: The City College, City University of New York, USA.

DOI: unavailable [What is this?](#)

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One of the most important functions of any fire department is to provide selective contact with fire fighting units and to dispatch these units based on information gathered from street alarm boxes and telephones. This paper is concerned with the problem of dispatching tactical response information to remote fire fighting units and with the effect of workload on the dispatch function.

Language: Eng

JOURNAL ARTICLE

Lifesavers and Samaritans: emergency use of cellular (mobile) phones in Australia.

Chapman S, Schofield WN. *Accid Anal Prev* 1998; 30(6): 815-9.

Correspondence: unavailable

Affiliation: Department of Public Health and Community Medicine, University of Sydney, NSW, Australia.

DOI: unavailable [What is this?](#)

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BACKGROUND: There has been highly publicised concern about possible radiation health effects from mobile phones and towers, but scant attention has been paid to the use of mobile phones in reducing notification times in emergencies. **METHOD:** National random telephone survey of Australian mobile phone users (n = 720) and extrapolation to national user population (n = 5.1 million). **FINDINGS:** Using a cellular phone, 1 in 8 users have reported a traffic accident; 1 in 4 a dangerous situation; 1 in 16 a non-road medical emergency; 1 in 20 a crime; and 1 in 45 being lost in the bush or being in difficulty at sea. **INTERPRETATION:** Any debate about the net health impact of mobile phone proliferation must balance possible negative effects (cancer, driving incidents) with the benefits from what appears to be their widespread use in rapidly reporting emergencies and in numerous acts of often health-relevant 'cellular Samaritanism'.

JOURNAL ARTICLE

Living dangerously: driver distraction at high speed.

Johnson MB, Voas RB, Lacey JH, McKnight AS, Lange JE. *Traffic Injury Prev* 2004; 5(1): 1-7.

Correspondence: unavailable

Affiliation: Pacific Institute for Research and Evaluation, Calverton, Maryland 20705-3102, USA. mjohanson@pire.org

DOI: unavailable [What is this?](#)

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Recent research indicates that cell phone use can distract drivers from safe vehicle operation. However, estimates of the prevalence of cell phone use while driving have been limited to daytime hours and low-speed roadways. This paper describes the results of a study to estimate rates of cell phone use and other distractions by examining approximately 40,000 high-quality digital photographs of vehicles and drivers on the New Jersey Turnpike. The photographs, which originally were collected as part of a separate study, were taken both during the day and during the night and at different locations across the span of the Turnpike. A radar gun linked to the camera recorded the speeds of vehicles as they passed. This provided us with the speeds of every vehicle photographed, and allowed us to determine population counts of vehicles. A panel of three trained coders examined each photograph and recorded the presence of cell phone use by the drivers or any other distracting behavior. Demographic information on the driver was obtained during previous examinations of the photographs for an unrelated study. A rating was considered reliable when two out of the three coders agreed. Population estimates (and confidence intervals) of cell phone use and other distractions were estimated by weighting the cases by the inverse probability of vehicle selection. Logistic regression was used to predict cell phone use from demographic and situational factors. The results indicated that the most frequent distraction was cell phone use: 1.5% of the drivers on the Turnpike were using cell phones compared to the 3 to 4% use rates reported in the National Occupant Protection Use Survey (NOPUS) surveys conducted during the daytime on lower speed roadways. The Turnpike survey indicated that cell phones were used less on weekends and at night, and when the driver was exceeding the speed limit or had a passenger in the car.

JOURNAL ARTICLE

Mobile (cellular) phone use and driving: a critical review of research methodology.

Haigney D, Westerman SJ. *Ergonomics* 2001; 44(2): 132-43.

Correspondence: unavailable

Affiliation: Psychology Department, University College Worcester, UK. d.haigney@worc.ac.uk

DOI: unavailable [What is this?](#)

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Studies have examined possible effects of concurrent mobile phone use on driving performance. Although interference is often apparent, determining the implications of such findings for 'real world' driving is problematic. This paper considers some relevant methodological issues including the definition of procedures and terms, operationalization of task elements, sampling of task components, and the provision of experimental controls. Suggestions are made about how methodological rigor could be improved.

Language: Eng

JOURNAL ARTICLE

Mobile phone use -- effects of conversation on mental workload and driving speed in rural and urban environments.

Tornros J, Bolling A. **Transp Res F Traffic Psychol Behav** 2006; 9(4): 298-306.

Correspondence: unavailable

Affiliation: Swedish Road and Transport Research Institute (VTI), Olaus Magnus vag 35, S-581 95 Linköping, Sweden (jan.tornros@vti.se)

DOI: [10.1016/j.trf.2006.01.008](https://doi.org/10.1016/j.trf.2006.01.008) [What is this?](#)

(Copyright © 2006, Elsevier Publishing)

The study was concerned with the effects of mobile phone conversation on simulated driving in different traffic environments. Forty-eight participants drove a distance of 70 km on a route which led through different environments. The environments were: rural environment with a speed limit of 90 km/h, rural environment with a speed limit of 70 km/h, urban environment of low complexity, urban environment of medium complexity and urban environment of high complexity. The experimental design was mixed with phone mode (handsfree/handheld) as a between-subjects factor and phone use (yes/no) and traffic environment as within-subjects factors. Performance on a peripheral detection task (PDT) - a measure of mental workload - presented while driving, was impaired by mobile phone conversation in all environments. PDT performance was, however, remarkably poor at the complex urban environment, even when the participants were not using the phone. Driving speed was reduced by conversation in all environments for handheld mode, but only in two environments for handsfree mode - the rural environment with a speed limit of 90 km/h and the complex urban environment. The effects on speed could be interpreted as a compensatory effort for the increased mental workload.

JOURNAL ARTICLE

Mobile phone use amongst New Zealand drivers.

Sullman MJM, Baas PH. **Transp Res F Traffic Psychol Behav** 2004; 7(2): 95-105.

Correspondence: unavailable

Affiliation: Department of Human Resource Management, Massey University, Palmerston North, New Zealand; Transport Engineering Research New Zealand (TERNZ), New Zealand

DOI: [10.1016/j.trf.2004.03.001](https://doi.org/10.1016/j.trf.2004.03.001) [What is this?](#)

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Research has shown that using a mobile phone whilst driving may increase the risk of being crash involved by as much as nine times. As around 65% of New Zealand's population own mobile phones, this represents a potentially very significant hazard. In order to effectively target interventions towards those drivers who use mobile phones while driving, information is needed about the characteristics of these drivers. The present study investigated the frequency of mobile phone use on New Zealand's roads and the characteristics of drivers who use mobile phones while driving. The research found that more than half (57.3%) of the participants used a mobile phone at least occasionally while driving. Those who reported using a mobile phone more often whilst driving tended to; be male, reside in a main urban area, report a higher annual mileage, drive a later model car with a larger engine, prefer a higher driving speed, have less driving experience (in years) and to be younger. In line with previous research, there was also a significant relationship between crash involvement and use of a mobile phone whilst driving. However, once the contributions of the demographic and descriptive variables had been partialled out, using hierarchical logistic regression, the relationship between crash involvement and mobile phone use was no longer significant.

JOURNAL ARTICLE

Mobile phone use while driving in a sample of Spanish university workers.

Gras ME, Cunill M, Sullman MJ, Planes M, Aymerich M, Font-Mayolas S. *Accid Anal Prev* 2006; ePub(ePub): ePub.

Correspondence: unavailable

Affiliation: Quality of Life Research Institute, Department of Psychology, University of Girona, Emili Grahit, 77 17071 Girona, Spain.

DOI: [10.1016/j.aap.2006.08.006](https://doi.org/10.1016/j.aap.2006.08.006) [What is this?](#)

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[ePub (volume, issue, and page range not yet available)]

A number of epidemiological studies have reported drivers who use a mobile phone while driving have an elevated risk of being involved in a crash. This is particularly concerning as a survey of drivers in the Spanish region of Catalunya found that approximately 87% own mobile phones. The present study investigated the reported frequency of mobile phone use on Spanish roads (for talking and using SMS), the characteristics of the drivers who use mobile phones while driving and whether they altered their driving behaviour when using a mobile phone. The research found that more than 60% use a mobile phone while driving and that the phone is mostly used for making calls, rather than using SMS. In general, males and females use mobile phones about the same reported frequency, although males were more likely to use a mobile phone to talk on the highway. The pattern for age was the same for both male and female participants, with the younger drivers using SMS more frequently than older drivers. On urban roads almost half of the drivers reported changing their driving behaviour when using a mobile phone, while on the highway this figure was slightly over 41%. The reported frequency of using a mobile phone to talk on urban roads was significantly correlated with crash involvement. However, this affect disappeared once the contributions of the demographic and descriptive variables had been partialled out.

Language: Eng

JOURNAL ARTICLE

Mobile phone use while driving in Florence health district area.

Lorini C, Bonaccorsi G, Mersi A, Baroncini O, Ciampi G, Boddì V, Santini MG, Comodo N. *Ann Ig* 2006; 18(4): 349-56.

