Analele Universităţii din Oradea, Seria Geografie **XXXI**, no. 1/**2021**, pp.**37-44**
ISSN **1221-1273**, E-ISSN **2065-3409** DOI 10.30892/auog.311105-843

ROAD CHARACTERISTICS, TRAFFIC NATURE AND DRIVERS' PROPENSITY TO USE MOBILE PHONE

Olabisi Michael OLAPOJU *
Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria,
oolapoju@oauife.edu.ng, olapojuolabisimichael@gmail.com

Citation: Olapoju, O.M. (2021). Road Characteristics, Traffic Nature and Drivers' Propensity to Use Mobile Phone. *Analele Universităţii din Oradea, Seria Geografie*, 31(1), 37-44. https://doi.org/10.30892/auog.311105-843

Abstract: The objective of this study was to investigate whether drivers' propensity to use mobile phone during active driving was determined by given road type, road condition and traffic nature. Naturalistic observations of vehicles were conducted on intra-city roads in Lagos, Ibadan and Ile-Ife and intercity roads between Lagos-Ibadan and Ibadan-Ife expressways. Interview was also conducted with 26 drivers purposively selected to provide narrative account of personal mobile phone use while driving. Descriptive and content analysis techniques were used to present the results of both the observation and interview. Results showed that 5.18% of a total 2627 drivers observed on the intra-city roads were seeing with their phones during active driving while 6.09% of 952 drivers observed on the intercity expressways were seeing using their mobile phones. Results also revealed that high percentage of drivers would not use their phone on high-ways (H-Ws), bumpy roads (BRs) and low-density traffic (LDT) while most drivers use their mobile phones on street-level roads (SLRs), smooth surface roads (SSRs). Factors such as exigency of calls, suitability to pick calls, consideration for speed, chaotic potential outcomes were among factors that determine their penchant to pick calls.

Key words: Mobile phones, driver, propensity, road characteristics, traffic nature

* * * * * *

INTRODUCTION

Since the introduction of mobile phones and its evolution into smartphones, its adoption and use has significantly increased, especially because of its capability to function as a full computer, its user-friendliness and a wide range of applications that created a world of "possibilities" to users/owners (Gretzel, 2010; Wang et al., 2012). Besides, its "carriability" confers on it a personalized attachment tendency than any other form of computer. This attachment tendency through carriability nature has created a huge measure of intrusiveness of mobile phone into virtually every facet of human endeavours. Significant of these intrusions is found in driving activities where mobile phone use has imprinted a challenging and unassailable negative influence, especially in relation to safe driving (Goodman et al., 1999; Seo and Torabi, 2004; McEvoy et al., 2006).

Since its adoption, studies have shown that mobile phone use during active driving is growing at an exponential rate (Edwards, 2001). However, studies established the deleterious

* Corresponding Author

effect of mobile phone use (Drews et al., 2009; Salvucci and Beltowska, 2008) especially in terms of its intrusion into driving tasks such as lane keeping and speed maintenance. Though questions keep evolving on various dimensional influence of mobile phone use on driving performance, observational studies have frequently revealed that mobile phones are still being used in vehicles (Johal et al., 2005; McD Taylor et al., 2003) and suggested that mobile phone use may result in hazardous increases in reaction time, and general degradation in driving performance (Horrey and Lesch, 2009). Studies including those of Klauer et al. (2006), Olson et al., (2009), Dingus et al., (2011) found that talking itself is not associated with an increase in risk, engaging in other mobile phone-related subtasks (reaching for, answering, dialing, texting, internet use and use of social networking applications) may further increase crash risk (Simons-Morton et al., 2014; Fitch et al., 2015; Irwin et al., 2015; McEvoy et al., 2006; Hosking et al., 2009; Klauer et al., 2014; Bassick, Reed and Robins, 2011). White et al. (2004) conducted two studies on risk perceptions of mobile phone use while driving. Seo and Torabi (2004) established a relationship between the frequency of use of mobile phones by drivers while driving and rate of crashes or near-crashes experienced. Crundall et al. (2005) indicated the interference deriving from the conversation itself was a potential risk indicating higher talk duration increased the risk. Generally however, all the studies support arguments that mobile phone use dramatically increases the cognitive load of the driver, which multiplies the risks for accidents. The increase on drivers' attention is explained either by the need to handle the phone device per se or by the demand to handle the conversation (Alm and Nilsson, 1995; Manalavan et al., 2002). Despite the prevailing use of mobile phones among drivers and its widely reported negative impacts on safe driving, little is known about drivers' penchant to using mobile phones on a given road type, road condition and traffic nature especially in the developing countries where studies on driving and mobile phone use linkage are scanty. This study examines whether road type, road condition and nature of traffic increase drivers' likelihood to use mobile phone.

