

Cell Phone Use While Driving: Results of a Statewide Survey

Jane C. Stutts, Ph.D. (*Corresponding Author*)

University of North Carolina
Highway Safety Research Center
730 Airport Road, Campus Box 3430
Chapel Hill, NC 27599-3430
Phone: 919-962-8717
Fax: 919-962-8710
E-mail: jane_stutts@unc.edu

William W. Hunter, M.C.E.
University of North Carolina
Highway Safety Research Center
730 Airport Road, Campus Box 3430
Chapel Hill, NC 27599-3430
Phone: 919-962-8716
Fax: 919-962-8710
E-mail: bill_hunter@unc.edu

Herman F. Huang, Ph.D.
University of North Carolina
Highway Safety Research Center
730 Airport Road, Campus Box 3430
Chapel Hill, NC 27599-3430
Phone: 919-962-8720
Fax: 919-962-8710
E-mail: herman_huang@unc.edu

Word Count: 5,839 words + 7 tables and figures = 7,589 words

ABSTRACT

A statewide telephone survey of licensed North Carolina drivers ages 18 and older was conducted during the summer of 2002. The purpose of the survey was to provide current information on cell phone use while driving and to learn drivers' perceptions of cell phone safety and their opinions regarding regulation. The survey targeted 500 users and 150 non-users of cell phones. Based on responses to the initial screening questions, it was estimated that 58.8 percent of the state's licensed drivers have used a cell phone while driving. Use levels were highest among younger drivers. One in four users reported having a hands-free device, although they did not always use the device. Users generally perceived talking on cell phones while driving to be less distracting and less of a safety concern than did non-users. They were also less likely to support legislation that would prohibit anything other than use of a hand-held phone, and less likely to support stricter penalties for cell phone users involved in crashes.

INTRODUCTION

The number of cell or mobile phone users in the United States has grown from fewer than 100,000 in January, 1985 to an estimated 137 million in July, 2002 (1). With the explosion in ownership has come increased use of cell phones while driving. Data collected by the National Highway Traffic Safety Administration (NHTSA) as part of its Fall 2000 National Occupant Protection Use Survey revealed that an estimated 3.9% of passenger car drivers are using cell phones at any time while driving (2).

Use of cell phones while driving raises safety concerns. A varied and growing body of literature provides convincing evidence that cell phone use while driving leads to poorer driving performance and increased risk of crash involvement (3-7). Studies have been conducted using driving simulators (8-11), instrumented vehicles on the road (12), case-control and other epidemiological study designs (13-15), and analyses of national and state motor vehicle crash data (7). Even though there is general consensus that talking on cell phones while driving poses safety risks, there is no consensus on the magnitude of these risks and on the best approaches for lowering them. Some favor strict regulation at the state or local level, even including a total ban on cell phone use while driving; others argue that more consumer education, focused not only on cell phone use but on all activities shown to distract drivers, is sufficient to allay safety concerns.

All parties agree on the need for more and better data to clarify the risks associated with use of cell phones while driving and the specific parameters influencing this risk. One topic that has drawn considerable attention is the extent to which "hands-free" cellular phone systems afford safety benefits over "hand-held" models. While the newer systems may well be easier and less distracting to use, whether this translates into fewer crashes is still a topic for debate. Despite a Japanese study showing that the greatest proportion of cell phone crashes occur while receiving or placing calls (7), U.S. studies have generally shown most crashes to occur while talking on phones, and suggest that hands-free versus hand-held systems have little impact on the cognitive distraction associated with carrying on a conversation while driving (8, 13).

Although legislation being considered in five states this year would prohibit use of cell phones while driving except in emergencies, and legislation in 24 states would ban the use of hand-held systems, only New York State currently has a law in place prohibiting use of a hand-held cell phone while driving (16). In addition, nine local jurisdictions have enacted bans on hand-held phone use while driving (16). A project was recently undertaken by the National Congress of State Legislatures in response to ever increasing requests for information regarding

cell phones and other in-vehicle technologies from state and local lawmakers and the general public. The project brought state legislators and staff together with representatives from industry and the highway safety community to “identify important issues, review current information, and create a forum where stakeholders could work toward finding common ground” (3). Consensus was reached in 14 important areas, including the need for better data and increased public education. However, the group failed to reach consensus on whether legislation was needed to lower the potential risk of crashes due to cell phones and other wireless technologies, or on whether cell phones should be singled out from other common driver distractions in state data collection efforts.

The current telephone survey of cell phone users and non-users in North Carolina was carried out as part of two larger projects funded by the state’s Governor’s Highway Safety Program exploring cell phone use and driving safety. Three tasks were carried out as part of the initial project. These included (1) a statewide observational survey of cell phone use while driving, similar to the NHTSA survey reported on earlier; (2) a pilot test of a supplemental data form for use by the N.C. State Highway Patrol to identify crashes involving cell phones; and (3) an analysis of narrative data on N.C.’s computerized crash files to identify potential cell phone-related crashes. Results from these efforts have been summarized in a final project report (17).

