

# CRASH RISK OF CELL PHONE USE WHILE DRIVING: A CASE-CROSSOVER ANALYSIS OF NATURALISTIC DRIVING DATA

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## INTRODUCTION

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Cell phone use while driving is widely known to impair many aspects of driving performance and increase the risk of involvement in a crash. However, the manner in which people interact with cell phones has changed dramatically over the past 10-15 years with the popularization of text messaging and the shift from traditional cellular telephones to smartphones. Few studies to date have examined the relationship between driver engagement in specific modes of smartphone use while driving and the risk of crash involvement.

This study sought to fill this gap by performing an in-depth examination of drivers' cell phone use immediately prior to crashes as well as during ordinary driving using data from a large federally funded study in which the driving of more than 3,500 drivers was monitored continuously using in-vehicle video for a period of several months.

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## KEY FINDINGS

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Drivers' odds of crash involvement nearly doubled when they were engaging in all forms of visual-manual cell phone tasks taken together and more than doubled when they were texting, compared with when the same drivers were under similar traffic and environmental conditions without engaging in any visible non-driving tasks.

The effect of visual-manual cell phone interactions on drivers' odds of crash involvement was greatest for types of crashes in which the driver played a clear active role. For example, visual-manual cell phone interaction:

- Tripled drivers' odds of involvement in a road departure crash.
- Increased drivers' odds of rear-ending the vehicle ahead by more than a multiple of seven.

The association between cell phone conversation alone and crash involvement was not statistically significant.

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## ABOUT

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Established in 1947 by AAA, the AAA Foundation for Traffic Safety is a not-for-profit, publicly funded, 501(c)(3) charitable research and educational organization. The AAA Foundation's mission is to prevent traffic deaths and injuries by conducting research into their causes and by educating the public about strategies to prevent crashes and reduce injuries when they do occur. This research is used to develop educational materials for drivers, pedestrians, bicyclists and other road users. Visit [www.AAAFoundation.org](http://www.AAAFoundation.org) for more information.

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## MORE INFORMATION

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## METHODOLOGY

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Researchers at the Virginia Tech Transportation Institute examined data from the Second Strategic Highway Research Program Naturalistic Driving Study (SHRP 2 NDS). In the SHRP 2 NDS, the driving of 3,593 study participants was monitored using in-vehicle cameras and other data collection equipment for a period of several months as they drove in their own vehicles. Participants ages 16 years and older were recruited from six sites around the United States. Participants were generally representative of the U.S. driving population except that younger and older drivers were oversampled.

Determination of driver cell phone use was made by trained data reductionists who manually reviewed the video recorded immediately prior to all crashes as well as a sample of brief segments of ordinary driving. Reductionists coded whether the driver was engaged in conversation, texting, dialing, browsing on a smartphone, reaching for the phone or answering a call.

In the current study, the relationship between cell phone use and crash involvement was quantified using a case-crossover study design. The frequency with which drivers used cell phones immediately prior to crashes was compared with the corresponding frequency in up to four six-second segments of ordinary driving by the same driver at similar speeds on similar roadways under similar traffic and environmental conditions within three months prior to the crash. A statistical model was used to isolate the effect of cell phone use on crash risk. Analyses were based on 566 crashes and 1,749 comparison segments of ordinary driving. Crashes included in the study involved significant transfer of energy, property damage or airbag deployment; approximately one-third of the crashes were severe enough to meet typical police-reporting thresholds.

The study has several limitations that should be noted. The data were from a sample of volunteers who agreed to have their vehicles fitted with cameras; their behavior and performance might differ from the general population. Some behaviors were observed too infrequently to quantify their risk (e.g., hands-free cell phone use). Some crashes were excluded because the same driver was never observed driving under conditions sufficiently similar to allow comparisons; it is possible that drivers' patterns of cell phone use and/or their crash risk might differ when driving under conditions that are uncommon or unfamiliar for them. Finally, there were no fatal crashes in the study; thus, the results should not be extrapolated to fatal crashes.

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