Correspondence: unavailable

Affiliation: Dipartimento di Sanita Pubblica, Universita degli Studi di Firenze. (chiara.lorini@unifi.it)

DOI: unavailable [What is this?](#)

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The practice of driving while using hand-held mobile phones is diffused in numerous countries, even though it has been demonstrated that they increase the risk of traffic accidents, and such use has consequently been prohibited. Because of the lack of Italian data on the spread of this behaviour a study was done in June 2004 on drivers' use of hand-held mobile phones in the Florence Health Authority area. The study was performed by direct observation from 4 watching-points (1 for each zone) which allowed for observation of several types of vehicles, on varying road conditions, in 5 hour time bands. Overall, 9387 vehicles were observed and the prevalence of mobile phone use while driving was found to be 1.8%. The greatest prevalence of mobile phone use was found in the following conditions: in the Northwest zone (2.8%), in the city suburbs (2.8%), on Tuesdays (3.0%), among drivers not using safety belts (3.0%), and among subjects driving alone (2.1%). Logistic regression analysis has shown a statistically significant association between mobile phone use and the zone, the number of persons in the vehicle, and seat belt use. Mobile phone use while driving is therefore a diffused practice that is particularly common among drivers who engage in other high-risk driving behaviours.

Language: Ita

JOURNAL ARTICLE

Mobile phone use-effects of handheld and handsfree phones on driving performance.

Tornros JE, Bolling AK. **Accid Anal Prev** 2005; 37(5): 902-9.

Correspondence: unavailable

Affiliation: VT1, Olaus Magnus väg 35, S-58195 Linköping, Sweden. jan.tornros@vti.se

DOI: [10.1016/j.aap.2005.04.007](https://doi.org/10.1016/j.aap.2005.04.007) [What is this?](#)

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The study was concerned with effects of handsfree and handheld mobile phone dialling and conversation in simulated driving. In the main experiment dealing with conversation, 48 participants drove a distance of about 70 km on a route which led through urban and rural environments. In the dialling experiment, the participants drove a distance of 15 km on a rural two-lane road. The experimental design was mixed with phone mode as a between-subjects factor and phone use (yes/no) as a within-subjects factor. Performance on a peripheral detection task (PDT) while driving was impaired by dialling and conversation for both phone modes, interpreted as an increase in mental workload. Driving performance was impaired by dialling--lateral position deviation increased in a similar way for both phone modes. Conversation had, however, opposite effects--lateral position deviation decreased in a similar way for both phone modes. Driving speed decreased as an effect of dialling with the greatest effect for handsfree phone mode. Conversation also caused reduced speed, but only for handheld phone mode. The effects on speed can be interpreted as a compensatory effort for the increased mental workload. In spite of the compensatory behaviour, mental workload was still markedly increased by phone use. Subjective effects of dialling and conversation were also analysed. Most participants reported a speed decrease but no effect on lateral position deviation as an effect of dialling or conversation. In the conversation experiment, driving performance was rated better for handsfree than for handheld mode. In the dialling experiment, no difference between the two phone modes appeared.

JOURNAL ARTICLE

Mobile phones and automobile driving.

Lings S. **Ugeskr Laeger** 2006; 168(23): 2266.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

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[Abstract unavailable]

Language: Dan

JOURNAL ARTICLE

Mobile phones and driving.

Johal S, Napier F, Britt-Compton J, Marshall T. **J Public Health** 2005; 27(1): 112-3.

Correspondence: unavailable

Affiliation: Department of Public Health and Epidemiology, University of Birmingham, Birmingham B15 2TT, UK.

DOI: [10.1093/pubmed/fdh213](https://doi.org/10.1093/pubmed/fdh213) [What is this?](#)

(Copyright © 2005, Oxford University Press)

Prior to the introduction of legislation in the United Kingdom, observational road-side studies showed that approximately 2 per cent of drivers use a mobile phone while driving. We studied the change in the usage rate of hand-held mobile phones from 10 weeks before to 10 weeks after the legislation came into force in December 2003. Across three different sites during the evening rush-hour, the usage rate changed from 1.85 to 0.97 per cent, a reduction of almost half. This change is attributed to the legislation. The effect of the

legislation on accident and injury rates is unknown.

JOURNAL ARTICLE

Mobile phones and driving.

Johal S, Napier F, Britt-Compton J, Marshall T. *J Public Health* 2005; ePub.

Correspondence: unavailable

Affiliation: Department of Public Health and Epidemiology, University of Birmingham, Birmingham B15 2TT, UK.

DOI: [10.1093/pubmed/fdh213](https://doi.org/10.1093/pubmed/fdh213) [What is this?](#)

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Prior to the introduction of legislation in the United Kingdom, observational road-side studies showed that approximately 2 per cent of drivers use a mobile phone while driving. We studied the change in the usage rate of hand-held mobile phones from 10 weeks before to 10 weeks after the legislation came into force in December 2003. Across three different sites during the evening rush-hour, the usage rate changed from 1.85 to 0.97 per cent, a reduction of almost half. This change is attributed to the legislation. The effect of the legislation on accident and injury rates is unknown.

JOURNAL ARTICLE

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

Chalker GJ, Joyner KH, Parkinson KS. *Med J Aust* 2004; 180(1): 44; author reply 44-5.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2004, Australasian Medical Publishing)

Letter. Abstract unavailable.

JOURNAL ARTICLE

Motorists' use of hand held cell phones in New Zealand: An observational study.

Townsend M. *Accid Anal Prev* 2006; 38(4): 748-750.

Correspondence: unavailable

Affiliation: Faculty of Education, University of Auckland, 74 Epsom Avenue, Auckland, New Zealand.

DOI: [10.1016/j.aap.2006.01.007](https://doi.org/10.1016/j.aap.2006.01.007) [What is this?](#)

(Copyright © 2006, Elsevier Publishing)

Unlike many similar countries, New Zealand has no specific legislation restricting the use of cell phones in vehicles. Several factors suggest that legislation may be introduced in the near future. This study provided a benchmark for current cell phone use among motorists. A total of 8700 drivers of cars were observed for cell phone use as they passed a fixed location in Auckland. Cell phone use was double that of an Australian city, where cell phones are banned. Use of a cell phone while driving was similarly likely in male and female drivers.

JOURNAL ARTICLE

Perceptions of driver distraction by cellular phone users and nonusers.

Wogalter MS, Mayhorn CB. *Hum Factors* 2005; 47(2): 455-67.

Correspondence: unavailable

Affiliation: Psychology Department, North Carolina State University, 640 Poe Hall, CB 7801, Raleigh, NC 27695-7801, USA. wogalterm@aol.com

DOI: unavailable [What is this?](#)

(Copyright © 2005, Human Factors and Ergonomics Society)

The present study examined the perceptions of cellular phone users and nonusers on issues relating to vehicle control and driver distraction. Participants were asked if they own a cellular phone; if so, how much they use it; and their beliefs regarding cellular phone use while driving, including actions involving the use of cellular phones which could potentially cause vehicular accidents and the need for laws. A total of 330 individuals participated; 72% owned a cellular phone. The results indicate that nonusers of cellular phones believed more strongly than users that cellular phone use while driving negatively affects driving performance and that talking on the cellular phone could potentially cause an accident, and they also had a greater preference for new laws limiting such acts. Cellular phone users, more than nonusers, preferred no laws limiting cellular phone use and believed more strongly that other people driving while using a cellular phone were more dangerous than themselves doing the same. Implications of these results are discussed. Actual or potential applications of this research include interventions that limit driver distractibility.

JOURNAL ARTICLE

Perceptual factors underlying user preferences toward product form of mobile phones.

Chuang MC, Chang CC, Hsu SH. *Int J Ind Ergonomics* 2001; 27(4): 247-258.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2001, Elsevier Publishing)

This study examined the relationship between user preference perception of mobile phones and their form design elements. Subjects were asked to judge 26 mobile phone designs by using a user preference rating scale for 11 image words. The determining factors for user preference, including image words for design trends and product design elements, were specified through the semantic differential method. It was found that users prefer mobile phone designs with soft and compact images. Design reference models composed of relative weights of design elements were then proposed for specific design trends. In accordance with the design reference model, optimal solutions for preference and design trends of "soft" and "compact" were obtained through a specific algorithm. Concrete examples were illustrated and verified. The user's preference database can serve as the styling benchmark to help designers adopt a proper design and development perspective for the intended end users. Relevance to industry Important design elements and design trends related to the user's preference for mobile phones were extracted from the study. The optimal design solutions obtained from the database can serve as the styling benchmark for designers and managers in making design strategy, by which the time and cost of product development can be reduced.

JOURNAL ARTICLE

Prevalence of mobile phone use while driving vehicles

Astrain I, Bernaus J, Claverol J, Escobar A, Godoy P. *Gac Sanit* 2003; 17(1): 66-9.

Correspondence: unavailable

Affiliation: Universitat de Lleida (UdL). Lleida. Espana.