BACKGROUND

This study is built around two main theories. One is the theory of propensity and the other is the theory of reasoned action. While the former explains the proclivity of performing a given behaviour given the prevailing condition, the latter explains performance or nonperformance of a given behavior based on the strength of one's intention to perform or not perform that behavior. According to Hozer and Doszyn (2004), propensity might be considered as a "slope of posture" towards something that makes probability of certain event higher. Propensity is considered as functional dependencies between certain variables that depend both on objective and subjective factors. Popper (1990) consider propensity as a result of all conditions that generate events, a characteristic of a whole situation and that probability of an event taking place is inherent in a given situation. By this, propensity is understood as a relative frequency which results from the intervention of various kinds of causes.

According to the theory of reasoned action, performance or nonperformance of a given behavior is primarily determined by the strength of one's intention to perform or not perform that behavior (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). However, intention is defined as the subjective likelihood that one will perform or try to perform the behavior. The intention to perform a given behavior is, in turn, viewed as a function of two basic factors: one's attitude toward performing the behaviour and one's subjective norm concerning the behaviour, that is, the perception that one's important others think that one should or should not perform the behavior in question.

Based on the aforementioned theories, drivers' propensity to use their mobile phones is premised on and inherent in the characteristics of a situation (now, the condition of the road, types of road and traffic density), whereas, their desire to use mobile phone while driving, even given the driving environment, is premised on the strength of their intention (desire) to use mobile phone while in active driving.

STUDY AREA AND METHODS

Study area comprised of Lagos, Ibadan and Ile-Ife (major cities in Southwestern Nigeria in their order of population and economic importance). Lagos is Nigeria's commercial nerves and providing the most important gateway to the country. Though an erstwhile administrative capital of Nigeria, it is still regarded as the commercial capital and the most important city in Nigeria. Ibadan is the administrative capital of Oyo State Study adopted observation and interview methods, while Ile-Ife provides a important city in Osun State. Natural observation and ethnography were used for data collection. Natural observation of the nature of selected roads and traffic condition on the roads were conducted (Huisingh et al., 2015). Two intercity roads and three intra-city roads were selected in Lagos, Ibadan and Ile-Ife. Intercity road connecting Lagos and Ibadan is about 138 km, while road connecting Ibadan and Ile-Ife measures 73km. Both routes are highways linking the Southwest to many parts of the country. However, Lagos Ibadan road is undergoing construction and further expansion to enhance the efficiency of transporting majority of importation from Lagos ports being the gateway to the nation. Intra-city roads selected included the Oshodi/Anthony/Gbagada route (Lagos), Iwo-Road/Adegbayi/Airport route (Ibadan) and Ede-road/Mayfair/Lagere route (Ile-Ife).

For the intercity routes, observations were made by travelling in an informal public cab between Lagos and Ibadan and between Ibadan and Ile-Ife, respectively. Researcher occupied the front seat and observed only vehicles overtaken by the researcher's cab. Only vehicles to the right of the researcher's cab were observed. This provided the researcher clearer view of drivers in the overtaken vehicles. For the intra-city observations, strategic points that posed no threat to safety of the researcher were selected in the three routes and as such that provided no obstruction to good observation.

Researcher observed if drivers were using mobile phone during active driving on these selected routes. However, vehicles with tinted windows that obscured clearer observation were excluded from the observations. Vehicle observed were classified into cars, buses and trucks. A total of 2627 vehicles were observed on the intra-city routes while 952 vehicles were observed on the inter-city routes. In all a total of 3579 vehicles were observed.

