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To: House Utilities and Telecommunications Committee

Date: February 10, 2015

Subject: **HB 2219** – Requesting Amendment to Eliminate the Distinction Between Handheld and Hands-Free Wireless Devices as it Relates to Voice Communication While Operating a Motor Vehicle

Chairman Seiwert and members of the House Utilities and Telecommunications Committee, thank you for the opportunity to provide neutral testimony today on behalf of the Kansas Association of REALTORS® regarding one provision contained in **HB 2219**, which would prohibit Kansans from operating a motor vehicle while they engage in voice communication over a handheld wireless device.

REALTORS® Have Absolutely No Objections to Strengthening the State’s Existing Ban on Texting While Driving

Kansas REALTORS® have no objections to the provisions of **HB 2219** that tighten the state’s existing ban on the use of a wireless device to compose or view written communications or text messages. The research on this issue is very clear that engaging in these activities while operating a motor vehicle leads to a statistically significant increase in motor vehicle accidents and near-accidents. The Kansas Association of REALTORS® did not oppose the texting ban when it was first instituted by the Kansas Legislature during the 2010 Legislative Session and we are in full support of the changes contained in **HB 2219** that would clarify the enforcement of the texting ban.

Research Demonstrates that the Use of Hands-Free Wireless Devices Does Not Increase Motor Vehicle Safety

Having said that, the language found in Section 1(b)(2) of **HB 2219** would prohibit a person from using a wireless device to conduct, initiate or receive a voice communication unless they are using a hands-free wireless device. At this time, only 14 states (shown on the map attached on page five of this testimony) have enacted similar bans on the use of a handheld wireless device to engage in voice communications. None of these states are ideologically similar or in geographic proximity to Kansas (all of the states are either on the eastern or western coasts).

Under Section 1(b)(2) of **HB 2219**, a person would be allowed to use a hands-free wireless communication device to engage in voice communication while operating a motor vehicle. However, nearly every single piece of research that has been done on this topic has shown that there is absolutely no demonstrable improvement in cognitive distraction or reduction in motor vehicle accidents or insurance claims between persons operating a motor vehicle and using a hands-free versus a handheld wireless device.

According to the National Safety Council’s (NSC) examination of more than 30 research studies and reports that used a variety of research methods and statistical analyses to compare driver performance between handheld and hands-free wireless devices, all studies concluded that the use of hands-free wireless devices provided absolutely no improvement in motor vehicle safety or cognitive awareness when driving. I have attached a summary of this research on pages 6 through 11 of this testimony.

Similarly, the AAA Foundation for Traffic Safety published a report in December 2008 that concluded that studies comparing the risks associated with using handheld and hands-free wireless devices while driving found that the risks associated with using either type of device were indistinguishable. Furthermore, the Highway Loss Data Institute (HLDI) published a study in December 2009 that concluded that there was no decrease in collision claims submitted in states that had enacted a ban on voice communication through handheld wireless devices.

Unfortunately, we can all agree that distracted driving is a problem and that the state should engage in all cost-effective and practical methods to reduce the number of traffic accidents, injuries and fatalities that result from this problem. At the same time, there are many causes of distracted driving that can never be legislated out of existence and many of these causes are much more prevalent than engaging in voice communications over a handheld wireless device.

Numerous studies have all concluded that the following activities reduce cognitive awareness for the operators of motor vehicles more than talking on a handheld wireless device: engaging in a conversation with another occupant of the motor vehicle, drinking or eating while driving and adjusting the radio station or the volume of music in the motor vehicle. Having said that, we do believe that it is important for the Kansas Legislature to take action on cost-effective and practical methods of reducing the problems associated with distracted driving, including strict enforcement of the state's existing ban on texting while driving.

Balloon Amendment Reinstates the Ability to Engage in Voice Communications on Handheld Wireless Devices

As stated previously in this testimony, the Kansas Association of REALTORS® strongly supports the provisions in **HB 2219** that strengthen the enforcement of the state's existing ban on texting while operating a motor vehicle. The research on this issue is very clear that engaging in these activities while operating a motor vehicle leads to a statistically significant increase in motor vehicle accidents and near-accidents.