DOI: unavailable [What is this?](#)

(Copyright © 2003, SESPAS - Editorial Doyma)

OBJECTIVE: To estimate the prevalence of mobile telephone use while driving vehicles in the city of Lleida (Spain). **METHODS:** A random sample of 1536 cars passing through six intersections regulated by traffic lights in Lleida were selected (three with urban traffic and three with interurban traffic). Cyclists, motorcyclists and driving school cars were excluded. The variables studied were mobile telephone use, age, (18-40; 41-60; >61), sex, the presence of passengers, type of intersection (urban traffic/interurban traffic), day of the week (working day/weekend or holiday) and hour of the day (rush hour/non-rush hour). The prevalence of mobile telephone use was calculated in percentages with a 95% CI. The relationship among the dependent variable (mobile telephone use) and the other independent variables was studied using odds ratios (OR) and 95% CI. **RESULTS:** A total of 1536 direct observations were made and mobile telephone use

was detected in 50 drivers. The prevalence was 3.3 (95% CI, 2.4-4.3). The prevalence was higher in men (OR = 2.2; 95% CI, 1.0-5.7), in drivers aged more than 60 years old (OR = 2.2; 95% CI, 0.5-8.4) and in those aged 18-40 years old (OR = 1.5; 95% CI, 0.8-3.0), in unaccompanied drivers (OR = 3.0; 95% CI, 1.5-6.3), in urban intersections (OR = 2.7; 95% CI, 1.2-5.9), on workdays (OR = 2.0; 95% CI, 0.9-4.4) and at the rush hour (OR = 1.4; 95% CI, 0.8-2.4). CONCLUSIONS: The prevalence of mobile telephone use while driving vehicles can be considered high, because of the increase in car accidents. The profile of drivers using mobile telephones corresponds to men aged 18-40 years or more than 61 years, in urban intersections, without passengers, during workdays and at the rush hour. We recommend the implementation of measures to decrease the use of mobile telephones while driving.

Language: Spa

JOURNAL ARTICLE

Preventing traffic accidents by mobile phone users.

Regan M. *Med J Aust* 2006; 185(11-12): 628-9.

Correspondence: unavailable

Affiliation: Monash University Accident Research Centre, Monash University, Melbourne, VIC, Australia. michael.reganATmuarc.monash.edu.au

DOI: unavailable [What is this?](#)

(Copyright © 2006, Australasian Medical Publishing)

[Abstract unavailable]

Language: Eng

JOURNAL ARTICLE

Profiles in driver distraction: effects of cell phone conversations on younger and older drivers.

Strayer DL, Drews FA. *Hum Factors* 2004; 46(4): 640-9.

Correspondence: unavailable

Affiliation: Department of Psychology, University of Utah, Salt Lake City, Utah 84112-0251, USA. david.strayer@utah.edu

DOI: unavailable [What is this?](#)

(Copyright © 2004, Human Factors and Ergonomics Society)

Our research examined the effects of hands-free cell phone conversations on simulated driving. We found that driving performance of both younger and older adults was influenced by cell phone conversations. Compared with single-task (i.e., driving-only) conditions, when drivers used cell phones their reactions were 18% slower, their following distance was 12% greater, and they took 17% longer to recover the speed that was lost following braking. There was also a twofold increase in the number of rear-end collisions when drivers were conversing on a cell phone. These cell-phone-induced effects were equivalent for younger and older adults, suggesting that older adults do not suffer a significantly greater penalty for talking on a cell phone while driving than compared with their younger counterparts. Interestingly, the net effect of having younger drivers converse on a cell phone was to make their average reactions equivalent to those of older drivers who were not using a cell phone. Actual or potential applications of this research include providing guidance for recommendations and regulations concerning the use of mobile technology while driving.

Language: Eng

JOURNAL ARTICLE

Profiles in driver distraction: effects of cell phone conversations on younger and older drivers.

Strayer DL, Drews FA. **Hum Factors** 2004; 46(4): 640-649.

Correspondence: unavailable

Affiliation: University of Utah, Salt Lake City, Utah

DOI: [10.1518/hfes.46.4.640.56806](https://doi.org/10.1518/hfes.46.4.640.56806) [What is this?](#)

(Copyright © 2004, Human Factors and Ergonomics Society)

Our research examined the effects of hands-free cell phone conversations on simulated driving. We found that driving performance of both younger and older adults was influenced by cell phone conversations. Compared with single-task (i.e., driving-only) conditions, when drivers used cell phones their reactions were 18% slower, their following distance was 12% greater, and they took 17% longer to recover the speed that was lost following braking. There was also a twofold increase in the number of rear-end collisions when drivers were conversing on a cell phone. These cell-phone-induced effects were equivalent for younger and older adults, suggesting that older adults do not suffer a significantly greater penalty for talking on a cell phone while driving than compared with their younger counterparts. Interestingly, the net effect of having younger drivers converse on a cell phone was to make their average reactions equivalent to those of older drivers who were not using a cell phone. Actual or potential applications of this research include providing guidance for recommendations and regulations concerning the use of mobile technology while driving.

JOURNAL ARTICLE

Psychological predictors of problem mobile phone use.

Bianchi A, Phillips JG. **Cyberpsychol Behav** 2005; 8(1): 39-51.

Correspondence: unavailable

Affiliation: Psychology Department, Monash University, Australia.

DOI: [10.1089/cpb.2005.8.39](https://doi.org/10.1089/cpb.2005.8.39) [What is this?](#)

(Copyright © 2005, Mary Ann Liebert Publishers)

Mobile phone use is banned or illegal under certain circumstances and in some jurisdictions. Nevertheless, some people still use their mobile phones despite recognized safety concerns, legislation, and informal bans. Drawing potential predictors from the addiction literature, this study sought to predict usage and, specifically, problematic mobile phone use from extraversion, self-esteem, neuroticism, gender, and age. To measure problem use, the Mobile Phone Problem Use Scale was devised and validated as a reliable self-report instrument, against the Addiction Potential Scale and overall mobile phone usage levels. Problem use was a function of age, extraversion, and low self-esteem, but not neuroticism. As extraverts are more likely to take risks, and young drivers feature prominently in automobile accidents, this study supports community concerns about mobile phone use, and identifies groups that should be targeted in any intervention campaigns.

JOURNAL ARTICLE

Reducing drivers' mental workload by means of an adaptive man-machine interface.

Piechulla W, Mayser C, Gehrke H, König W. **Transp Res F Traffic Psychol Behav** 2003; 6(4): 233-248.

Correspondence: unavailable

DOI: [10.1016/j.trf.2003.08.001](https://doi.org/10.1016/j.trf.2003.08.001) [What is this?](#)

(Copyright © 2003, Elsevier Publishing)

Modern in-vehicle information and communication devices are changing the nature of the driving task. Drivers take it for granted that they are able to divide their attention between the primary task of driving and secondary tasks like monitoring information displays or using mobile phones. While it is commonly accepted that driver information overload can compromise traffic safety, attempts to introduce attention management within the vehicle are nowadays limited to restrictive decisions by legislative bodies. In an increasing number of countries, the use of hands-free phones is enforced by law. In some countries, the use of phones while driving is prohibited altogether. We argue that there is a more intelligent solution to the information overload issue, namely an adaptive man-machine interface that filters information presentation according to situational

requirements. We implemented such a filter as a projective real-time computational workload estimator which is based on the assessment of traffic situations detected from an on-board geographical database. Workload estimates are refined by data from sensors that monitor the traffic environment and variables of driving dynamics. The prototype system is operational in a demonstrator vehicle. Whenever the workload estimate exceeds a threshold value, incoming telephone calls are automatically redirected to the telephone mailbox without notifying the driver. An evaluation field experiment that employed objective and subjective methods of assessing workload yielded promising results in terms of the possibilities of reducing workload by means of the adaptive interface. The results are in favour of the idea of a futuristic, situation-aware vehicle which has the potential to enhance comfort and safety while driving.

JOURNAL ARTICLE

Reply to Comments by Hancock and Scallen, Moray, and Smiley on "Using Cellular Telephones in Vehicles: Safe or Unsafe?".

Tijerina L, Goodman MJ, Wierwille WW, Bents FD. *Transp Hum Fact* 1999; 1(1): 61-65.

Correspondence: unavailable

DOI: [10.1207/sthf0101_6](https://doi.org/10.1207/sthf0101_6) [What is this?](#)

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[Abstract unavailable]

JOURNAL ARTICLE

Risks linked to mobile phone use and how they are portrayed in the media: examples from three daily newspapers.

Martha C, Coulorr M, Souville M, Griffet J. *Sante Publique* 2006; 18(2): 275-88.