In a second follow-on project, we have continued to work with the N.C. Highway Patrol to collect supplementary data on cell phone-related crashes, and have linked the narrative crash data to the complete state motor vehicle crash files for further analysis. In place of the statewide observational survey (which yielded a use rate of 3.1% for hand-held phones), it was decided to conduct a telephone survey to provide an updated snapshot of cell phone use while driving in North Carolina, and to learn drivers’ opinions regarding the safety of cell phones and attitudes regarding regulation.

With the exception of industry marketing surveys, which are limited in scope, only a few surveys have been carried out to gather information on cell phone use while driving, and much of this information is quickly outdated as more phones are sold and new technologies are introduced. Industry surveys have generally shown a trend of increasing cell phone use by younger and older drivers and by individuals with lower incomes. Surveys have also shown a decrease in the proportion of business or work-related calls compared to personal calls (7, 3). Surveys conducted by *Prevention Magazine* in 1994 and 1995 reported that 15% of cell phone owners never use their phones while driving; 5% have had a “near miss” crash while driving and talking, and 2% have been involved in a crash where someone else was talking (7, 3). An ongoing Internet-based survey being conducted by Nationwide Insurance reports that 15.2 percent of respondents “always” or “frequently” talk on cell phones while driving, while an additional 28.7 percent “occasionally” use cell phones (18).

Drawing from data collected as part of its Motor Vehicle Occupant Safety Survey conducted November 1996 - January 1997, NHTSA found that 30% of respondents reported having a phone or carrying one with them when they drove. Phone use was highest among persons age 45-54 (39%), and those age 35-44 (36%), and among college graduates. Nine of ten cell phone owners reported using their phones while driving, with males reporting using them on a higher proportion of their trips than females (7). NHTSA recently estimated that 55% of drivers routinely carry phones in vehicles, and half of these leave the phones on during their trip. It further estimated that 73% of the phones used in cars are hand-held models (3).

Having up-to-date information on who is using cell phones while driving, how the phones

are being used, and the perceived safety of their use can provide a useful complement to available data on cell phone-related crashes, and help guide lawmakers and the highway safety community in identifying the best approaches for promoting safety without unnecessarily curtailing the many benefits that cell phones and other new in-vehicle technologies can offer.

METHODS

A North Carolina statewide telephone survey was conducted over a one-month period from mid-June until mid-July, 2002. The survey questionnaire was developed by researchers at the UNC Highway Safety Research Center, working with a marketing and survey research firm based in the area. The questionnaire was developed over a period of several months with input from NHTSA staff and others. It was pilot tested on an informal basis during the development process, and then formally pilot tested in the field before actual data collection was begun. Cell phone users were asked the full questionnaire, while non-users were asked an abbreviated version that omitted questions pertaining to cell phone use but which otherwise contained identical questions.

The survey was a random digit dial household telephone survey. Invalid, disconnected, or not-in-service numbers were screened out, as were businesses. Households were also screened out of the survey if (1) there was no adult over age 18 in the household; (2) there was no adult with NC residency in the household, and/or (3) there was no adult with a valid driver's license in the household. In addition to these screening criteria, potential participants were screened on the basis of age and their use or non-use of cell phones. A quota of at least 50 survey participants in each of five age groups (18-24, 25-39, 40-54, 55-69, 70+) was set. In addition, we targeted 500 interviews to be completed with cell phone users and 150 with cell phone non-users, for a total of 650 completed interviews. Cell phone users were oversampled to allow for more in depth analyses within this subpopulation of interest.

A copy of the questionnaire will be available in the full project report (19). Cell phone users averaged just over nine minutes to complete the survey, while non-users completed the shorter version in six-and-a-half minutes. The survey was conducted using a Computer Aided Telephone Interviewing (CATI) system, which allowed for automatic quota allocations, skips, and validity checks on data entries. The completed database was further edited for completeness and accuracy and converted to a SAS dataset for analysis using Statistical Analysis System software, Version 8. The data were analyzed descriptively using single variable and two- and three-way crosstabulations of the data. Statistical testing was carried out using chi-square tests of association on categorical variables and t-tests or Pearson correlation coefficients for continuous data. Standard regression models were used in some limited multivariate analyses of the data.

RESULTS

Screener Results

A total of 1,006 individuals completed the survey screener. An additional 106 individuals were contacted but did not complete the screener because of refusals to participate, language barriers, medical or physical disabilities, etc. Of the 1,006 individuals completing the survey screener, 550 (54.7 percent) reported having used a cell phone while driving, while 456 (45.3 percent) reported not having used a cell phone while driving (see Table 1). These numbers likely underestimate the true percentage of licensed adult drivers in North Carolina who have used a cell phone while driving, since they are based on a sample of individuals contacted by telephone.

As shown in the table, this sample underrepresented drivers in the youngest two age categories (ages 18-24 and 25-39) and overrepresented those in the oldest two age categories (ages 55-69 and 70+). To the extent cell phone use is higher among younger than older drivers, the overall statewide estimate should also be higher.