However, nearly every study conducted on this issue has also demonstrated that the use of hands-free wireless devices to engage in voice communication while operating a motor vehicle provides absolutely no improvement in motor vehicle safety or cognitive awareness compared to engaging in voice communication over a handheld wireless device. As such, we believe that the artificial distinction created between handheld and hands-free wireless devices in **HB 2219** is unnecessary as research suggests that it will not noticeably improve traffic safety.

Accordingly, we would suggest that the committee consider the adoption of an amendment that would eliminate the distinction between handheld and hands-free wireless devices and reinstate the ability of a person to operate a motor vehicle while using a wireless device to engage in voice communications. Most importantly, the adoption of such an amendment would have absolutely no impact on the remaining provisions in **HB 2219** pertaining to the prohibitions on composing or viewing written communications or text messages.

In addition, the suggested balloon amendment on pages three and four of this testimony would also continue to prohibit a person under the age of 18 from using either a handheld or hands-free wireless device while operating a motor vehicle. In our opinion, there are legitimate reasons to differentiate the treatment of adults and minors under this act including the fact that minors are generally not required to use a wireless device to engage in a business or profession while operating a motor vehicle.

Under the suggested balloon amendment, the new language in lines 34 through 36 on page one and line one on page two of the bill would be stricken. This would eliminate the distinction between handheld and hands-free wireless devices and ensure that individuals could use either a handheld or hands-free wireless device to engage in voice communication while operating a motor vehicle.

Moreover, the suggested balloon amendment would restore the language that had been stricken in lines 15 through 17 on page two of the bill in the current statutory language found in K.S.A. 8-15,111(d)(3). This would clarify that a person could read, select or enter a telephone number in a handheld wireless device for the purpose of making or receiving a phone call without violating the statute's prohibition on texting while driving.

Conclusion

In closing, we would respectfully request that the committee consider the adoption of an amendment that would preserve the ability of a person to operate a motor vehicle while using a handheld wireless device to engage in voice communication. Thank you for the opportunity to provide comments on this very important issue.

HOUSE BILL No. 2219

By Committee on Utilities and Telecommunications

2-3

1 AN ACT regulating traffic; concerning the operation of a motor vehicle;
2 providing penalties for the use of a wireless communication device,
3 license examination questions; amending K.S.A. 8-2118 and K.S.A.
4 2014 Supp. 8-240 and 8-15,111 and repealing the existing sections.

5
6 Be it enacted by the Legislature of the State of Kansas:
7 Section 1. K.S.A. 2014 Supp. 8-15,111 is hereby amended to read as
8 follows: 8-15,111. (a) As used in this section:

9 (1) "Wireless communication device" means any handheld wireless
10 electronic communication device that provides for voice or data
11 communication between two or more parties, including, but not limited to,
12 a mobile or cellular telephone, a text messaging device, a personal digital
13 assistant that sends or receives messages, an audio-video player that sends
14 or receives messages or a laptop computer. "Wireless communication
15 device" does not include a device which is voice-operated and which
16 allows the user to send or receive a text based communication without the
17 use of either hand, except to activate or deactivate a feature or function.

18 (2) "Write, send or read a written communication" means using a
19 wireless communication device to manually type, send or read a written
20 communication, including, but not limited to, a text message, instant
21 message or electronic mail. "Hands free wireless communication device"
22 means a wireless communication device that has an internal feature or
23 function or is equipped or operated with an attachment or addition,
24 whether or not permanently part of such wireless communication device,
25 by which a user engages in voice or data communication between two or
26 more parties without the use of either hand except to activate, deactivate
27 or initiate a function of the hands free wireless communication device.

28 (b) Except as provided in subsections (c) and subsection (d);:

29 (1) No person shall operate a motor vehicle on a public road or
30 highway while using a wireless communications device to write, send or,
31 read, post, view, access, browse, transmit, save or retrieve a written
32 communication or an electronic data communication unless using a hands
33 free wireless communication device;

34 ~~(2) no person shall operate a motor vehicle on a public road or~~
35 ~~highway while using a wireless communication device to initiate, receive~~
36 ~~or conduct a voice communication unless using a hands free wireless~~

Summary of Suggested Balloon Amendment

- (1) Reinstate the ability of a person to operate a motor vehicle while using a handheld or hands-free wireless communication device to initiate, receive or conduct a voice communication
(2) Reinstate the exception to the texting ban to allow a person to read, select or enter a telephone number in a wireless communication device for the purpose of making or receiving a phone call

and

1 ~~communication device, and~~

2 ~~(3) no person under the age of 18 shall operate a motor vehicle on a~~
3 ~~public road or highway while using a wireless communication device or~~
4 ~~hands free wireless communication device.~~

(2)

5 (c) An operator of a motor vehicle is presumed to be using a wireless
6 communication device to initiate, receive or conduct a voice
7 communication if such operator is holding such device in the immediate
8 proximity of such operator's ear.