Correspondence: unavailable

Affiliation: UPRES EA 3294 Sport, Loisir, Santé, Faculté des Sciences du Sport, Université de la Méditerranée, 163 avenue de Luminy CP 910, 13288 Marseille, France. cecile.martha@staps.univ-mrs.fr

DOI: unavailable [What is this?](#)

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This study analyses how three French daily newspapers (Liberation, Le Monde, Le Figaro) convey information on the risks associated with mobile phone use in the period from 1995 to 2002. Quantitatively, the physical risks inherent to the low-intensity, electro-magnetic waves are most frequently reported, followed by those linked to mobile phone use while driving. "Social" risks, such as those related to noise or uncivil behaviour, are amongst the most rarely communicated. In general, the media present two types of physical risks connected to mobile phone use: the collective ones, which cover the low-intensity electro-magnetic waves which are emitted from the antennas on signal base stations, and the individual ones, which concern the waves produced by the mobile phone itself, and the danger associated with its use by a driver while operating a motor vehicle. Controversy surrounding the current scientific studies and the uncontrollable character of the risks linked to the low-intensity, electro-magnetic waves instill much more fear and debate than around those related to the combination of driving while talking on the telephone. While this latter point is scientifically proven, it is also subjectively under control.

Language: Fre

JOURNAL ARTICLE

Risky behaviors among motorcycling adolescents in Italy.

Pileggi C, Bianco A, Nobile CG, Angelillo IF. *J Pediatr* 2006; 148(4): 527-532.

Correspondence: unavailable

Affiliation: Chair of Hygiene, Medical School, University of Catanzaro Magna Græcia, Catanzaro, Italy.

DOI: [10.1016/j.jpeds.2005.11.017](https://doi.org/10.1016/j.jpeds.2005.11.017) [What is this?](#)

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OBJECTIVE: To investigate the relationship between risky behaviors and motorcycling in adolescents in Italy. **STUDY DESIGN:** A questionnaire was administered to a random sample of 1000 adolescents attending randomly selected public secondary schools to assess personal characteristics and lifestyle; motorcycle and helmet use; behavior while driving a motorcycle; traffic-related accidents, and receipt of tickets. **RESULTS:** Of the 894 responders, 54% and 29.2% routinely use the helmet as driver or passenger, respectively. Routine helmet use was higher among males, current smokers, alcohol drinkers, and those who reported that at least one close friend used a helmet. Motorcycling after consuming alcohol was higher in males, in current smokers, and in those who used cell phones and were tired while driving. An accident in the past year occurred in 25.7% of riders and was significantly higher in those who used cell phones while driving and in those who were interested in learning about motorcycle use. Adolescents who reported always motorcycling over the speed limit were at lower risk of smoking, talking with the passenger, and using a cell phone while driving. Being male, being older, learning about motorcycle use from someone outside the family, talking with a passenger, and using a cell phone while driving increased the risk of receiving a ticket. **CONCLUSIONS:** Educational programs, legislative measures, and policies to reduce risk behaviors in adolescents who use motorcycles are needed.

Language: Eng

JOURNAL ARTICLE

Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study.

McEvoy SP, Stevenson MR, McCartt AT, Woodward M, Haworth C, Palamara P, Cercarelli R. *Br Med J* 2005; 331(7514): 428.

Correspondence: Susan P McEvoy, The George Institute for International Health, University of Sydney, PO Box M201, Sydney, NSW 2050, Australia.; (Email: smcevoy@thegeorgeinstitute.org)

Affiliation: George Institute for International Health, Univ. of Sydney, Australia; Insurance Inst. for Highway Safety, Arlington, VA, USA; Injury Research Centre, University of Western Australia, Crawley, WA

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(Copyright © 2005, BMJ Publishing Group)

OBJECTIVES: To explore the effect of drivers' use of mobile (cell) phones on road safety. **DESIGN:** A case-crossover study. **SETTING:** Perth, Western Australia. **PARTICIPANTS:** 456 drivers aged ≥ 17 years who owned or used mobile phones and had been involved in road crashes necessitating hospital attendance between April 2002 and July 2004. **MAIN OUTCOME MEASURE:** Driver's use of mobile phone at estimated time of crash and on trips at the same time of day in the week before the crash. Interviews with drivers in hospital and phone company's records of phone use. **RESULTS:** Driver's use of a mobile phone up to 10 minutes before a crash was associated with a fourfold increased likelihood of crashing (odds ratio 4.1, 95% confidence interval 2.2 to 7.7, $P < 0.001$). Risk was raised irrespective of whether or not a hands-free device was used (hands-free: 3.8, 1.8 to 8.0, $P < 0.001$; hand held: 4.9, 1.6 to 15.5, $P = 0.003$). Increased risk was similar in men and women and in drivers aged ≥ 30 and < 30 years. A third ($n = 21$) of calls before crashes and on trips during the previous week were reportedly on hand held phones. **CONCLUSIONS:** When drivers use a mobile phone there is an increased likelihood of a crash resulting in injury. Using a hands-free phone is not any safer.

JOURNAL ARTICLE

Situation awareness and workload in driving while using adaptive cruise control and a cell phone.

Ma R, Kaber DB. *Int J Ind Ergonomics* 2005; 35(10): 939-953.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2005, Elsevier Publishing)

Little work has empirically examined the cognitive construct of situation awareness (SA) in driving tasks involving the use of advanced in-vehicle automated technologies and personal communication devices. This research investigated the effects of an adaptive cruise control (ACC) system, and cell phone use in driving, on a direct and objective measure of SA, and assessed the competition of multiple driving and communication tasks for limited mental resources in terms of driving performance. Eighteen participants drove a virtual car in a driving simulation and performed a following task involving changes in speed and lateral position. Half of the participants were required to respond to cell phone calls and all completed trials with and without use of the ACC system. Task performance was measured in terms of lane deviations and speed control in tracking a lead vehicle, as well as headway distance in the following task. SA was measured using a simulation freeze technique and SA queries on the driving situation. Subjective workload was measured using a uni-dimensional mental workload rating. Results indicated use of the ACC system to improve driving task SA under typical driving conditions, and to reduce driver mental workload. However, the cell phone conversation caused deleterious effects on driving SA and increased driver mental load. The cell phone conversation (secondary task) competed for limited mental resources of drivers, leading to less attention to, and accurate knowledge of, the driving situation. Results also revealed the ACC system to improve driving performance along multiple dimensions; however, the cell phone did not have an effect. The latter result may be attributed to a short duration of the cell phone conversations during the experiment. This study has implications for the implementation of in-vehicle automation to support driver SA under normal driving conditions and regulations on the use of cell phones while driving. **Relevance to Industry** The results of this study have relevance to the introduction of advanced automation in commercial vehicles for supporting driver SA and regulation of cell phone use in driving. The study brings to light the critical role of attention-demanding distracter tasks, such as cell phone conversation while driving and using in-vehicle automation.

JOURNAL ARTICLE

Sleep deprivation and injuries in part-time Kentucky farmers: impact of self reported sleep habits and sleep problems on injury risk.

Spengler SE, Browning SR, Reed DB. **AAOHN J** 2004; 52(9): 373-82.

Correspondence: unavailable

Affiliation: College of Public Health, University of Kentucky, Lexington, KY, USA.

DOI: unavailable [What is this?](#)

(Copyright © 2004, Slack Publishing)

Part-time farmers who hold off-farm jobs may be at risk for injuries because of impaired performance resulting from inadequate sleep. For this study, 1004 part-time male Kentucky farmers completed a telephone interview for the 1994 to 1995 National Institute for Occupational Safety and Health-funded Farm Family Health and Hazard Surveillance Project. Questions were included about demographics, sleep habits, and injury occurrence. Twelve percent of the farmers reported an injury requiring medical intervention in the previous year. Farmers reported sleeping an average of 7.6 hours daily. Approximately 6.7% of the sample had three symptoms of sleep apnea. Although hours of sleep were not related to injury incidence, sleep medication use (odds ratio [OR] = 2.11, 95% confidence interval [CI] = 1.01 to 4.40) and presence of three sleep apnea symptoms (OR = 2.48, 95% CI = 1.13 to 5.41) were related to injury incidence. These data support the need for further research to examine sleep habits and promote strategies that reduce the risk for injuries caused by lack of sleep.

JOURNAL ARTICLE

Sleep quantity and quality as a predictor of injuries in a rural population.

Choi SW, Peek-Asa C, Sprince NL, Rautiainen RH, Flamme GA, Whitten PS, Zwerling C. **Am J Emerg Med** 2006; 24(2): 189-96.

Correspondence: unavailable

Affiliation: Department of Occupational and Environmental Health, College of Public Health, The University of Iowa, Iowa City, IA 52242-5000, USA.

DOI: [10.1016/j.ajem.2005.09.002](https://doi.org/10.1016/j.ajem.2005.09.002) [What is this?](#)

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This study aimed to assess the association of sleep disturbance and injuries in a rural population of Iowa. Study participants were 1345 adults who were enrolled in the KCRHS. Sleep problems were assessed based on self-reports at the beginning of the study. Injury information was collected by telephone interviews an average of every 6 months from August 1999 to June 2004. Sleeping for less than 7.5 hours increased the risk for injuries by 61% (rate ratio, 1.61; 95% confidence interval, 1.21-2.15) compared with sleeping for 7.5 to 8.5 hours (reference). Snoring frequency/severity and daytime fatigue/sleepiness were not significant in predicting the risk for injuries. Alcohol consumption of 1 to 2 or more drinks per day increased the risk for injuries among those who had sleep problems. Having adequate hours of sleep is important in preventing injuries. Avoiding alcohol consumption would be especially helpful in reducing injuries among people with sleep disturbance.

