

The effect of mobile phone conversation, text-message reading and texting on driving performance:

Results from a study of Greek professional drivers

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Introduction

Research with simulators has confirmed that increased risk of mobile phone usage is highly linked to the impairment caused to some very crucial aspects of driving performance (Bowditch, 2001; Brookhuis et al., 1991; McKnight and McKnight, 1993; Goodman et al., 1999; Wikman et al., 1998). The current study aims to investigate the effect of mobile phone use on the driving performance of professional drivers and particularly taxi drivers, using laboratory tests.

Methods & Procedures

A sample of 50 male professional drivers, above 18 years old were recruited. They all held a professional drivers' license and they had normal or corrected to normal vision and did not suffer from migraines, epilepsy or motion sickness. Laboratory tests were conducted using the VS500M driving simulator manufactured by Virage Simulation Inc. The driver has at his disposal the exact same instrumentation and controls that he would have in a conventional car.

Driving Environment

A simulated two-lane motorway road with solid edge delineation and a dashed centerline was depicted. The weather conditions were clear sky. It involved the participant's vehicle moving in the right lane, a lead vehicle on the same lane and a vehicle moving next to the participant's vehicle.



Driving Scenario

In the first session participants were instructed by the researchers to drive without using a mobile phone, while in the second session the participants had to drive in four different conditions/assignments within the 10 minute experimental session were the following: a **control task** (1 minute); a **"conversation" task** (3 minutes), a **"text-message reading" task** (3 minutes), and a **"texting" task** (3 minutes). The experimental session was conducted starting with the control task, for safety reasons, followed by the conversation task, the text-message reading task, and the texting task.

Measures and Analysis

Variation of the steering position per second: Represented the deviation from the centre.
Following distance per second: Represented the distance between the participants' vehicle and the lead vehicle and was estimated over time (per second).
Variation of the lateral lane position per second: "Lane offset" represented the distance in absolute value (in meters) between the centre of the vehicle and the centre of the lane
Sum of squared acceleration per second: "Sum of abs acceleration" was an indicator of variation that was calculated based on the speed. SPSS 21.0 was used for the statistical analysis (paired samples t-test/significance level .05)

Results

Participants had a mean age of 36.8 (SD 5.8) years with a minimum of 27.0 years and a maximum of 55.0 years

Steering position variation per second

	Control Vs Conversation		Control Vs Text-message reading		Control Vs Texting	
	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)
Without assignment (control time)	0.0066 (0.0063)	0.098 (t=1.684)	0.0066 (0.0063)	<0.0001 (t=-5.443)	0.0066 (0.0063)	<0.0001 (t=-5.542)
With assignment	0.0053 (0.0024)		0.0127 (0.0097)		0.0145 (0.0121)	

According to the statistical tests performed, steering position was significantly affected by "text-message reading and "texting"] while no significant effect was found regarding the "conversation" assignment.

Following distance per second

	Control Vs Conversation		Control Vs Text-message reading		Control Vs Texting	
	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)
Without assignment (control time)	3.6774 (0.6542)	0.009 (t=2.732)	3.6774 (0.6542)	<0.0001 (t=5.135)	3.6774 (0.6542)	<0.0001 (t=5.994)
With assignment	3.2031 (1.1056)		2.6135 (1.2596)		2.3770 (1.3679)	

A significant main effect was observed in terms of the "following distance per second" for all the three mobile phone assignments

Variation of the lateral lane position per second

	Control Vs Conversation		Control Vs Text-message reading		Control Vs Texting	
	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)
Without assignment (control time)	0.3171 (0.0680)	p<0.0001 (t=10.811)	0.3171 (0.0680)	p<0.0001 (t=4.433)	0.3171 (0.0680)	p<0.0001 (t=-4,102)
With assignment	0.1857 (0.0750)		0.2387 (0.1084)		0.3887 (0.1008)	

More specifically, the variation of the distance between the participants' vehicle and the centre of the lane, assessed per second, was significantly decreased during "conversation" on the mobile phone [t(50)=10.811; p<0.0001] as well as during "text-message reading"

Sum of squared acceleration per second

	Control Vs Conversation		Control Vs Text-message reading		Control Vs Texting	
	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)	Mean (SD)	p-value (t)
Without assignment (control time)	3.1965 (1.8707)	0.009 (t=2.713)	3.1965 (1.8707)	0.217 (t=1.251)	3.1965 (1.8707)	0.001 (t=3.428)
With assignment	2,6222 (1.5776)		2.6946 (2.4208)		2.2743 (2.3685)	

Results

The variation of the lateral acceleration per second was significantly decreased during conversation on the phone as well as during texting as compared with the control time

Conclusions

Although "texting" was found to increase the variation of the lane position per second, "conversation" and "text-message reading" were shown to have the opposite effect; all mobile phone assignments significantly decreased the following distance from the lead vehicle. This implies that the participants drove closer to the lead vehicle when they were carrying out a mobile phone assignment as compared with the control time. It can be concluded from this study that the drivers tried to compensate for the increased workload caused by the mobile phone assignments by increasing the variations in steering and in some cases the variations in the lateral lane position as well as by decreasing the distance from the lead vehicle and the acceleration.

Greek policies on road safety should concentrate their attention not only to the improvement of the road environment and on monitoring driving performance but on the implementation on driving behaviour changing programmes also.



References

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