9 (d) The provisions of subsection (b) shall not apply to:

10 (1) A law enforcement officer or emergency service personnel acting
11 within the course and scope of the law enforcement officer's or emergency
12 service personnel's employment;

13 (2) a motor vehicle stopped off the regular traveled portion of the
14 roadway;

15 ~~(3) a person who reads, selects or enters a telephone number or name~~
16 ~~in a wireless communications device for the purpose of making or~~
17 ~~receiving a phone call;~~

a person who reads, selects or enters a telephone number or name in a wireless communications device for the purpose of making or receiving a phone call;

18 (4) a person who receives an emergency, traffic or weather alert
19 message; or

20 ~~(5)(4) a person receiving a message related to the operation or~~
21 ~~navigation of the motor vehicle;~~

22 (5) the use of any non-cellular two way radio to transmit or receive
23 communications;

24 (6) a person who reports current or ongoing illegal activity to law
25 enforcement;

26 (7) a person who uses a wireless communication device or hands free
27 electronic device to prevent imminent injury to a person or property; or

28 (8) a person who relays information between transit or a for-hire
29 operator and the operator's dispatcher if the device is permanently affixed
30 to the motor vehicle.

31 ~~(d) The provisions of subsection (b) shall not prohibit a person from~~
32 ~~using a wireless communications device while operating a moving motor~~
33 ~~vehicle to:~~

Renumber the subsections accordingly.

34 (1) Report current or ongoing illegal activity to law enforcement;

35 (2) prevent imminent injury to a person or property; or

36 (3) relay information between transit or for-hire operator and the
37 operator's dispatcher, in which the device is permanently affixed to the
38 motor vehicle.

39 (e) From and after the effective date of this act and prior to January 1,
40 2011, a law enforcement officer shall issue a warning citation to anyone
41 violating subsection (b) Violation of this section is punishable by a fine of:

42 (1) \$60, for a first conviction;

43 (2) \$120, for a second conviction within five years immediately

Appendix A Studies Comparing Hands-Free and Handheld Cell Phones



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Abdel-Aty, M.	Investigating the relationship between cellular phone use and traffic safety	ITE Journal 73 (10) 2003	20	Simulator	Conversation	Low/high	HF, HH	Lane deviation, leaving road, crossing median, disobeying speed limit, crashing, failing to stop, wrong way, and hitting pedestrian	Results show no significant difference between using a hands-free or a handheld cell phone, although both were related to significantly higher error rates than baseline. Lane deviation and crossing the median were significantly more likely to occur than other errors. Crashing and failing to stop were significantly less likely to occur than other errors. Also, distraction-related errors did not end with termination of the phone call. Drivers with higher citation rates and lower levels of experience tended to make more errors while driving and using a phone.	Original research
Alm, H. Nilsson, L.	Changes in driver behaviour as a function of hands-free cell phones – a simulator study	Accident Analysis and Prevention 26 1994	40	Simulator	Information processing	Low/High	HF	Reaction time, lane position, speed level, and workload	Findings show a mobile telephone task negatively affected reaction time and led to reduction of speed level. When drivers had to perform a difficult driving task, findings showed a mobile telephone task had an effect only on the driver's lateral position. The mobile telephone task led to increased workload for both the easy and the difficult driving task.	Original research
Alm, H. Nilsson, L.	The effects of a mobile telephone task on driver behaviour in a car following situation	Accident Analysis and Prevention 27 1995	40	Simulator	Information processing	N/A	HF	Choice reaction time, headway, lateral position, and workload	A mobile telephone task had a negative effect on drivers' choice reaction time, and the effect was more pronounced for elderly drivers. Subjects did not compensate for 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.	Original research
Beede, K.E. Kass, S.J.	Engrossed in conversation: The impact of cell phones on simulated driving performance	Accident Analysis and Prevention 2, 415-421 2006	36	Lab	Cognitive	N/A	HF	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	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.	Original research
Brace, C.L. Young, K.L. Regan, M.A.	Analysis of the literature: The use of mobile phones while driving	Monash University Report No. 2007: 35 2007	N/A	N/A	N/A	N/A	N/A	Visual search pattern, reaction time, speed, lateral position, and throttle control	Using a cell phone can distract drivers visually, physically, and cognitively. Distraction caused by talking on a cell phone, regardless of handheld or hands-free application, impairs drivers' ability to maintain appropriate speed, throttle control, and lateral position of the vehicle. It also can impair drivers' visual search patterns, reaction time, and decision-making process.	Literature review