INSERT TABLE 1 ABOUT HERE

Figure 1 shows the percentage of cell phone users within each of our five identified age categories, i.e., the row percents from Table 1. Cell phone use was highest among adults ages 25-39, and only slightly lower for the 18-24 and 40-54 year age groups. Use rates dropped off considerably in the older age categories. If one adjusts the use rates found in Table 1 to reflect the overall age distribution of North Carolina licensed drivers ages 18+, the estimated percentage of drivers who have used a cell phone while driving increases to **58.8 percent**.

INSERT FIGURE 1 ABOUT HERE

Characteristics of Cell Phone Users and Non-users

The demographic characteristics of the cell phone users and non-users *participating in the survey* are shown in Table 2. As described above, not everyone who was screened was asked to participate in the survey. Interviews were completed with 500 cell phone users (91 percent of those screened), but only 150 non-users (32.9 percent of those screened). In addition to user and non-user quotas, we specified that at least 50 interviews should be completed in each age group. As a result, the age distribution of the non-user participants shown in Table 2 differs significantly from that shown in Table 1. The age distribution of users remains almost identical except for a slight decrease in the percentage of participants age 70+. Compared to non-users, cell phone users participating in the survey were more likely to fall into the 25-39 and 40-54 year age categories, and less likely to be age 70 or above ($p < .0001$).

INSERT TABLE 2 ABOUT HERE

Results with respect to sex and race (which were not affected by the cell phone use and age quotas) were both non-significant. Although more females than males participated in the survey, there was a higher proportion of males among the users than among the non-users. Cell phone users were also more likely than non-users to drive sport utility vehicles (SUVs). The overall pattern for vehicle type, however, was not significantly different for the two groups.

Cell Phone Use Patterns

Results with respect to cell phone use characteristics, based only on responses from the 500 survey participants who reported having used a cell phone while driving, are summarized in Table 3 and discussed below.

Use of Hands-free versus Hand-held Phones

One in four respondents (28.2 percent) indicated that they used a hands-free device when talking on their cell phone while driving. For nearly two-thirds of these individuals, this hands-free

device was a headset or earpiece connected to the phone; only one-third indicated that they had a speaker phone system. Those who had hands-free systems reported using them on most occasions. The overall mean use rate was 72.8 percent, while the median use rate was 80.0 percent. One-third reported always using their hands-free system. There were no significant differences in reported use rates by respondent age or sex, or by the type of system available. Mean use rate was 75.3 percent for those with speaker phones, compared to 71.5 percent for those with headsets and/or earpieces.

Those who had hands-free systems overwhelmingly (89.9 percent) felt that the system made it *easier* for them to talk on the phone while driving. Almost as many (87.7 percent) felt that it made it *safer* for them to talk on the phone while driving. These results did not vary significantly by type of hands-free system.

Typical Daily Use

Participants in the survey spent on average 106 minutes per day driving. Driving time, however, was positively skewed, so that the median time spent driving was 60 minutes, as was the mode. Average time spent talking on a cell phone per day while driving was similarly skewed, with a mean of 14.5 minutes and median and mode of 5.0 minutes. Average time talking was significantly associated with both age and gender: usage decreased with increasing age, and was higher for males than for females ($p < .001$ for both age and gender, based on linear regression). Using mean reported times, the proportion of time survey participants spent using their cell phone while driving can be estimated at 14.5 minutes (talking) / 106 minutes (driving), or .14. A comparison of median reported talking and driving times yields a somewhat reduced ratio of .08 (i.e., 5.0 minutes talking / 60 minutes driving).

Participants were also asked what percentage of the calls they made each day were work-related calls, and what percentage were personal calls. Responses were required to total 100 percent. Just over half of the respondents (53.3 percent) reported that they made no work-related calls, while at the other extreme, 6.4 percent responded that all of their calls were work-related. The average reported percentage was 27.3 percent. There was a significant positive correlation between percent work-related calls per day and total time spent talking on phone per day (Pearson $R^2 = 0.227$, $p < .0001$).

Over three-fourths (76.7 percent) of cell phone users reported placing two or fewer calls per day. Only a few (8.0 percent) reported placing more than five calls per day. Results were similar with respect to receiving incoming calls. Both the number of outgoing calls and the number of incoming calls were significantly associated with respondent age and sex: generally, the percentages of respondents making 3-5 or 6 or more calls per day decreased with respondent age, and was higher for males than for females ($p < .001$ for both age and sex crosstabulations).

A final question pertaining to cell phone use was how often the respondents pulled their car off the road to use their cell phone. Over a third of the respondents (34.8 percent) said that they never pulled their car off the road, whereas 22.4 percent said that they usually or always pulled off. Results were strongly associated with age ($p < .0001$), with older drivers much more likely to respond that they always or usually pulled over (60.0 percent for drivers age 70+, decreasing to only 4.3% for drivers age 18-24). Responses did not vary by sex, and were not associated with the various measures of cell phone use (total time talking per day, average number incoming and outgoing calls per day) once age was incorporated into the regression model.

