Evaluating Driving Performance during Texting using Driving Simulator

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Introduction: The ability to drive is an integral part of community participation, socialization, and perceived independence in society. Studies show that automobile accidents are one of the leading causes of unintentional deaths in the US. A multitude of factors contribute to one's ability to drive safely including attention, information processing, reaction time, and dual task ability. The goal of this study was to determine the effects of texting while driving on cognitive loading and how it contributes to increased driving performance errors including collisions, speed exceedances, and stop signs missed in healthy individuals, in addition to other parameters discussed below.

Materials and Methods: A (2X2) factorial design, with two levels (driving simulation tests A and B) and two factors (with and without dual tasking) was conducted. Nine healthy adults (7 males, 2 females; mean age 26 $\pm$ 2.45 years, height 68.78 $\pm$ 3.77 in., weight 157.67 $\pm$ 29.71 lbs.) participated in several driving simulation trials using a driving simulator. Trials included driving while navigating sudden road obstacles and driving while reacting to sudden appearance of stop cues, with and without texting as a dual-task component. Data regarding vehicular and pedestrian accidents, speed exceedances, missed stops, text mistakes, and reaction time to road obstacles were recorded.

Results and Discussion: We observed a non-significant decrease in number of collisions, speed exceedances, and stop signs missed in the no texting versus texting conditions. Specifically, we saw that the group in the texting condition had 20% fewer collisions compared to the no texting group, made 11% fewer speed exceedances and missed 62% more stop signs. Our results show that some healthy adults were able to outperform in both physical and cognitive tasks efficiently with fewer collisions and no texting errors. Whereas some participants demonstrated challenges with high cognitive loading during dual-tasking, thus made texting errors as well as collisions during driving.

Figure 1. Subject demonstrates driving using the driving simulator with

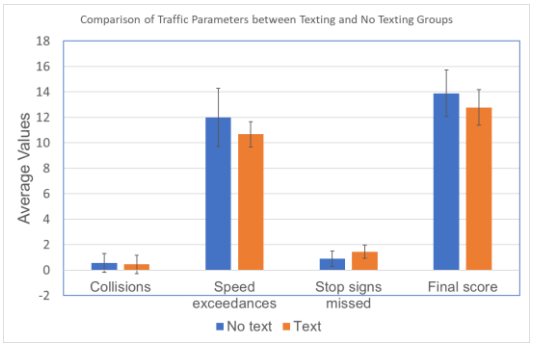

Figure 2. Average values for collisions, speed exceedances, stop signs missed, and final score plotted separately for no texting and texting group. Boxes indicate average values of the traffic parameters and final score, with error bars representing standard deviations.

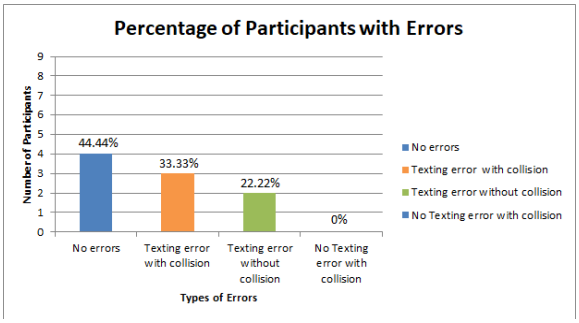

Figure 3. The percentage of participants with and without errors associated with texting, driving collisions, or a combination of texting and driving collisions.

Conclusions: The results in this study were severely impacted by the state of health of participants. Most of the participants being healthy were able to handle dual-tasking with no decline in their performances during dual-task driving. Although there were not significant declines in driving performance with dual-tasking, texting while driving still affects driving performance and safety. These implications are more important in individuals with neurological conditions such as a brain injury or stroke, and future studies should further research in these conditions.