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Brookhuis, K.A. De Vries, G. De Waard, D.	The effects of mobile telephoning on driving performance	Accident Analysis and Prevention 23 1991	12	Field	Information processing	Light/heavy/ city	HH, HF	Lateral position speed, following distance, reaction time, number of mirror glances, and heart rate	Results showed no difference in workload between handheld and hands-free. Both types had a significant decrease in changes in lateral positioning while on the phone. Subjects checked the rearview mirror significantly less often while phoning. Reaction time to brake increased (although not significantly) on the phone. Reaction time to speed variations and heart rate increased significantly. When subjects manually dialed numbers, a substantial effect on steering wheel amplitude was apparent. Distraction is not inhibiting at the operational level, but at the tactical level.	Original research
Caird, J.K. Willness C.R. Steel, P. Scialfa, C.	A meta-analysis of the effects of cell phones on driver performance	Accident Analysis and Prevention 40, 1282-1293 2008	~2,000	N/A	N/A	N/A	N/A	Reaction time, vehicle control, and speed	A comprehensive meta-analytical study of effects of cell phone use on driving performance based on 33 independent inquiries. Handheld and hands-free phones produced similar reaction time decrements. A mean increase in reaction time of .25 seconds was found for all types of phone-related tasks. Drivers using either phone type do not appreciably compensate by giving greater headway or reducing speed.	Meta-analysis
Charlton, S.G.	Distractive effects of cell phone use	Land Transport NZ Report No. 349 2008	119	Simulator	Naturalistic	Low/high	HF	Reaction to hazards	Driving performance suffered during cell phone use when compared to in-car passenger conversations and no-conversation controls in terms of speed, reaction times, and avoidance of road and traffic hazards.	Original research
Cooper, P.J. Zheng, Y. Richard, C. Vavrik, J. Heinrichs, B. Sigmund, G.	The impact of hands-free message reception/ response on driving task performance	Accident Analysis and Prevention 35 2003	41	Field	Information processing	Low/High	HF	Reaction time	The results clearly showed a negative impact of the message task on driver decision-making performance when this involved the more complex tasks of weaving, especially left-turning. These decision-making decrements were exacerbated by adverse pavement surface conditions. Overall effect of the messages on the traffic signal task (long trigger) was to produce a more conservative response among subject drivers. When the driving task moved away from the familiar and towards the more demanding, the effect of the cell message intervention on driver performance changed. In the more critical short-trigger weave situation (short spaces between targets), drivers decelerated less when the messages were playing than they did under the no-message condition. Thus, made significantly less speed adjustment and drove substantially faster through the weave maneuver than they did when not exposed to the messages. The time to collision was shorter (less safe) when subjects were listening/responding to messages. Subjects did not adjust their safety margin to account for the wet road when they were listening and responding to messages as they did when not so engaged.	Original research
Horrey, W.J. Wickens, C.D.	Examining the impact of cell phone conversations on driving using meta-analytic techniques	Human Factors 48(1), 196-205 2006	N/A	N/A	N/A	N/A	N/A	Reaction time and lane keeping	A meta-analytical study based on 23 independent inquiries. Hands-free and handheld phones revealed similar patterns of results for both measures of performance. Conversation tasks tended to show greater costs than information-processing tasks.	Meta-analysis