In addition, using ethnographic method, private conversation were made with 13 private car drivers and 13 commercial vehicle drivers, making a total of 26 drivers (not part of the observed drivers) who were active drivers and who possessed mobile phones with a view to providing additional support to our naturalistic observation. Drivers interviewed were included based on the possession of valid driver's license, possession of mobile phone, being active drivers up till the month preceding the conduct of the interview. Questions asked included whether they use mobile phone while driving, whether road type, road condition and traffic nature influence their use of mobile phone during active driving. By road type, we considered high-way with fast flowing traffic, city routes with medium traffic, and street-level roads. By road condition, we considered paved and rough surface roads, bumpy surfaces and by traffic nature, we considered degree of denseness of traffic on each selected road.

Results of the observation were presented using descriptive charts, while result of the interview was presented using some descriptive method and content analysis method.

RESULTS

Observed vehicles on the intercity and intra-city roads

Table 1 represents observation made on selected intercity roads (Lagos-Ibadan and Ibadan-Ife Expressways). 600 vehicles were observed during the journey along Lagos-Ibadan Expressway. Of these, 456 were cars, 131 buses and 13 trucks. 6.3%, 7.6% and 15.4% of drivers of cars, buses and trucks were seen using mobile phones while driving. In all, 6.8% of the total 600 vehicles observed had their drivers using mobile phones during active driving. Similarly, 352 vehicles were observed on Ibadan-Ife Expressway out of which 199 were cars, 123 buses and 30 trucks. 6.5% of drivers of cars were observed using their mobile phones, while 1.6% and 6.7% of drivers of buses

and trucks, respectively, were observed using their mobile phones. In all, 4.8% of 352 drivers observed were using mobile phones during driving.

Table 1. Observation on intercity roads

	LAGOS-IBADAN EXPRESSWAY			IBADAN-IFE EXPRESSWAY			TOTAL		
	Obsvd	DUP	% Freq	Obsvd	DUP	% Freq	Obsvd	DUP	% Freq
Car	456	29	6.3	199	13	6.5	655	42	6.4
Bus	131	10	7.6	123	2	1.6	254	12	4.7
Truck	13	2	15.4	30	2	6.7	43	4	9.3
Total	**600**	**41**	**6.8**	**352**	**17**	**4.8**	**952**	**58**	**6.09**

Note: Obsvd (Observed); DUP (Drivers using phone)

In another vein, table 2 showed observation made on selected roads in Lagos (Oshodi/Anthony/Gbagada), Ibadan (Iwo-Road/Adegbayi/Airport Road) and Ile-Ife (Ede-Road/Mayfair/Lagere Road). A total of 2627 vehicles were observed on all the roads. This comprised of 1110, 854 and 663 vehicles on the three roads respectively. 2015 cars, 474 buses and 138 trucks made up the total observation. 5.4% of the drivers observed in Oshodi/Anthony/Gbagada were involved in mobile phone use while driving, while 5.26% and 4.67% of observed drivers in Iwo-Road/Adegbayi/Airport axis and Ede-Road/Mayfair/Lagere axes, respectively, were seen using mobile phone during active driving. In all, only 5.18% of the drivers of the observed vehicles were using mobile phones while driving.

Table 2. Observations on intra-city roads

	OSHODI/ANTHONY/ GBAGADA ROUTE				IWO-ROAD/ADEGBAYI/ AIRPORT ROUTE			EDE-ROAD/MAYFAIR/ LAGERE ROUTE			TOTAL	
	Obsvd	DUP	% Freq	Obsvd	DUP	% Freq	Obsvd	DUP	% Freq	Obsvd	DUP	% Freq
Car	920	37	4.02	632	29	4.5	463	21	4.5	2015	87	4.32
Bus	124	16	12.9	184	12	6.5	166	7	4.2	474	35	7.36
Truck	66	7	9.4	38	4	10.5	34	3	8.8	138	14	10.1
Total	**1110**	**60**	**5.4**	**854**	**45**	**5.26**	**663**	**31**	**4.67**	**2627**	**136**	**5.18**

Note: Obsvd (Observed); DUP (Drivers using phone)

Drivers' propensity to use phone during driving

Results of interview with 26 drivers (13 commercial and 13 private drivers) revealed that all the drivers recruited for the interview use their mobile phone during active driving. However, 15.4% of commercial drivers use mobile phone whenever they feel like while 84.6% sometimes use their phone during driving. 30.8% of private drivers use their phones at any time while 69.2% sometimes make use of their phone during active driving.