Driving Safety and Use of Cell Phone

Those who reported using a cell phone while driving were asked if they had ever “had to make a sudden evasive maneuver to avoid being in an accident” while driving and talking on their phone. A “sudden evasive maneuver” was described as slamming on the brakes or jerking the steering wheel. Nearly one in eight (11.8 percent) respondents said that they had. Although the likelihood of a positive response was highest for drivers ages 18-24 and lowest for those ages 55-69, the results were only marginally associated with driver age ($p=.068$), and were not at all associated with use of a hands-free versus a hand-held phone system. Results were, however, significantly associated with likelihood of pulling off the road to use a phone: those who reported usually or always pulling over to use their cell phone were less likely than those who never or rarely pulled over to have made an evasive maneuver while on the phone. These results held even after adjusting for driver age ($p=.018$), as well as total driving time and total talking time ($p=.044$).

Use of Other Electronic Services

Cell phone users were also asked about other electronic services they might access while driving. These included voice mail, e-mail, or the Internet; vehicle navigation systems such as On-Star; PDAs or “personal digital assistants” like Palm Pilot or Handspring; and reading text or instant messages. Accessing voice mail received the highest positive response, with 19.4 percent of cell phone users indicating that they also accessed voice mail while driving. Results were strongly associated with age, ranging from a high of 42.6 percent for respondents ages 18-24 to only 3.7 percent for respondents ages 70 and older ($p<.001$).

Results with respect to the other services generally hovered in the one to two percent range: accessing e-mail 1.4 percent; accessing the Internet 0.8 percent; use of a vehicle navigation system 1.8 percent; and use of a PDA 2.2 percent. None of these findings was significantly associated with respondent age. A somewhat higher percentage of cell phone users said that they read text or instant messages while driving. These results were especially high among the 18-24 year-old respondents, with 14.9 percent indicating that they read text or instant messages while driving ($p=.0013$).

Cell phone non-users were only questioned about their use of in-vehicle navigational equipment while driving. Only one of the 150 non-user respondents indicated using such a system.

Opinions on Cell Phone Safety and Regulation

Both cell phone users and non-users were asked to rate how distracting they thought various activities were to driving. The specific instructions were, “Please rate how distracting you think the following activities are to a driver. Use a scale of 0 to 10, where 0 means ‘not at all distracting’ and 10 means ‘extremely distracting.’” A total of ten activities was presented in random order, except that “talking on a cell phone with a hands-free device” and “talking on a cell phone without a hands-free device” were always asked consecutively. Results are summarized in Table 4, roughly ordered from least distracting to most distracting based on ratings assigned by the non-cell phone users.

INSERT TABLE 4 ABOUT HERE

All of the activities except for finding a location using a road map were significantly associated with cell phone user status, with non-users rating the activities more distracting than users. In the case of finding a location using a road map, cell phone users rated this the most distracting of the ten activities, while non-users rated it somewhat less distracting than either talking on a cell phone without a hands-free device or dialing a cell phone. Talking with other passengers in the vehicle received the lowest overall distraction rating from both groups. Also, both groups rated talking on a cell phone with a hands-free device much less distracting than talking on a cell phone without a hands-free device. Still, for the non-users especially, cell phone use and in particular dialing a cell phone were considered extremely distracting activities.

Ratings for the various potential distractions were also significantly associated with respondent age and gender: females gave higher distraction ratings than males, and ratings increased with age.

In addition to rating how distracting they thought various activities, including cell phone use, were to driving, respondents were asked to use the same 0-10 scale to indicate the extent to which they agreed or disagreed with the following three statements:

- Most people can carry on a conversation on their cell phone and still drive safely.
- Cell phones are more beneficial to drivers than they are harmful.
- Using a hands-free device with a cell phone is safer than using a hand-held cell phone.

In this case, a rating of “0” corresponded to “completely disagree” while a rating of “10” corresponded to “completely agree.” Results were again differentiated by cell phone use status. As expected, cell phone users were more likely than non-users to agree with the various statements, indicated by their higher average ratings (see Table 5). However, it is interesting that except for the benefits of a hands-free phone system, even users did not demonstrate strong agreement with the two statements related to cell phone safety. Younger respondents were the most likely to feel that drivers could carry on a conversation on a cell phone and still drive safely, but otherwise these opinions did not vary significantly by age or gender.

INSERT TABLE 5 ABOUT HERE

A final set of “opinion” questions related to possible legislative issues. Participants were asked whether they would vote “for” or “against” the following (hypothetical) driving laws in North Carolina:

- A new law making it illegal to talk on a hand-held cell phone while driving, except in case of emergency, but still allowing talking if using a hands-free device.
- A new law making it illegal to talk on any type of cell phone (hand-held or hands-free) while driving, except in case of emergency.
- A new law requiring that drivers in accidents while talking on a cell phone

automatically be cited for careless and reckless driving and be heavily penalized on their insurance premiums.