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Iqbal, S.T. Ju, Y.C. Horvitz, E.	Cars, calls, and cognition: Investigating driving and divided attention	CHI 2010 Paper	18	Simulator	Conversation and information processing	Low/High	HF	Collisions, following instructions, sudden braking, and speed	The collision rate in the driving-while-talking condition was significantly higher than in the no-phone driving condition (baseline). High-complexity road conditions were associated with higher collision rates. Talking on a phone increased the number of missed turns and the frequency of sudden braking. Talking on a phone also led to a decrease in speed. Information retrieval (e.g., answering questions) had the most negative influence on driving performance.	Original research
Ishigami, Y. Klein, R.M.	Is a hands-free phone safer than a handheld phone?	Journal of Safety Research 40, 157-164 2009	N/A	N/A	N/A	N/A	N/A	Speed, lane maintenance, and reaction time	Talking on the phone, regardless of phone type, negatively impacts driving performance, especially in detecting and identifying events. Performance while using a hands-free phone was rarely found to be better than when using a handheld phone. Drivers may compensate for the deleterious effects of cell phone use when using a handheld phone but neglect to do so when using a hands-free phone.	Literature review
Lamble, D. Kauranen, Laakso, Summala	Cognitive load and detection thresholds in car following situations: safety implications for using mobile (cellular) telephones while driving	Accident Analysis and Prevention 31 1999	19	Field	Information processing	Low	Simulated	Reaction time	The results indicated drivers' detection ability in a closing headway situation was impaired by about 0.5 seconds for brake reaction time and almost 1 second for time-to-collision when they were doing a non-visual cognitive task while driving. This impairment was similar to when the same drivers were dividing their visual attention between the road ahead and dialing series of random numbers on a keypad.	Original research
Lui, B.-S. Lee, Y.-H.	Effects of car-phone use and aggressive disposition during critical driving maneuvers	Transportation Research Part F: Traffic Psychology and Behaviour 8, 369-382 2005	12	On-road	Cognitive	Varied	HF	Task performance (response time, correct rate), driving performance, physiological responses, and compensatory behavior	Analysis of task performance revealed a mean correct rate of 90% for addition tests in the laboratory; however, this decreased to 87.5% in city traffic and 75.8% at intersections. The mean (SD) response time for these additional tests was 3.8 (1.9) seconds in the laboratory, 4.5 (1.9) seconds in city traffic, and 5.6 (2.4) seconds at the intersections. These results confirm the notion that the combination of decision making and car-phone communication at signalized intersections increases crash risk. This study examined compensatory behavior as drivers attempt to reduce workload. Driving speed while passing through green lights and simultaneously performing additional tests was 6.4% lower (45.1 km/h) than in normal driving. This indicates drivers adjust their speeds to keep subjective perception of risk levels constant. When they respond to a red light, distraction causes drivers to react later; to compensate, drivers brake harder.	Original research
Lui, B.-S. Lee, Y.-H.	In-vehicle workload assessment: effects of traffic situations and cellular telephone use	Journal of Safety Research 37 (1), 99-105 2006	12	On-road	Cognitive	Varied	HF	Lateral position, speed, task and driving performance, physiological responses, and compensatory behavior	Analysis of task performance revealed mean response time was markedly increased (11.9%) for driving on urban roads compared with motorways. Mean driving speed only decreased 5.8% during phone tasks in comparison to driving without distractions. Overall physiological workload increased through compensatory behavior in response to phone tasks.	Original research