With respect to whether road type increases their chance of using mobile phones during active driving, dividing road type into high-ways (H-Ws) and street-level roads (SLRs), 77.0% of commercial drivers and 61.5% of private drivers submitted that they are inclined to using their phones on the H-Ws while all the drivers agreed they use their phones on the SLRs.

Drivers' propensity to use mobile phone given road condition showed that 53.8% of commercial drivers and 77.0% of private drivers inclined to use mobile phones on bumpy roads (BRs) while all the drivers use their mobile phones on smooth surface roads (SSRs). However, in respect of traffic density and inclination to use mobile phones, 69.2% and 77.0% of commercial

and private drivers respectively, would use their mobile phone in low density traffic (LDT) while 30.8% and 23.0% would use it in high density traffic (HDT).

Table 3. Drivers' responses from personal interview

Variable	No	Yes	
Ownership of mobile phone			
Commercial drivers	-	13 (100%)	
Private drivers	-	13 (100%)	
Do you use mobile phone when in active driving?	No	Yes	
Commercial drivers	-	13 (100%)	
Private drivers	-	13 (100%)	
How frequently do you use your phone while in active driving?	Anytime	Sometimes	Never
Commercial drivers	2 (15.4%)	11 (84.6%)	-
Private drivers	4 (30.8%)	9 (69.2%)	-
Road Type and propensity to use phone	H-Ws	SLRs	
Commercial drivers	10 77.0%)	13 (100%)	
Private drivers	8 (61.5%)	13 (100%)	
Road Condition and propensity to use phone	BRs	SSRs	
Commercial drivers	7 (53.8%)	13 (100%)	
Private drivers	10 77.0%)	13 (100%)	
Traffic density and propensity to use phone	LDT	HDT	
Commercial drivers	9 (69.2%)	4 (30.8%)	
Private drivers	10 77.0%)	3 (23.0%)	

Note: H-Ws (High-ways); SLRs (Street-level roads); BRs (Bumpy roads);
SSRs (Smooth-surface roads); LDT (Low-density traffic); HDT (High-density traffic)

To buttress respondents' responses to their propensity to use mobile phone during active driving, some themes were drawn from other responses based on the driving situation. For those who are probable to use their mobile phones on the H-Ws, the significance of the incoming call, and frequency of call notification (phone ringing) inform their use of mobile phone. However, speed of the vehicle, safety condition is first put into consideration. This is demonstrated through the following comments:

Sometimes I pick calls when on highways when the call is important and/or when my phone keeps ringing showing the same number; you know, this may be a sign of emergency. But in any case, I consider my safety first and reduce speed to manageable minimum before picking the calls. Again I consider convenience, by this, I mean if the phone is within reach but if it's in my pocket and have to wriggle to get it, I suspend the idea of picking it.

For those that wouldn't use phone on the highway, safety and the need for more concentration are reasons for not using phones on the highways. This comment buttresses their claim:

My decision not to use mobile phone on the highway is simply because speed is much from every driver and as such, you need to concentrate more on wheel coordination. Don't forget that distraction or inattention will cause a chaos that may be irreparable. Laughs! If anything should happen while trying to receive the call, you know, it's your headache. Because your caller will be alive while you are dead.

In the case of using mobile phone based on road condition, speed and maneuverability were major considerations for use or non-use of mobile phone during active driving. The following comment represents the commonest reason for those who use their phone:

I receive and even initiate calls in bumpy areas because speed is reduced. I can use one hand to hold the wheel and quickly make use of the other hand for receiving or making calls.

On the contrary, for those who are not inclined to using phone on bumpy routes, the following comment represents their reason:

Bad or bumpy routes as we commonly have here considering the state of our roads require more concentration. You need to have a good grip of the steering because a lot of maneuvering is required here. Otherwise you may damage your vehicle.