Results are summarized in Table 6. Cell phone users as well as non-users generally supported legislation that would make it illegal to use a hand-held phone while driving, but still allow use of a hands-free system (70.6 percent of users, 76.7 percent of non-users). Older respondents were especially likely to support such legislation ($p=.003$), while there were no significant gender differences. In contrast, cell phone users and non-users held sharply different opinions about legislation that would make *all* cell phone use illegal: whereas 63.3 percent of non-users said they would vote for such legislation, only 26.8 percent of users would vote for it. Older respondents were again more likely to support such legislation ($p<.001$), as were females ($p=.043$). Users and non-users also gave different responses with regard to stricter penalties for persons involved in crashes while talking on a phone, with just over half (53.8%) of users supporting such legislation, compared to three-fourths (78.0 percent) of non-users. The same age and sex distinctions also held ($p=.014$ for age, $p=.003$ for gender).

INSERT TABLE 6 ABOUT HERE

DISCUSSION

This paper has reported on the results of a statewide survey to gather information on the characteristics of adults ages 18 and older who report using a cell phone while driving and the nature of their reported cell phone use. Additionally, information was gathered on opinions of users and non-users regarding the safety of using a phone while driving and support for legislation regulating cell phone use. While carried out in North Carolina to help guide its own highway safety efforts, the survey should have relevance to safety professionals and policy makers beyond the state seeking to better understand the risks associated with cell phone use and ways these risks might be reduced.

Nearly six out of ten North Carolina drivers were estimated to have used a cell phone while driving. Reported cell phone use was highest in the younger age groups, dropping significantly with age. Still, more than one in five “senior” drivers ages 70+ reported having used a cell phone while driving. Although a few users reported high levels of “talk time” on their phones, most reported much more modest times of less than 10 minutes per day. Three-fourths reported placing or receiving two or fewer calls per day. Use levels were highest in the youngest age groups, and were higher for males than for females.

Two of the more interesting survey topics from an educational and/or policy perspective pertain to the use of hand-held versus hands-free phone systems, and the likelihood of pulling off the roadway to use a phone rather than trying to place a call or carry on a conversation while driving. One in four of our cell phone users reported having a hands-free device, although they did not always use it when talking on their phone. Despite the inconsistent use, the vast majority of those with hands-free devices felt that the devices made it both easier and safer to talk on a phone while driving. One concern is that, by passing legislation that prohibits the use of hand-held phones but allows the use of hands-free systems, lawmakers may be sending the message that the hands-free systems are, in effect, “risk-free.” This might not only encourage more individuals to use cell phones while driving, but also encourage longer and more frequent conversations. Research has shown, however, that conversing on either a hand-held or a hands-

free phone leads to significant decrements in simulated driving performance, a result of “the diversion of attention from driving to the phone conversation itself” (8). Among the participants in our survey, use of a hands-free phone system was not associated with lower reported incidences of “sudden evasive maneuvers” while driving and talking on a cell phone. Users of the hands-free systems also did not report significantly higher use levels in terms of either total talk time or numbers of outgoing and incoming calls. Further research is needed to clarify the risks and benefits associated with use of hands-free versus hand-held phone systems.

One in five respondents said that they usually or always pulled off the road to use their cell phone, while a third said that they never did so. Older respondents were much more likely than younger respondents to report always or usually pulling over. Safety advocates differ on whether to advise people to pull off the road while using their cell phone, recognizing that both pulling off the road and merging back into traffic can pose hazards, as can being parked along a roadside. Most safety literature simply advises cell phone users to try to place their calls before beginning a trip, or when stopped in traffic. Among our survey participants, however, pulling off the road was associated with a *lower* likelihood of having made a sudden evasive maneuver while talking on a cell phone. It could be that participants are pulling off to relatively “safe” locations such as parking lots or service stations. It is also possible that people who elect to pull over are generally more safety conscious than those who do not. Regardless, this option should be communicated to cell phone users as one way of potentially reducing their risk of crashing.

In-vehicle use of wireless equipment other than cell phones remains low, at least in our sample of North Carolina drivers. However, this situation may change in the near future if the rapid proliferation of cell phones is any indication. One area of special concern is the relatively high percentage of young drivers in our survey who reported using text or instant messaging. Given the generally high crash risks already faced by young drivers, one can hardly envision increasing this risk by condoning the use of potentially distracting technologies while driving. Some states are already considering enacting legislation prohibiting novice drivers with provisional licenses from talking on a cell phone while driving. This legislation might well be extended to cover other wireless communication technologies. In its consensus report dealing with driver focus and in-vehicle wireless technologies, the National Conference of State Legislatures acknowledged that, “Because teenage and novice drivers lack driving experience, they are more susceptible to the distractions caused by communications, entertainment and information technology in motor vehicles,” but stops short of recommending any legislation that would restrict their use of such equipment (3). Our survey made no attempt to interview minors under the age of 18, but this is clearly an area where further research is warranted.

Finally, the results of this survey generally confirm a willingness by the driving public to accept some restrictions on their use of cell phones while driving. However, there were clear differences among users and non-users in their perceptions of risk associated with cell phone use, and in their support for legislation that might restrict cell phone use. As cell phone ownership and use becomes more “mainstream,” one can expect less support for any legislation that would place a total ban on cell phone use while driving, or that would bring automatic penalties to cell phone users in crashes. Instead, the public is much more likely to continue its support for restrictions on hand-held phone use, believing the hands-free systems to confer some level of safety. Again, public education is needed regarding the potential distracting nature of cell phone conversations regardless of the type of phone being used.