JOURNAL ARTICLE

State anger and the risk of injury: a case-control and case-crossover study.

Vinson DC, Arelli V. **Ann Fam Med** 2006; 4(1): 63-8.

Correspondence: unavailable

Affiliation: Department of Family and Community Medicine, University of Missouri-Columbia, Columbia, Mo, USA. (VinsonD@health.missouri.edu)

DOI: [10.1370/afm.390](https://doi.org/10.1370/afm.390) [What is this?](#)

(Copyright © 2006, American Academy of Family Physicians)

PURPOSE: Previous studies have examined anger at a given moment (state anger) and proxies for injury, or anger as a trait and injuries per se. Findings have been inconsistent. We sought to define further the relationship between state anger and risk of injury. **METHODS:** We conducted a case-control and case-crossover study in all 3 emergency departments in 1 county in Missouri. Cases were patients seeking care for an acute injury. They were compared with 2 controls: the patient himself or herself 24 hours before, and an individual recruited by telephone from the community and matched for age-group, sex, and time. Self-reported anger was assessed with 3 Likert scale items. Anger just before the injury was compared in case-crossover analyses with the respondent's own level of anger 24 hours before, and in standard case-control analyses with community participants' level of anger at the same hour the same day of the week in a subsequent week. **RESULTS:** Of 2,517 patients, 2,446 provided data on anger just before the injury, and 2,117 reported data for 24 hours before injury. Of 1,856 community individuals, 1,533 provided complete data. Anger was prevalent. Of injured patients, 9%, 7%, and 4% reported feeling "quite a bit" or "extremely" "irritable," "angry," and "hostile," respectively, just before injury. Odds ratios for risk of injury were notably higher for greater degrees of anger; for example, for "angry," they were 1.8 (95% confidence interval, 1.1-2.7) for "quite a bit" and 7.2 (3.9-13) for "extremely." Odds ratios in women were substantially lower than those in men. Anger was not associated with fall and traffic injuries, but anger was strongly associated with intentional injuries inflicted by another person in both men and women. **CONCLUSIONS:** High levels of self-reported state anger increase the risk of injury, especially among men, and specifically the risk of intentional injury in both sexes.

REPORT

The 100-Car Naturalistic Driving Study, Phase II: Results of the 100-Car Field Experiment

Dingus TA, Klauer SG, Neale VL, Petersen A, Lee SE, Sudweeks J, Perez MA, Hankey J, Ramsey D, Gupta S, Bucher C, Doerzaph ZR, Jermeland J, Knippling RR. **In public domain. Published by: National Highway Traffic Safety Administration.** Washington, DC: National Highway Traffic Safety Administration, 2006.

The full document is available online: (Download the Report <http://www.nrd.nhtsa.dot.gov/departments/nrd-13/driver-distraction/PDF/100CarMain.pdf>)

Correspondence: unavailable

Affiliation: Virginia Tech Transportation Institute

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The 100-Car Naturalistic Driving Study is the first instrumented vehicle study undertaken with the primary purpose of collecting large-scale naturalistic driving data. Drivers were given no special instructions, no

experimenter was present, and the data collection instrumentation was unobtrusive. In addition, the majority of the drivers drove their own vehicles (78 out of 100 vehicles). As described throughout this document, there is every indication that the drivers rapidly disregarded the presence of the instrumentation. Thus, the resulting database contains many extreme cases of driving behavior and performance, including severe drowsiness, impairment, judgment error, risk taking, willingness to engage in secondary tasks, aggressive driving, and traffic violation (just to name a few) that have been heretofore greatly attenuated by other empirical techniques.

Since the study was the first of its kind, new techniques had to be created and existing methods modified to make the study successful. The data collection effort resulted in the following dataset contents:

- Approximately 2,000,000 vehicle miles of driving.
- Almost 43,000 hours of data.
- 241 primary and secondary driver participants.
- 12 to 13 month data collection period for each vehicle; 18 month total data collection period.
- Five channels of video and many vehicle state and kinematic variables.

An "event" database was created, similar in classification structure to an epidemiological crash database, but with video and electronic driver and vehicle performance data appended to it. The events in this case are crashes, near-crashes, and other "incidents" that represent less severe conflicts. This approach allows the video and electronic data to be replayed multiple times and at varying frame rates in order to fully understand the nature of the event. This approach allows the classification of the following:

- Pre-event maneuver.
- Precipitating factor.
- Event type.
- Contributing factors.
- Associative factors.
- Avoidance maneuver.

The scope of the current project specified 10 initial, high priority objectives or goals addressed through the initial analysis of the event database. This report addresses the first 9 of these 10 goals, which include:

Goal 1: Characterization of crashes, near-crashes, and incidents for the 100-Car study

Goal 2: Quantification of near-crash events

Goal 3: Characterization of driver inattention

Goal 4: Driver behavior over time

Goal 5: Rear-end conflict causal factors and dynamic conditions

Goal 6: Lane change causal factors and dynamic conditions

Goal 7: Inattention for rear-end lead-vehicle scenarios

Goal 8: Characterize the rear-end scenarios in relation to Heinrich's Triangle

Goal 9: Evaluate performance of hardware, sensors, and the data collection system.

Goal 10: Evaluate the data reduction plan, triggering methods, and data analysis

Some of the most important findings addressed as part of the high priority goals analyzed for this report are presented below:

- This study allowed, perhaps for the first time, the capture of crash and collision events that included minor, non-property-damage contact. These low severity collisions provide very valuable information and occur much more frequently than more severe crashes. As a result, crash/collision-involvement was much higher than expected in that 82 total crashes/collisions were reported in this study, while only 15 of these crashes were reported to the police. For urban/suburban settings, this suggests that total crash/collision involvement

may be over five times higher than police-reported crashes.

- Almost 80 percent of all crashes and 65 percent of all near-crashes involved the driver looking away from the forward roadway just prior to the onset of the conflict. Prior estimates related to "distraction" as a contributing factor have been in the range of 25 percent.

- Inattention, which was operationally defined as including: (1) secondary task distraction; (2) driving-related inattention to the forward roadway (e.g., blind spot checks); (3) moderate to extreme drowsiness; and (4) other non-driving-related eyeglances, was a contributing factor for 93 percent of the conflict with lead-vehicle crashes and minor collisions. In 86 percent of the lead-vehicle crashes/collisions, the headway at the onset of the event was greater than 2.0 seconds.

- For scenarios involving conflict with a lead vehicle, the most frequent cases of lower severity conflicts (i.e., incidents and near-crashes) occurred in lead-vehicle moving scenarios, while 100 percent of the crashes (14 total) occurred when the lead vehicle was stopped. This indicates that drivers have sufficient awareness and ability to perform evasive maneuvers when closing rates are lower and/or expectancies about the flow of traffic are not violated.

- The rate of inattention-related crash and near-crash events decreases dramatically with age, with the rate being as much as four times higher for the 18-to-20 age group relative to some of the older driver groups (i.e., 35 and up).

- The use of hand-held wireless devices (primarily cell phones but including a small amount of PDA use) was associated with the highest frequency of secondary task distraction-related events. This was true for both events of lower severity (i.e., incidents) and for events of higher severity (i.e., near-crashes). Wireless devices were also among the categories associated with the highest frequencies of crashes and minor collisions, along with looking at/reaching for an object in vehicle and passenger-related secondary tasks.

- Drowsiness also appears to affect crashes and collisions at much higher rates than is reported using existing crash databases. Drowsiness was a contributing factor in 12 percent of all crashes and 10 percent of near-crashes, while most current database estimates place drowsiness-related crashes at approximately 2 to 4 percent of total crashes.

- The lead-vehicle crash and near-crash data clearly shows that development of purely quantitative near-crash criteria (i.e., not requiring at least some degree of verification by a human analyst) is not currently feasible. A primary reason for this was that vehicle kinematics associated with near-crashes were virtually identical to common driving situations that were not indicative of crash risk. Thus, qualitative and quantitative criteria are dependent upon one another to some degree. Fortunately, advances in digital video compression and storage technology, and the advancement of data reduction software, have made video verification feasible for large numbers of events.

- Results from the analysis investigating driver adaptation to instrumented vehicles indicate that even when the same driver was switched from a private vehicle to a leased vehicle, there were still more events per mile in the leased vehicle than in the private vehicle. If there was an effect of adaptation, it was extinguished before the first week of driving was completed. In addition, drivers appeared to adapt to the presence of the unobtrusive instrumentation within the first hour of driving.

In addition to the 10 high-priority goals addressed as part of this report, there are three additional

research contracts in place to perform further data reduction and analysis efforts for the purpose of addressing another 8 goals. There is also considerable interest in using the data for even more purposes from researchers in several disciplines. Progressing toward this potential for a multipurpose, highly flexible and adaptable tool for driving safety may be the most important aspect of this study.