With respect to propensity to use mobile phones given traffic density, speed and convenience were common factors for using phone during driving. Examples of the comments are given below:

- I use my phone when held up in traffic, especially when in a static state. At this point, I even initiate calls.

- For me, probability of using phone is high because vehicles are all moving slowly. That's even the best time for me to call or send message to people.

However, the following comment represents the common reason for not using mobile phone in traffic situation:

It's difficult for me, because one may complicate the traffic problem especially when one collides with the vehicle ahead.

DISCUSSION OF RESULTS

The results of this study provided understanding of the propensity of drivers to use mobile phone given road type, road condition and traffic density. Results showed that observation of usage of mobile phones among drivers on all the selected routes were generally low (table 1 and 2). This record may not be a true reflection of mobile phone usage among drivers during active driving task. This is because observations were not a follow-through process. Thus we could not ascertain whether or not those not found with mobile phone at the time of observation might have at any time during their driving made use of their mobile phones. However, results of the interview with selected drivers revealed that all drivers use mobile phone in active driving though with varying frequency of use. This coincides with the study of risk perceptions of mobile phone use while driving by White et al. (2004) which reported that almost half of the drivers who had a mobile phone had used it while driving. Use of mobile phones by most drivers in the study area may be attributed to their lack of awareness of the risk related to using mobile phones during active driving (Horrey et al., 2008; Rosenbloom, 2006). Reports from the results that some drivers used their phones while driving on the H-Ws because of emergency implies that where some drivers would desire not to use mobile phone during active driving, given the road type, the exigency of calls may induce the use of phones at some occasions. This alludes with the suggestion that the use of mobile phones in vehicle may not be harmful per se especially where the urgency of the call which may enhance timely response to cases of emergency is known or determined (Loeb et al., 2009; Fowles et al., 2010). Again, the consideration of speed reduction by drivers who engage their mobile phones on the H-Ws confirms studies which established that drivers modulate their driving task to increase their safety margin by reducing speed (Engström et al., 2005; Törnros and Bolling, 2005; Schömig 2011; Liang, 2015) so as to increase time headway to a lead vehicle (Hosking et al., 2009). Generally, however, there seems to be an understanding of distracting effect of mobile phone use by some of the drivers who underscored the chaotic potential outcome of using mobile phone on the H-Ws. This understanding buttresses global concern about the inattention caused by mobile phones and increasing crash risk and fatalities associated with mobile phone use during active driving (Overton et al., 2014; Backer and Sagberg, 2011). This understanding puts this category of drivers in the class of individuals regarded by Wogalter amd Mayhorn (2005) as those having strong beliefs about the existence of safety problems associated with driving.

Further, the determination of use or non-use of mobile phone by drivers given the nature of traffic is explained by the intensity of the traffic situation, and the complexity of maneuvering, which varies with journey and location. This explains why Dula et al., (2011) established that accident risk is high for both the high and low traffic density, while this risk increases with increasing exposure to traffic flow (Forkenbrock and Weisbrod, 2001).

CONCLUSION

In a time when mobile phone use among drivers has become a global issue, this study determined the propensity of drivers to use their mobile phones considering road type, road condition and traffic density. Though result of the observation revealed a low rate of observed use of mobile phones by drivers, it was considered as not being a true reflection of real situation as no follow up could be made with drivers to determine who decided to use their phone later in the course of the journey. However, interview with selected drivers revealed that majority of drivers use their mobile phone during active driving but at varying frequency regardless of road type, road condition and traffic nature. Factors such as exigency of call, complexity of maneuvering, chaotic potential outcome of combining driving with use of mobile phone, suitability of picking calls determined drivers' propensity to use mobile phones in the study area.

One limitation of this study is the difficulty of determining real-time phone use among the interviewed drivers and also to follow-through with observed drivers in order to know determine their propensity to use their mobile phone in road scenario other than where the observations were made. Thus, simulation will be recommended to determine the real-time propensity of drivers to use mobile during active driving.

REFERENCES

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Alm, H., & Nilsson, L. (1995). The effects of a mobile telephone task on driver behaviour in a car following situation. *Accident Analysis & Prevention*, 27(5), 707-715.