The growth of cell phones and other wireless communications technologies in vehicles

appears inevitable. Although research has demonstrated that use of these technologies can impair driving performance and increase risk of crash involvement, the magnitude of this risk remains unknown. More data are needed both with regard to the safety implications of cell phone (and other technology) use while driving, and levels of exposure to these technologies. This statewide survey of cell phone users and non-users represents a step in this direction.

ACKNOWLEDGMENTS

Appreciation is expressed to Brad Martin and Steve Wakefield with Johnston, Zabor, McManus, Inc. for their expert guidance and management of the telephone survey, and to Mike Goodman and Paul Tremont at NHTSA for their helpful suggestions regarding the questionnaire.

REFERENCES

1. Cellular Telecommunications & Internet Association (CTIA). U.S. Wireless Subscribers. <http://www.wow-com.com/>. Accessed July 22, 2002.
2. Utter, D. Passenger Vehicle Driver Cell Phone Use: Results from the Fall 2000 National Occupant Protection Use Survey. Research Note DOT HS 809 293. NHTSA, U.S. Department of Transportation, 2001.
3. Sundeen, M. *Along for the Ride: Reducing Driver Distractions. Final Report of the Driver Focus and Technology Forum*. National Conference of State Legislatures, Denver, CO, March 2002.
4. Llaneras, R. E. *NHTSA Driver Distraction Internet Forum: Summary and Proceedings*. Westat, Rockville, MD, November 2000.
5. Lissy, K. S., Cohen, J. T., Park, M. Y. and Graham, J. D. *Cellular Phone Use While Driving: Risks and Benefits*. Phase I Report. Harvard Center for Risk Analysis, Harvard School of Public Health, Boston, MA, 2000.
6. Cain, A. and Burris, M. *Investigation of the Use of Mobile Phones While Driving*. Center for Urban Transportation Research, College of Engineering, University of South Florida, 1999.
7. Goodman, M., Bents, F. D., Tijerina, L., Wierwille, W., Lerner, N. and Benel, D. *An Investigation of the Safety Implications of Wireless Communications in Vehicles*. Report No. DOT HS 808-635. NHTSA, U.S. Department of Transportation, 1997.
8. Strayer, D. L. and Johnston, W. A. Driven to Distraction: Dual-Task Studies of Simulated Driving and Conversing on a Cellular Telephone. *Psychological Science*, Vol. 12, No. 6, November 2001, pp. 462-466.

9. Parkes, A. and Hooijmeijer, V. The Influence of the Use of Mobile Phones on Driver Situation Awareness. Paper submitted to the NHTSA Driver Distraction Internet Forum, July 5 - August 11, 2000.
<http://www-nrd.nhtsa.dot.gov/departments/nrd-13/driver-distraction/Topics023060002.htm#A2> , accessed July 22, 2002.
10. Alm, H. and Nilsson, L. The Effects of a Mobile Telephone Task on Driver Behavior in a Car Following Situation. *Accident Analysis and Prevention*, Vol. 27, No. 5, 1995, pp. 707-715.
11. McKnight, A. J. and McKnight, A. S. The Effect of Cellular Phone Use Upon Driver Attention. *Accident Analysis and Prevention*, Vol. 25, No. 3, 1993, pp.259-265.
12. Lamble, D., Kauranen, R., Laakso, M. and Summala, H. Cognitive Load and Detection Thresholds in Car Following Situations: Safety Implications for Using Mobile (Cellular) Telephones While Driving. *Accident Analysis and Prevention*, Vol. 31, No. 6, 1999, pp. 617-623.
13. Redelmeier, D. A. and Tibshirani, R. J. Association Between Cellular-Telephone Calls and Motor Vehicle Collisions. *The New England Journal of Medicine*, Vol. 336, No. 7, 1997, pp. 453-458.
14. Laberge-Nadeau, C., Maag, U., Bellavance, R., Desjardins, D., Messier, S. and Saïdi, Abdelnasser. *Wireless Telephones and the Risk of Road Accidents*. Publication CRT-2001-16. Université de Montréal, Montreal, Quebec Canada, 2001.
15. Violanti, J. M. Cellular Phones and Fatal Traffic Collisions. *Accident Analysis and Prevention*, Vol. 30, No. 4, 1998, pp. 519-524.
16. Sundeen, M. Mobile Telecommunications Technology and Driver Distraction Legislative Activity. Presentation at the Lifesavers 2002 National Conference on Highway Safety Priorities, Lake Buena Vista, FL, June 2002.
17. Reinfurt, D. W., Huang, H. F., Feaganes, J. R. and Hunter, W. W. *Cell Phone Use While Driving in North Carolina*. Highway Safety Research Center, University of North Carolina - Chapel Hill, November 2001. <http://www.hsrb.unc.edu/pdf/2001/cellphone.pdf> .
18. Nationwide. Safe Choices Survey Quiz: National.
<http://www.nationwide.com:80/nisurvey/quizzes/national/ques1.htm>, last accessed Nov. 15, 2002.
19. Stutts, J. C., Huang, H., and Hunter, W. W. *Cell Phone Use While Driving in North Carolina: 2002 Update Report*. University of North Carolina Highway Safety Research Center, in press.

