

The Impact of Hand-Held and Hands-Free Cell Phone Use on Driving Performance and Safety-Critical Event Risk

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Issue

Using a cell phone while driving has been found to increase crash risk (McEvoy et al., 2005; Redelmeier & Tibshirani, 1997). However, newer hands-free technologies may reduce this risk by mitigating visual-manual distraction.

Method

The National Highway Traffic Safety Administration contracted the Virginia Tech Transportation Institute (VTTI) to investigate the effects of distraction from the use of three types of cell phones: 1) hand-held (HH), 2) portable hands-free (PHF), and 3) integrated hands-free (IHF) (Fitch et al., 2013). Through a naturalistic driving study (NDS), 204 drivers were continuously recorded for an average of 31 days each in 2011. The data were collected through a separate contract performed by VTTI and Westat. Only drivers that reported talking on a cell phone while driving at least once per day were recruited. A key feature of this study was that drivers provided their cell phone records for analysis, making this the first NDS to date to combine call and text records with continuous naturalistic driving data.

Results

Drivers talked on a cell phone 10.6% of the time the vehicle was in operation (28% of all calls and 10% of all text messages occurred while the vehicle was being operated). Talking on a cell phone, of any type, while driving was not associated with an increased safety-critical event (SCE) risk. SCEs comprised crashes, near-crashes, and crash-relevant conflicts. Visual-manual (VM) subtasks performed on an HH cell phone, however, were associated with an increased SCE risk. HH cell phone use in general was thus found to be associated with an increased SCE risk. In contrast, PHF and IHF cell phone use, absent of any VM HH cell phone subtasks, were not found to be associated with an increased SCE risk. However, VM HH cell phone subtasks were frequently observed during hands-free cell phone use. Driver performance when using a cell phone was also investigated through a within-subject comparison. VM HH cell phone subtasks were found to significantly increase the percentage of time drivers took their eyes off the forward roadway, while talking on an HH cell phone significantly decreased the percentage of time drivers took their eyes off the forward roadway. The effects of cell phone use on vehicle control were less pronounced.

Conclusion

Visual-manual cell phone subtasks are associated with an increased safety-critical event risk and affect driver performance. Drivers continue to interact with hand-held cell phones despite hands-free technologies and text-messaging bans.

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