The naturalistic approach fills a void in our existing driving safety research methods. Specifically, it provides much greater information regarding the pre-crash and crash events than is currently available, even after a detailed crash investigation. Furthermore, the data provides much greater external validity relative to the larger context of driving than do empirical methods such as test tracks or simulators.

Despite the massive scope of the current effort, it was designed to also serve as a pilot to a much larger future study. From an epidemiological viewpoint, the study was small with the presence of 15 police-reported and 82 total crashes and minor collisions. Furthermore, drivers were represented from only one area of the country (Northern Virginia/Washington, DC, metro area).

One purpose of a larger-scale study would be to have a statistically representative sample of crashes (perhaps 2,000) and a more representative subject/environment sample. Since a primary purpose of the 100-Car Study was to serve as a pilot for a larger-scale study (e.g., 5,000-car study), a goal was to evaluate the process and results of the 100-Car Study to assess the feasibility of such an undertaking. Based upon the results of the evaluations conducted, it is believed that a large-scale database would be an enormous asset and would be used by transportation researchers to address many transportation safety problems. Such an undertaking would allow researchers to gain insight and understanding into a wide array of driving behavior issues and potentially serve as a basis for decision making and program development in both the public and private sectors. This belief is based upon the robustness of these pilot results and the anticipation that these data will continue to be analyzed and the results made available from a variety of researchers and research organizations. Clearly, a large-scale, nationally-representative study, that includes a statistically significant number of police-reported crashes, would provide tremendous insight into issues that have eluded the highway safety community for many years.

JOURNAL ARTICLE

The causes and consequences of distraction in everyday driving.

Stutts J, Feaganes J, Rodgman E, Hamlett C, Reinfurt D, Gish K, Mercadante M, Staplin L. *Annu Proc Assoc Adv Automot Med* 2003; 47: 235-51.

Correspondence: unavailable

Affiliation: University of North Carolina Highway Safety Research Center, Chapel Hill, NC, USA.

DOI: unavailable [What is this?](#)

(Copyright © 2003, Association for the Advancement of Automotive Medicine)

To document drivers' exposure to potential distractions and the effects of these distractions on driving performance, inconspicuous video camera units were mounted in the vehicles of 70 volunteer subjects. The camera units automatically recorded a closeup view of the driver's face, a broader view of the interior of the vehicle, and the roadway immediately ahead of the vehicle whenever it was powered on. Three hours of randomly selected data per subject were coded based on a taxonomy of driver distractions (talking on cell phone, eating, tuning radio, etc.), contextual variables (whether vehicle stopped or moving, road type, traffic level, etc.) and observable measures of driver performance (eyes directed inside or outside vehicle, hands on or off steering wheel, and vehicle position in travel lane). Results were analyzed descriptively and using nonparametric bootstrap analysis techniques. The most common distractions in terms of overall event durations were eating and drinking (including preparations to eat or drink), distractions inside the vehicle

(reaching or looking for an object, manipulating vehicle controls, etc.), and distractions outside the vehicle (often unidentified). Although many of the distractions were also associated with negative driving performance outcomes, further research is needed to clarify their impact on driving safety.

JOURNAL ARTICLE

The distraction effects of phone use during a crucial driving maneuver.

Hancock PA, Lesch M, Simmons L. *Accid Anal Prev* 2003; 35(4): 501-14.

Correspondence: unavailable

Affiliation: Department of Psychology, Institute for Simulation and Training, University of Central Florida, 411 Phillips Hall, FL 32765, Orlando, USA. phancock@pegasus.cc.ucf.edu

DOI: unavailable [What is this?](#)

(Copyright © 2003, Elsevier Publishing)

Forty-two licensed drivers were tested in an experiment that required them to respond to an in-vehicle phone at the same time that they were faced with making a crucial stopping decision. Using test track facilities, we also examined the influence of driver gender and driver age on these dual-task response capacities. Each driver was given task practice and then performed a first block of 24 trials, where one trial represented one circuit of the test track. Half of the trials were control conditions in which neither the stop-light was activated nor was the in-vehicle phone triggered. Four trials required only stop-light response and a further four, phone response only. The remaining four trials required the driver to complete each task simultaneously. The order of presentation of specific trials was randomized and the whole sequence was repeated in a second block giving 48 trials per driver. In-vehicle phone response also contained an embedded memory task that was evaluated at the end of each trial circuit. Results confirmed our previous observation that in the dual-task condition there was a slower response to the light change. To compensate for this slowed response, drivers subsequently brake more intensely. Most importantly, we recorded a critical 15% increase in non-response to the stop-light in the presence of the phone distraction task which equates with increased stop-light violations on the open road. These response patterns varied by driver age and driver gender. In particular, age had a large effect on task components that required speed of response to multiple, simultaneous demands. Since driving represents a highly complex and interactive environment, it is not possible to specify a simplistic relationship between these distraction effects and outcome crash patterns. However, we can conclude that such in-vehicle technologies erode performance safety margin and distract drivers from their critical primary task of vehicle control. As such it can be anticipated that a causal relation exists to collision events. This is a crucial concern for all in-vehicle device designers and for the many safety researchers and professionals seeking to reduce the adverse impacts of vehicle collisions.

JOURNAL ARTICLE

The effect of cell phone type on drivers subjective workload during concurrent driving and conversing.

Matthews R, Legg S, Charlton S. *Accid Anal Prev* 2003; 35(4): 451-7.

Correspondence: unavailable

Affiliation: Ergonomics Research Group, Department of Human Resources, Health and Workplace Management, Massey University, Palmerston North, New Zealand. r.m@ihug.co.nz

DOI: unavailable [What is this?](#)

(Copyright © 2003, Elsevier Publishing)

The effect of three types of cell phones (hand held, hands free with an external speaker and personal hands free) on total subjective workload (including its constituent components; mental demand, physical demand, temporal demand, performance, effort and frustration) and intelligibility was measured using the NASA-task load index (TLX) and the modified rhyme test (MRT), respectively in 13 experienced drivers (nine male, four female, age range 28-65 years), whilst driving on a rural highway. The drivers rated all components of workload for each type of cell phone to be significantly higher than for a control condition in which no cell phone was used. The mean (standard deviation) total workload was lowest for the personal hands free cell phone (7.1(3.65)) and highest for the hands free speaker phone (10.8 (3.63)) ($P < 0.001$). The mean (standard deviation) intelligibility score was highest for the personal hands free cell phone (74.1 (7.9)) and

lowest for the hands free speaker phone (55.0 (10.4)) ($P < 0.001$). Frustration was significantly correlated with total workload (0.60, $P < 0.001$) and intelligibility was significantly correlated with frustration (-0.35, $P < 0.05$). Physical demand was not a high contributor to total workload. It is concluded that a personal hands free cell phone would interfere least with the cognitive demands of driving.

JOURNAL ARTICLE

The effect of cellular phone use on driving performance.

Ishida T, Matsuura T. *IATSS Res* 2001; 25(2): 6-14.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2001, International Association of Traffic and Safety Sciences)

Many experiments using driving simulators or real roads have shown that using a cellular phone while driving may cause an accident because it delays visual information processing by the driver. In this research, we examined the influence on driving performance of cellular phone use on a course that simulated streets. Driving conditions were driving only, listening to the car radio, hands-free cellular phone use and using a cellular phone with the left hand. Driving performance measurements included braking response time to the brake lights of a preceding car, eye movement, distance from the vehicle in front and lane observance. The subjects were 50 drivers, including ten driving instructors. The mean glance duration when manipulating a cellular phone was longer than when manipulating a hands-free set or car stereo. Braking reaction delay time increased in the following order: driving only, car radio, hands-free and, longest of all, cellular phone. When the cellular phone was used, car speed was slowest, and the distance from the vehicle in front became the longest. Glance duration other than to the front, indicating divided attention, was shortest during the cellular phone use and there were also fewer instances of eye movement. In the case of cellular phone use, stable driving appeared to be more difficult, as there was substantial steering wheel deflection. In this experiment, it was confirmed that use of a hands-free set is effective to some extent, but driving performance was poorer than with driving only. Even though different forms of in-vehicle information apparatus were used, a delay in information processing was consistently found.

JOURNAL ARTICLE

The effect of cellular phone use upon driver attention.

McKnight AJ, McKnight AS. *Accid Anal Prev* 1993; 25(3): 259-65.

Correspondence: unavailable

Affiliation: National Public Services Research Institute, Landover, MD 20785.

DOI: unavailable [What is this?](#)

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In this study, 150 subjects observed a 25-minute video driving sequence containing 45 highway traffic situations to which they were expected to respond by manipulation of simulated vehicle controls. Each situation occurred under five conditions of distraction: placing a cellular phone call, carrying on a casual cellular phone conversation, carrying on an intense cellular phone conversation, tuning a radio, and no distraction. All of the distractions led to significant increases in the proportion of situations to which subjects failed to respond. However, significant age differences of nonresponse appeared. Among subjects over age 50, nonresponses increased by about one-third under all of the telephone distractions. The response rate of younger subjects increased by a lesser degree except under intense conversation. Results were not influenced by gender or prior experience with cellular phones. The authors conclude that older drivers might reduce their accident risk during attention-demanding traffic conditions by avoiding use of cellular phones and that other drivers might do so by refraining from calls involving intense conversation.