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Matthews, R. Legg, Charlton	The effect of cell phone type on drivers subjective workload during concurrent driving and conversing	Accident Analysis and Prevention 35 2003	13	Field	Conversation	Low	HH, HF	Workload	All phone types resulted in significantly higher ratings of workload than control, including mental demand, physical demand, temporal demand, performance, effort, and frustration. Intelligibility was lower than the handheld phone for the hands-free speaker, but not the hands-free headset. Significant differences were found in physical demands between the handheld and hands-free phones, and frustration between handheld and hands-free speaker versus hands-free headset phones. No significant differences between the phone types were found for mental demand, temporal demand, performance or effort.	Original research
McEvoy, S.P. Stevenson, M. R. McCartt, A. T. Woodward M. Haworth, C. Palamara, P.	Role of mobile phones in motor vehicle crashes resulting in hospital attendance: A case-crossover study	British Medical Journal 331(7514) 2005	456	N/A	N/A	N/A	N/A	Crashes	Mobile phone use during and up to 10 minutes before the estimated time of crash was associated with a fourfold increase in the likelihood of crashing. Similar results were obtained when we analyzed only the interval up to 5 minutes before a crash. Analyses with paired matching to compare the hazard interval to an equivalent single control interval also showed significant associations between mobile phone use and the likelihood of a crash. Sex, age group, or type of mobile phone did not affect the association between phone use and risk of crash. Both handheld and hands-free phone use while driving was associated with a fourfold increased risk.	Original research
Nilsson, L. Alm, H.	Effects of mobile telephone use on elderly drivers' behavior – including comparisons to younger drivers' behavior	VTI, DRIVE Project V1017 (BERTIE) Report No. 53 1991	20	Simulator	Information processing	Low	HF	Reaction time, speed, lateral position, and mental workload	Cell phone conversation had a negative impact on reaction times for both older and younger drivers. Cell phone use was associated with a reduction in speed and increased variation in lateral position.	Original research
Parkes, A.M. Hooijmeijer, V.	Driver situation awareness and carphone use	Proceedings of the 1st Human-Centered Transportation Simulation Conference (U of Iowa) 2001	15	Simulator	Information processing	Low	HF	Tracking and reaction time	Drivers who talked on a hands-free cell phone showed slower reaction time, particularly at the beginning of the conversation, and reduced awareness of surroundings compared with drivers who were not using a cell phone.	Original research
Patten, CJD. Kircher, A. Östlund, J. Nilsson, L.	Using mobile telephones: Cognitive workload and attention resource allocation	Accident Analysis and Prevention 36(3) 2004	40	Field	Information processing	Low	HH, HF	Reaction time	Participants' reaction times to LED increased significantly when conversing, but there was no significant difference between hands-free and handheld units. Increasing the complexity of conversation significantly increased reaction time for both phone types. Accuracy of peripheral detection was significantly lower for both phone types versus baseline. Handheld usage led to lower means speeds while hands-free usage was associated with increases in mean speed.	Original research
Rakauskas, M. Gugerty, L. Ward, N.J.	Effects of cell phone conversations on driving performance with naturalistic conversation	Journal of Safety Research 35, 453-464 2004	24	Simulator	Conversation	Low/high	HF	Workload demand, tracking, and reaction time	Hands-free 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.	Original research



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Ranney, T. Watson, G. Mazzae, E.N. Papelis, Y.E. Ahmad, O. Wightman, J.R.	Examination of the distraction effects of wireless phone interfaces using the National Advanced Driving Simulator- Preliminary report on freeway pilot study	NHTSA Pre. No. DOT 809 737 2004	12	Simulator	Cognitive	Low/high	HF, HH	Reaction time, lateral position, headway, speed, and time to collision	There were no statistically significant differences between drivers using hands-free and handheld on the driving performance outcome measures. Handheld phone use was associated with fastest dialing times and fewest dialing errors.	Original research
Redelmeier, D.A. Tibshirani, R.J.	Association between cellular-telephone calls and motor vehicle collisions	New England Journal of Medicine 336(7) 1997	699	N/A	N/A	N/A	N/A	Crashes	Cell phone use is associated with an increased risk of property-damage-only collision compared with no cell phone use.	Original research
Rosenbloom, T.	Driving performance while using cell phones: An observational study	Journal of Safety Research 37, 207-212 2006	24	Field	Conversation	Varied	HF	Speed, gap, and self-reported disturbance	There were no statistically significant correlations between drivers' self-reported driving disturbance and actual disturbances in speed and gap keeping, thus they were not aware of their performance decrements. Speed was not significantly different when drivers were on the phone versus not on the phone. However, safe gap keeping diminished significantly when drivers were on the phone.	Original research
Strayer, D.L. Drews, F.A.	Effects of cell phone conversations on younger and older drivers	Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting pp. 1860-1864 2003	40	Simulator	Conversation	Low	HF	Brake onset time, following distance, speed, and recovery time	Cell phone use in simulated driving slowed braking reaction time by 18 percent, increased following distance by 12 percent, had no impact on speed, and increased speed recovery time by 17 percent compared with driving only.	Original research
Strayer, D.L. Drews, F.A. Johnston, W.A.	Cell phone-induced failures of visual attention during simulated driving	Journal of Experimental Psychology: Applied 9, 23-32 2003	Varied (20-40)	Simulator	Information processing	Low/high	HF	Reaction time	Use of a hands-free cell phone degrades driving performance compared with control conditions. Cell phone conversations increased braking reaction time and impaired both explicit recognition and implicit perceptual memory.	Original research
Strayer, D.L. Drews, F.A.	Profiles in driver distraction: Effects of cell phone conversations on younger and older drivers	Human Factors 46 (4), 640-649 2004	40	Simulator	Naturalistic conversation	Moderate	HF	Reaction time, headway, and speed	Drivers distracted by competing activities (i.e., cell phone conversation) demonstrated poor ability to control their speed and following distance. Cell phone use was associated with a twofold increase in the number of rear-end collisions.	Original research
Strayer, D.L. Drews, F.A. Crouch, D.J.	A comparison of the cell phone driver and the drunk driver	Human Factors 48(2) 2006	40	Simulator	Conversation	Low/high	HFH	Braking response, driving speed, and following distance	Handheld and hands-free cell phone cause similar levels of impairment in driving performance. When drivers were talking on either a handheld or hands-free phone, their braking reactions were delayed and they were involved in more crashes than when they were not talking on a cell phone.	Original research