Backer-Grøndahl, A., & Sagberg, F. (2011) Driving and telephoning: Relative accident risk when using hand-held and hands-free mobile phone. *Safety Science* 49, 324–330.

Basacik, D., Reed, N., & Robbins, R. (2011). Smartphone use while driving: a simulator study (No. PPR592). Crowthorne: The Transport Research Laboratory.

Crundall, D., Bains, M., Chapman, P., & Underwood, G. (2005). Regulating conversation during driving: A problem for mobile telephones? *Transportation Research, Part F*, 8, 197–211. http://dx.doi.org/10.1016/j.trf.2005.01.003.

Dingus, T. A., Hanowski, R. J., & Klauer, S. G. (2011). Estimating crash risk. *Ergonomics in Design*, 19(4), 8-12. https://doi.org/10.1177/1064804611423736

Drews, F. A., Yazdani, H., Godfrey, C. N., Cooper, J. M., & Strayer, D. L. (2009). of the Human Factors and. Human Factors: *The Journal of the Human Factors and Ergonomics Society*, 51, 762–770. https://doi.org/10.1177/0018720809353319

Dula, C. S., Geller, E. S., & Chumney, F. L. (2011). A social-cognitive model of driver aggression: Taking situations and individual differences into account. *Current Psychology*, 30(4), 324–334. https://doi.org/10.1007/s12144-011-9120-3.

Edwards, M. (2001). Driver distraction and safety. Implications for Telematic Devices. *AAA White paper, Lake Mary, FL*.

Engström, J., Johansson, E., & Östlund, J. (2005). Effects of visual and cognitive load in real and simulated motorway driving. *Transportation research part F: traffic psychology and behaviour*, 8(2), 97-120.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior*. Reading, MA: Addison-Wesley.

Fitch, G. M., Hanowski, R. J., & Guo, F. (2015). The risk of a safety-critical event associated with mobile device use in specific driving contexts. *Traffic Injury Prevention*, 16(2), 124-132.

Forkenbrock D and Weisbrod G (2001). *Guidebook for assessing social and economic effects of transportation projects*, NCHRP Report 456. National Academy Press, New York.

Fowles, R., Loeb, P. D., & Clarke, W. A. (2010). The cell phone effect on motor vehicle fatality rates: A Bayesian and classical econometric evaluation. *Transportation research part E: logistics and transportation review*, 46(6), 1140-1147.

Goodman, M. F., Bents, F. D., Tijerina, L., Wierwille, W., Lerner, N., & Benel, D. (1999). An investigation of the safety implications of wireless communication in vehicles. Report summary.

Gretzel, U. (2010). Travel in the Network: Redirected Gazes, Ubiquitous Connections and New Frontiers. In M. Levina & G. Kien (Eds.), *Post-global Network and Everyday Life* (pp. 41–58). New York: Peter Lang.

Horrey, W. J., & Lesch, M. F. (2009). Driver-initiated distractions: Examining strategic adaptation for in-vehicle task initiation. *Accident Analysis & Prevention*, 41(1), 115-122.

Horrey, W. J., Lesch, M. F., & Garabet, A. (2008). Assessing the awareness of performance decrements in distracted drivers. *Accident Analysis & Prevention*, 40(2), 675-682.

Hosking, S. G., Young, K. L., & Regan, M. A. (2009). The effects of text messaging on young drivers. *Human factors*, 51(4), 582-592.

Hozer J., & Doszyń, M. (2004). *Econometrics of propensities [in Polish]*. Warsaw: PWE.

Huisingh, C., Griffin, R., & McGwin Jr, G. (2015). The prevalence of distraction among passenger vehicle drivers: a roadside observational approach. *Traffic injury prevention*, 16(2), 140-146. http://dx.doi.org/10.1080/15389588.2014.916797

Irwin, R., Stokes, T., & Marshall, T. (2015). Practice-level quality improvement interventions in primary care: a review of systematic reviews. *Primary health care research & development*, 16(6), 556-577.

Johal, S., Napier, F., Britt-Compton, J., & Marshall, T. (2005). Mobile phones and driving. *Journal of Public Health*, 27(1), 112-113.