LIST OF TABLES

TABLE 1 Age Distribution of Cell Phone Users and Non-Users Completing the Survey Screener and Comparison to All N.C. Licensed Drivers

TABLE 2 Characteristics of Cell Phone Users and Non-users Participating in the Telephone Survey

TABLE 3 Cell Phone Use Characteristics (n=500 Cell Phone Users)

TABLE 4 Opinions on Level of Distraction of Various Activities While Driving

TABLE 5 Extent Agree with Statements Regarding Cell Phone Safety While Driving

TABLE 6 Support for Possible Legislation with Regard to Self Phone Use While Driving

LIST OF FIGURES

FIGURE 1 Percent of respondents to screener reporting using a cell phone while driving.

TABLE 1 Age Distribution of Cell Phone Users and Non-Users Completing the Survey Screener and Comparison to All N.C. Licensed Drivers

Age Distribution	Cell Phone User		Cell Phone Non-user		Total Completing Screener		All Licensed NC Drivers Age 18+ ^a
	n	Col. %	n	Col. %	n	Col. %	Col. %
18-24	52	9.5	26	5.7	78	7.8	11.7
25-39	153	27.8	72	15.8	225	22.4	33.2
40-54	181	32.9	112	24.6	293	29.1	29.3
55-69	130	23.6	131	28.7	261	25.9	16.6
70+	34	6.2	115	25.2	149	14.8	9.2
Total	550	100.0	456	100.0	1006	100.0	100.0

^a Based on data from "Highway Statistics 1999," published by FHWA's Office of Highway Policy Information and available on the web at <http://www.fhwa.dot.gov/ohim/hs99/tables/dl22.pdf>.

TABLE 2 Characteristics of Cell Phone Users and Non-users Participating in the Telephone Survey

Characteristic	Cell Phone User (n=500)		Cell Phone Non-user (n=150)		P-value ^a
	n	Col. %	n	Col. %	
Age					
18-24	47	9.4	11	7.3	p<.0001
25-39	140	28.0	24	16.0	
40-54	168	33.6	44	29.3	
55-69	118	23.6	48	32.0	
70+	27	5.4	23	15.3	
Sex					
Male	208	41.6	52	34.7	N.S.
Female	292	58.4	98	65.3	
Race					
White	408	83.1	118	83.1	N.S.
Black	60	12.2	20	14.1	
Hispanic	6	1.2	2	1.4	
Other	17	3.5	2	1.4	
Missing / Unknown	9	--	8	--	
Vehicle type					
Passenger car	266	53.4	84	56.4	N.S.
Pickup truck	87	17.5	24	16.1	
Sport Utility Vehicle	84	16.9	17	11.4	
Van / minivan	49	9.8	16	10.7	
Other	12	2.4	8	5.4	
Missing / Unknown	2	--	1	--	

^a Based on chi-square tests of association. N.S. = non-significant p-value.

TABLE 3 Cell Phone Use Characteristics (n=500 Cell Phone Users)

Characteristic	n	Col. %
Use of hands-free device		
Yes	140	28.1
No	358	71.9
Unknown / missing	2	--
Type of hands-free device		
Headset or earpiece connected to phone	89	64.0
Speaker phone system	46	33.1
Other hands-free device	4	2.9
Unknown / missing	1	--
Percent of time use hands-free device when talking ¹		
0-29 percent	17	12.5
30-59 percent	29	21.3
60-89 percent	25	18.4
90-99 percent	19	14.0
100 percent (always)	46	33.8
Unknown / missing	4	--
Believe hands-free device makes talking on phone while driving <u>easier</u> ?		
Yes	125	89.9
No	14	10.1
Unknown / missing	1	--
Believe hands-free device makes talking on phone while driving <u>safer</u> ?		
Yes	121	87.7
No	17	12.3
Unknown / missing	2	--
Total driving time on typical day ¹		
Less than 20 minutes	32	6.4
20-29 minutes	28	5.6
30-59 minutes	101	20.2
1 hour - 1 hour and 59 minutes	163	32.6
2 hours - 2 hours and 59 minutes	84	16.8
3 hours or more	92	18.4

Total time using cell phone while driving on typical day ^a		
Less than one minute	92	18.4
1-4 minutes	148	29.6
5-9 minutes	100	20.0
10-19 minutes	79	15.8
20-29 minutes	28	5.6
30-59 minutes	19	3.8
1 hour	16	3.2
Two hours or more	18	3.6
Percentage of calls that are work-related ^a		
None	260	53.3
1-24 percent	46	9.4
25-49 percent	17	3.5
50-74 percent	67	13.7
75-99 percent	67	13.7
100 percent	31	6.4
Unknown / missing	12	--
Typical number outgoing calls made while driving		
None or almost none	122	24.5
Less than 1 per day	113	22.7
1-2 calls per day	147	29.5
3-5 calls per day	76	15.3
6-10 calls per day	22	4.4
More than 10 calls per day	18	3.6
Unknown / missing	2	--
Typical number incoming calls answered		
None or almost none	174	34.9
Less than 1 per day	81	16.3
1-2 calls per day	134	26.9
3-5 calls per day	69	13.9
6-10 calls per day	24	4.8
More than 10 calls per day	16	3.2
Unknown / missing	2	--
How often pull off the road to use cell phone?		
Never	172	34.8
Rarely	95	19.2
Sometimes	116	23.5
Usually	57	11.5
Always	54	10.9
Unknown / missing	6	--

^a Responses grouped for presentation.