Authors	Title	Publication/ Organization, Issue, Year	No. of Study Participants	Setting	Phone Task	Road Complexity	Phone Type	Measured Outcomes	Key Findings	Publication Type
Strayer, D.L. Johnston, W.A.	Driven to distraction: Dual-task studies of simulated driving and conversing on a cellular telephone	Psychological Science 12(6) 2001	48	Non-driving	Conversation	N/A	HH, HF	Reaction time and missed signals	Handheld and hands-free both showed significant increases in reaction time, but there were no differences found between decrements for handheld versus hands-free. Probability of missing the simulated traffic signal doubled when subjects were on the phone. Response time slowed significantly for both, but was slower when study subjects were talking than when they were listening. Gender and age did not contribute to differences.	Original research
Törnros, J.E.B. Bolling, A.K.	Mobile phone use – Effects of handheld and handsfree phones on driving performance	Accident Analysis and Prevention 37(5) 2005	48	Simulator	Information processing	Low/high	HF	Peripheral detection, lateral position, and speed	Use of handheld and hands-free phone increased mental workload (peripheral detection), lateral position deviation due to dialing, and decreased lateral position deviation due to talking. Talking on a handheld phone reduced speed (compensatory effect).	Original research
Treffner, P.J. Barrett, R.	Hands-free mobile phone speech while driving degrades coordination and control	Transportation Research Part F7, 229–246 2004	9	On-road	Information processing	Low	HF	Cornering, controlled braking, and obstacle avoidance	While talking on a cell phone, drivers demonstrated brake initiation that was temporally closer to the corner than when not using the phone. During the conversations, drivers had to employ a higher degree of late deceleration, resulting in a harsher style of braking. Under conversation, there was a later onset of mediolateral g-forces, which suggests a delayed or slower anticipatory response under critical conditions such as obstacle avoidance.	Original research
Uno, H Hiramatsu, K.	Effects of auditory distractions on driving behavior during lane change course negotiation: Estimation of spare mental capacity as an index of distraction.	JSAE Review 21, 219-224 2000	16	On-road	Cognitive	Low/high	HF	Speed	Speed control deteriorated when the driver's mental capacity decreased below a certain level (6-7 bits/second) due to an auditory arithmetic task that was communicated via headphones.	Original research
Young, K. Regan, M	Driver distraction: A review of the literature	Australasian College of Road Safety, 379-405 2007	N/A	N/A	N/A	N/A	N/A	Degradations in driving performance	Results showed that although the physical distraction associated with handling the phone can present a significant safety hazard, the cognitive distraction associated with being engaged in a conversation also can have a considerable effect on driving. Indeed, studies have found that conversing on a hands-free phone while driving is no safer than using a handheld phone.	Literature review