JOURNAL ARTICLE

The effect of distractions on the crash types of teenage drivers.

Neyens DM, Boyle LN. *Accid Anal Prev* 2006; ePub(ePub): ePub.

Correspondence: unavailable

Affiliation: Department of Mechanical and Industrial Engineering, and Public Policy Center, The University of Iowa, Iowa City, IA 52242, USA.

DOI: [10.1016/j.aap.2006.07.004](#) [What is this?](#)

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[ePub (volume, issue, and page range not yet available)]

Teenage drivers are overrepresented in crashes when compared to middle-aged drivers. Driver distraction is becoming a greater concern among this group as in-vehicle devices, opportunities for distractions, and teenage drivers' willingness to engage in these activities increase. The objective of this study was to determine how different distraction factors impact the crash types that are common among teenage drivers. A multinomial logit model was developed to predict the likelihood that a driver will be involved in one of three common crash types: an angular collision with a moving vehicle, a rear-end collision with a moving lead vehicle, and a collision with a fixed object. These crashes were evaluated in terms of four driver distraction categories: cognitive, cell phone related, in-vehicle, and passenger-related distractions. Different driver distractions have varying effects on teenage drivers' crash involvement. Teenage drivers that were distracted at an intersection by passengers or cognitively were more likely to be involved in rear-end and angular collisions when compared to fixed-object collisions. In-vehicle distractions resulted in a greater likelihood of a collision with a fixed object when compared to angular collisions. Cell phone distractions resulted in a higher likelihood of rear-end collision. The results from this study need to be evaluated with caution due to the limited number of distraction related cases available in the U.S. GES crash database. Implications for identifying and improving the reporting of driver distraction related factors are therefore discussed.

Language: Eng

JOURNAL ARTICLE

The effects of a mobile telephone task on driver behaviour in a car following situation.

Alm H, Nilsson L. *Accid Anal Prev* 1995; 27(5): 707-15.

Correspondence: unavailable

Affiliation: Swedish Road and Transport Research Institute (VTI), Linköping, Sweden.

DOI: unavailable [What is this?](#)

(Copyright © 1995, Elsevier Publishing)

The effects of a mobile telephone task on young and elderly drivers' choice reaction time, headway, lateral position, and workload were studied when the subjects were driving in a car-following situation, in the VTI driving simulator. It was found that a mobile telephone task had a negative effect upon the drivers' choice reaction time, and that the effect was more pronounced for the elderly drivers. Furthermore, the subjects did not compensate for their increased reaction time by increasing their headway during the phone task. The subjects' mental workload, as measured by the NASA-TLX, increased as a function of the mobile telephone task. No effect on the subjects' lateral position could be detected. Taken together, these results indicate that the accident risk can increase when a driver is using the mobile telephone in a car following situation. The reasons for the increased risk, and possible ways to eliminate it, are also discussed.

JOURNAL ARTICLE

The effects of mobile phone use on pedestrian crossing behaviour at signalised and unsignalised intersections.

Hatfield J, Murphy S. *Accid Anal Prev* 2006; ePub: ePub.

Correspondence: unavailable

Affiliation: NSW Injury Risk Management Research Centre, The University of NSW, Sydney 2052, Australia.

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[ePub (volume, issue, and page range not yet available)]

Research amongst drivers suggests that pedestrians using mobile telephones may behave riskily while crossing the road, and casual observation suggests concerning levels of pedestrian mobile-use. An observational field survey of 270 females and 276 males was conducted to compare the safety of crossing behaviours for pedestrians using, versus not using, a mobile phone. Amongst females, pedestrians who crossed while talking on a mobile phone crossed more slowly, and were less likely to look at traffic before starting to cross, to wait for traffic to stop, or to look at traffic while crossing, compared to matched controls. For males, pedestrians who crossed while talking on a mobile phone crossed more slowly at unsignalised crossings. These effects suggest that talking on a mobile phone is associated with cognitive distraction that may undermine pedestrian safety. Messages explicitly suggesting techniques for avoiding mobile-use while road crossing may benefit pedestrian safety.

Language: Eng

JOURNAL ARTICLE

The effects of mobile telephoning on driving performance.

Brookhuis KA, de Vries G, de Waard D. *Accid Anal Prev* 1991; 23(4): 309-16.

Correspondence: unavailable

Affiliation: Traffic Research Centre, University of Groningen, Haren, The Netherlands.

DOI: unavailable [What is this?](#)

(Copyright © 1991, Elsevier Publishing)

The effects of telephoning while driving were studied in three different traffic conditions, i.e. in light traffic on a quiet motorway, in heavy traffic on a four-lane ring-road, and in city traffic. Twelve subjects, unfamiliar with mobile telephones, drove an instrumented vehicle for one hour each day during three weeks and while in each of the three traffic conditions, had to operate the mobile telephone for a short while. To ensure a fixed "heavy traffic load" in the second condition, the subjects were instructed to follow another instrumented vehicle (at a safe distance). The results showed a significant effect of telephoning while driving as opposed to normal driving (i.e., not involving telephone conversation), on the effort subjectively measured by an effort scale and objectively measured by heartrate indices and on some of the measured parameters of driving performance. One half of the subjects had to operate the telephone manually, the other half performed the telephone task with a handsfree mobile telephone set. The subjects who operated the handsfree telephone showed better control over the test vehicle than the subjects who operated the handheld telephone, as measured by the steering wheel movements. Also, a clear improvement over time in the course of the 15 test days was found for some of the measurements. As a consequence of the results, some advice concerning mobile telephoning can be given to authorities, manufacturers, and users.

JOURNAL ARTICLE

The influence of moving auditory stimuli on standing balance in healthy young adults and the elderly.

Tanaka T, Kojima S, Takeda H, Ino S, Ifukube T. *Ergonomics* 2001; 44(15): 1403-12.

Correspondence: unavailable

Affiliation: Department of Physical Therapy, School of Health Sciences, Sapporo Medical University, Japan.
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DOI: [10.1080/00140130110110601](#) [What is this?](#)

(Copyright © 2001, Taylor and Francis Group)

The maintenance of postural balance depends on effective and efficient feedback from various sensory inputs. The importance of auditory inputs in this respect is not, as yet, fully understood. The purpose of this study

was to analyse how the moving auditory stimuli could affect the standing balance in healthy adults of different ages. The participants of the study were 12 healthy volunteers, who were divided into two age categories: the young group (mean = 21.9 years) and the elderly group (mean = 68.9 years). The instrument used for evaluation of standing balance was a force plate for measuring body sway parameters. The toe pressure was measured using the F-scan Tactile Sensor System. The moving auditory stimulus produced a white-noise sound and binaural cue using the Beachtron Affordable 3D Audio system. The moving auditory stimulus conditions were employed by having the sound come from the right to left or vice versa at the height of the participant's ears. Participants were asked to stand on the force plate in the Romberg position for 20 s with either eyes opened or eyes closed for analysing the effect of visual input. Simultaneously, all participants tried to remain in the standing position with and without auditory stimulation that the participants heard from the headphone. In addition, the variables of body sway were measured under four conditions for analysing the effect of decreased tactile sensation of toes and feet soles: standing on the normal surface (NS) or soft surface (SS) with and without auditory stimulation. The participants were asked to stand in a total of eight conditions. The results showed that the lateral body sway of the elderly group was more influenced than that of the young group by the lateral moving auditory stimulation. The analysis of toe pressure indicated that all participants used their left feet more than their right feet to maintain balance. Moreover, the elderly had the tendency to be stabilized mainly by use of their heels. The young group were mainly stabilized by the toes of their feet. The results suggest that the elderly may need a more appropriate stimulus of tactile and auditory sense as a feedback system than the young for maintaining and control of their standing postures.

Language: Eng

JOURNAL ARTICLE

The Influence of Music on Driver Stress.

Wiesenthal DL, Hennessy DA, Totten B. *J Appl Soc Psychol* 2000; 30(8): 1709-1719.

Correspondence: unavailable

DOI: [10.1111/j.1559-1816.2000.tb02463.x](https://doi.org/10.1111/j.1559-1816.2000.tb02463.x) [What is this?](#)

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In order to examine the efficacy of music in dealing with daily stressors, automobile drivers were randomly assigned to either a music or nonmusic group. The music group listened to their favorite music, while the nonmusic group abstained from any music or talk radio during their entire commute to or from school or work. Using a cellular telephone, state measures of driver stress were obtained during a single commute in low- and high-congestion conditions. A Condition x Music Group interaction was found. Driver stress was greater in high congestion than in low congestion, but the nonmusic group demonstrated extreme levels of stress within high congestion. Listening to self-selected music appeared to limit driver stress only within highly frustrating and irritating traffic congestion.

JOURNAL ARTICLE

The relationship between cellular phone use, performance, and reaction time among college students: implications for cellular phone use while driving.