TABLE 4 Opinions on Level of Distraction of Various Activities While Driving

Driving Activity	Average Rating on Scale of 0 to 10 where 0=Not at all distracting and 10=Extremely distracting		P-value for Cell Phone Use Status ^a
	Cell Phone Users (n=500)	Cell Phone Non-Users (n=150)	
Talking with passengers	3.68	4.30	p=.029
Changing the station on the radio	3.75	4.99	p<.001
Talking on a cell phone with a hands-free device	3.36	6.03	p<.001
Drinking a cup of coffee	4.45	6.36	p<.001
Eating a sandwich	5.46	6.70	p<.001
Answering an incoming call on a cell phone	5.62	8.29	p<.001
Reading driving directions	7.62	8.51	p=.001
Finding a location using a road map	8.23	8.51	N.S.
Talking on a cell phone without a hands-free device	6.53	8.74	p<.001
Dialing a cell phone	7.28	9.25	p<.001

^a For cell phone use status, based on regression models incorporating age and gender.

TABLE 5 Extent Agree with Statements Regarding Cell Phone Safety While Driving

Cell Phone Safety Issue	Average Rating on Scale of 0 to 10 where 0=Completely Disagree and 10=Completely Agree		P-value for Cell Phone Use Status ^a
	Cell Phone Users (n=500)	Cell Phone Non-Users (n=150)	
Most can carry on a conversation on their cell phone and still drive safely.	4.76	3.40	p<.001
Cell phones are more beneficial to drivers than they are harmful.	5.40	3.92	p<.001
Using a hands-free device is safer than using a hand-held cell phone.	8.09	6.72	p<.001

^a For cell phone use status, based on regression models incorporating age and gender.

TABLE 6 Support for Possible Legislation with Regard to Self Phone Use While Driving

Cell Phone Legislation		Cell Phone Users (n=500)	Cell Phone Non-Users (n=150)	P-value ^a
Illegal to talk on hand-held phone except in emergency, talking using hands-free device O.K.	% For	70.6	76.7	N.S.
	% Against	25.8	20.7	
	% Unknown	3.6	2.7	
Illegal to talk on any type cell phone (hand-held or hands-free) except in case of emergency.	% For	26.8	63.3	p<.001
	% Against	69.8	32.7	
	% Unknown	3.4	4.0	
Drivers in accidents while talking on phone automatically cited for careless and reckless driving and heavily penalized on insurance premiums.	% For	53.8	78.0	p<.001
	% Against	39.8	15.3	
	% Unknown	6.4	6.7	

^a For cell phone use status, based on regression models incorporating age and gender.

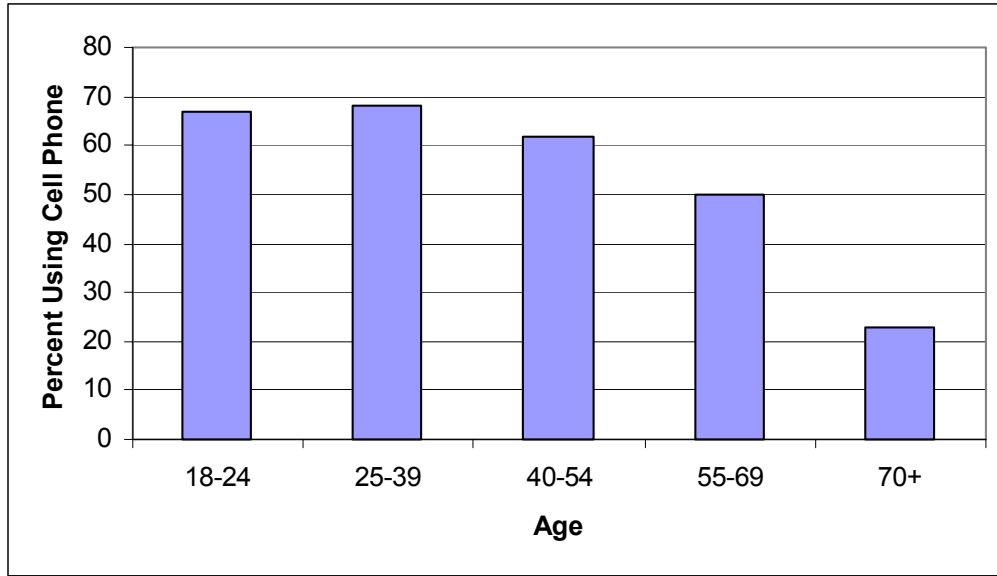


FIGURE 1 Percent of respondents to screener reporting using a cell phone while driving.