Klauer, S. G., Dingus, T. A., Neale, V. L., Sudweeks, J. D., & Ramsey, D. J. (2006). The impact of driver inattention on near-crash/crash risk: An analysis using the 100-car naturalistic driving study data.

Klauer, S. G., Guo, F., Simons-Morton, B. G., Ouimet, M. C., Lee, S. E., & Dingus, T. A. (2014). Distracted driving and risk of road crashes among novice and experienced drivers. *New England journal of medicine*, *370*(1), 54-59.

Liang, Y., Horrey, W. J., & Hoffman, J. D. (2015). Reading text while driving: Understanding drivers' strategic and tactical adaptation to distraction. *Human factors*, 57(2), 347-359. http://dx.doi.org/10.1177/0018720814542974

Loeb, P. D., Clarke, W. A., & Anderson, R. (2009). The impact of cell phones on motor vehicle fatalities. *Applied Economics*, 41(22), 2905-2914.

Manalavan, P., Samar, A., Schneider, M., Kiesler, S., & Siewiorek, D. (2002, April). In-car cell phone use: mitigating risk by signaling remote callers. In *CHI'02 Extended Abstracts on Human Factors in Computing Systems* (pp. 790-791).

McD Taylor D., Bennet, D. M, Carter, M., Garewal, D. (2003). Mobile telephone use among Melbourne drivers: A preventable exposure to injury risk. *The Medical Journal of Australia*, 179, 140–142.

McEvoy, S. P., Stevenson, M. R., & Woodward, M. (2006). Phone use and crashes while driving: a representative survey of drivers in two Australian states. *Medical journal of Australia*, 185(11-12), 630-634.

Olson, R. L., Hanowski, R. J., Hickman, J. S., & Bocanegra, J. (2009). *Driver distraction in commercial vehicle operations* (No. FMCSA-RRT-09-042). United States. Department of Transportation. Federal Motor Carrier Safety Administration.

Overton, T. L., Rives, T. E., Hecht, C., Shafi, S., & Gandhi, R. R. (2015). Distracted driving: prevalence, problems, and prevention. *International journal of injury control and safety promotion*, 22(3), 187-192.

Popper, K. (1990). *A World of Propensities.* Bristol: Thoemmes.

Rosenbloom, T. (2006). Driving performance while using cell phones: An observational study. *Journal of Safety Research*, 37(2), 207-212.

Salvucci, D. D., & Beltowska, J. (2008). Effects of memory rehearsal on driver performance: Experiment and theoretical account. *Human factors*, 50(5), 834-844. https://doi.org/10.1518/001872008X354200

Schömig, N., Metz, B., & Krüger, H. P. (2011). Anticipatory and control processes in the interaction with secondary tasks while driving. *Transportation research part F: traffic psychology and behaviour*, 14(6), 525-538. http://dx.doi.org/10.1016/j.trf.2011.06.006

Seo, D., & Torabi, M. R. (2004). The impact of in-vehicle cell phone use on accidents or near accidents among college students. *Journal of American College Health*, 53, 101-107.

Simons-Morton, B. G., Bingham, C. R., Falk, E. B., Kaigang, L., Pradhan, A. K., Ouimet, M. C., et al. (2014). Experimental effects of injunctive norms on simulated risky driving among teenage males. *Health Psychology*, 33, 616–627.

Törnros, J. E., & Bolling, A. K. (2005). Mobile phone use—effects of handheld and handsfree phones on driving performance. *Accident Analysis & Prevention*, 37(5), 902-909. http://dx.doi.org/10.1016/j.aap.2005.04.007

Wang, D., Park, S., & Fesenmaier, D. (2012). The role of smartphones in mediating the tourism experience. *Journal of Travel Research, 51*(4), 371–387.

White, M. P., Eiser, J. R., & Harris, P. R. (2004). Risk perceptions of mobile phone use while driving. *Risk Analysis: An International Journal*, 24(2), 323-334.

Wogalter, M.S., Mayhorn, C.B., 2005. Providing cognitive support with technology based warning systems. *Ergonomics* 48, 522-533.

Submitted:	Revised:	Accepted and published online
March 02, 2020	December 15, 2020	May 19, 2021