Szyfman A, Wanner G, Spencer L. *Am J Health Educ* 2003; 34(2): 81-83.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

(Copyright © 2003, American Alliance for Health, Physical Education, Recreation and Dance)

Two studies were performed to determine the relationship between cellular phone use and either reaction time or performance among college students. In the first study 60 undergraduates completed a computerized reaction time test. Mean reaction times were significantly higher when participants were talking on a cellular phone, either handheld or on a headset, than when they were not. In the second study 40 undergraduates steered a remote-controlled car through an obstacle course. Performance scores were significantly poorer for

participants when they were talking on a cellular phone than when they were not. A majority of participants reporting using cellular phones while driving, yet believed this was a dangerous practice. We recommend incorporation of education about cellular phone use and driving in health/safety curriculum for high school and college students.

JOURNAL ARTICLE

The role of driver distraction in crashes: an analysis of 1995-1999 Crashworthiness Data System Data.

Stutts JC, Reinfurt DW, Rodgman EA. *Annu Proc Assoc Adv Automot Med* 2001; 45: 287-301.

Correspondence: unavailable

Affiliation: University of North Carolina, Highway Safety Research Center, Chapel Hill, North Carolina, USA.

DOI: unavailable [What is this?](#)

(Copyright © 2001, Association for the Advancement of Automotive Medicine)

Five years (1995-1999) of national Crashworthiness Data System (CDS) data are analyzed to determine the role of driver distraction in traffic crashes and the specific sources of this distraction. Results show that 8.3 percent of the drivers were distracted at the time of their crash; after adjustment for the large percentage of drivers with unknown distraction status, the percentage rose to 12.9 percent. The most frequently cited sources of driver distraction were persons, objects or events outside the vehicle (29.4% of distracted drivers), adjusting the radio, tape or CD player (11.4%), and other occupants in the vehicle (10.9%). Other specific distractions (moving objects in vehicle, other objects brought into vehicle, adjusting vehicle or climate controls, eating and drinking, cell phones, and smoking) were each cited in only one to four percent of the cases. The likelihood of being distracted and the source of distraction varied by driver age but not by gender. Results are discussed in light of the limitations inherent in the CDS and other crash data, and the need for expanded data collection initiatives.

JOURNAL ARTICLE

The scope and nature of the drowsy driving problem in New York State.

McCartt AT, Ribner SA, Pack AI, Hammer MC. *Accid Anal Prev* 1996; 28(4): 511-17.

Correspondence: unavailable

Affiliation: Institute for Traffic Safety Management and Research, University at Albany, State University of New York 12205-2604, USA.

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A telephone survey was conducted of a random sample of New York State licensed drivers to determine the prevalence and circumstances of drowsy driving. Based on the survey responses, 54.6% of the drivers had driven while drowsy within the past year; 22.6% had ever fallen asleep at the wheel without having a crash, 2.8% had ever crashed when they fell asleep, and 1.9% had crashed when driving while drowsy. Of the reported crashes due to driving while drowsy or falling asleep at the wheel, 82.5% involved the driver alone in the vehicle, 60.0% occurred between 11:00 p.m. and 7:00 a.m. 47.5% were drive-off-road crashes, and 40.0% occurred on a highway or expressway. Multiple regression analysis suggested that the following driver variables are predictive of an increased frequency of driving drowsy: demographic characteristics (younger drivers, more education, and men); sleep patterns (fewer hours of sleep at night and greater frequency of trouble staying awake during the day); work patterns (greater frequency of driving for job and working rotating shifts); and driving patterns (greater number of miles driven annually and fewer number of hours a person can drive before becoming drowsy).

JOURNAL ARTICLE

Understanding small graphical symbols: a cross-cultural study.

Piamonte DP, Abeysekera JDA, Ohlsson K. *Int J Ind Ergonomics* 2001; 27(6): 399-404.

Correspondence: unavailable

DOI: unavailable [What is this?](#)

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Graphical symbols such as icons or pictograms as interfaces in modern technological devices have become quite common. Although generally designed in western countries, their use can be found worldwide from audio-visual appliances to computers and computer-related devices. A basic ergonomic principle is to involve the potential users in the design and evaluation stages especially when the user groups are quite diverse. This study was part of an international project on evaluating telecommunication symbols. One of the major objectives was to test different graphical symbols (of the videophone), designed, and tested in Western Europe using subject groups from Asia, Europe, and the United States. This paper would discuss the major portions of the tests involving US and Swedish subjects. Performance indices used were hits, certainties, confusions, and semantic differential ratings. They were useful in analysing how the symbols were recognised, confused, and perceived by different subject groups. They also helped detect differences between groups which otherwise seemed to have similar test results. The results showed differences in patterns of ratings, which may be culturally linked and could help determine aspects of symbol design and usage that may be more helpful in designing instructions, learning aids, etc. Awareness of such subject bias and their implications are important on how one interprets the test results. Relevance to industry The study outcome can be very helpful for industries in designing and evaluating candidate graphical symbols across various types of consumer products for worldwide use.

JOURNAL ARTICLE

Unsafe driving behaviour and four wheel drive vehicles: observational study.

Walker L, Williams J, Jamrozik K. *Br Med J* 2006; 333(7558): 71-73.

Correspondence: unavailable

Affiliation: Department of Primary Care and Social Medicine, Imperial College, London.

DOI: [10.1136/bmj.38848.627731.2F](#) [What is this?](#)

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[ePub (volume, issue, and page range not yet available)]

OBJECTIVE: To assess the level of compliance with the new law in the United Kingdom mandating penalties for using a hand held mobile phone while driving, to compare compliance with this law with the one on the use of seat belts, and to compare compliance with these laws between drivers of four wheel drive vehicles and drivers of normal cars. **DESIGN:** Observational study with two phases--one within the "grace" period, the other starting one week after penalties were imposed on drivers using such telephones. **SETTING:** Three busy sites in London. **PARTICIPANTS:** Drivers of 38 182 normal cars and 2944 four wheel drive vehicles. **MAIN OUTCOME MEASURES:** Proportions of drivers seen to be using hand held mobile phones and not using seat belts. **RESULTS:** Drivers of four wheel drive vehicles were more likely than drivers of other cars to be seen using hand held mobile phones (8.2% v 2.0%) and not complying with the law on seat belts (19.5% v 15.0%). Levels of non-compliance with both laws were slightly higher in the penalty phase of observation, and breaking one law was associated with increased likelihood of breaking the other. **CONCLUSIONS:** The level of non-compliance with the law on the use of hand held mobile phones by drivers in London is high, as is non-compliance with the law on seat belts. Drivers of four wheel drive vehicles were four times more likely than drivers of other cars to be seen using hand held mobile phones and slightly more likely not to comply with the law on seat belts.

Language: Eng

JOURNAL ARTICLE

Using Cellular Telephones in Vehicles: Safe or Unsafe?

Goodman MJ, Tijerina L, Bents FD, Wierwille WW. *Transp Hum Fact* 1999; 1(1): 3-42.

Correspondence: unavailable

DOI: [10.1207/sthf0101_2](https://doi.org/10.1207/sthf0101_2) [What is this?](#)

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[Abstract unavailable]

JOURNAL ARTICLE

Wireless telephones and the risk of road crashes.

Laberge-Nadeau C, Maag U, Bellavance F, Lapierre SD, Desjardins D, Messier S, Saidi A. *Accid Anal Prev* 2003; 35(5): 649-60.

Correspondence: unavailable

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In light of the rapidly increasing development of the cell phone market, the use of such equipment while driving raises the question of whether it is associated with an increased accident risk; and if so, what is its magnitude. This research is an epidemiological study on two large cohorts, namely users and non-users of cell phones, with the objective of verifying whether an association exists between cell phone use and road crashes, separating those with injuries. The Société de l'Assurance Automobile du Québec (SAAQ) mailed a questionnaire and letter of consent to 175000 licence holders for passenger vehicles. The questionnaire asked about exposure to risk, driving habits, opinions about activities likely to be detrimental to driving and accidents within the last 24 months. For cell phone users, questions pertaining to the use of the telephone were added. We received 36078 completed questionnaires, with a signed letter of consent. Four wireless phone companies provided the files on cell phone activity, and the SAAQ the files for 4 years of drivers' records and police reports. The three data sources were merged using an anonymized identification number. The statistical methods include logistic-normal regression models to estimate the strength of the links between the explanatory variables and crashes. The relative risk of all accidents and of accidents with injuries is higher for users of cell phones than for non-users. The relative risks (RR) for injury collisions and also for all collisions is 38% higher for men and women cell phone users. These risks diminish to 1.1 for men and 1.2 for women if other variables, such as the kilometres driven and driving habits are incorporated into the models. Similar results hold for several sub-groups. The most significant finding is a dose-response relationship between the frequency of cell phone use, and crash risks. The adjusted relative risks for heavy users are at least two compared to those making minimal use of cell phones; the latter show similar collision rates as do the non-users.

JOURNAL ARTICLE

Wireless telephones in cars.

Ann Emerg Med 1998; 31(2): 278-9.

Correspondence: unavailable

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