

Small Screen Use and Driving Safety

Paul Atchley, PhD,^a David L. Strayer, PhD^b

abstract

The increased availability of “small screens,” wireless devices with Internet-enabled connections, and their associated applications has almost overnight changed the way that we interact with our phones. The current work outlines some of the aspects of this problem as it relates to the influence of small screens on driving safety. Small screens are highly compelling to drivers, both for the information they convey and because the ability to ignore them while driving is impaired by cognitive resources used by the driving task itself. However, much is unknown about why people make choices to multitask while driving. Given the safety risks, it is recommended that parents, the public, and regulators take a stand against the use of Internet-enabled small screens unrelated to driving when the vehicle is in motion.

^aDepartment of Psychology, University of Kansas, Lawrence, Kansas; and ^bDepartment of Psychology, University of Utah, Salt Lake City, Utah

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The analysis, conclusions, and recommendations contained in each article are solely a product of the individual workgroup and are not the policy or opinions of, nor do they represent an endorsement by Children and Screens: Institute of Digital Media and Child Development or the American Academy of Pediatrics.

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Address correspondence to Paul Atchley, PhD, Department of Psychology, 1415 Jayhawk Blvd, University of Kansas, Lawrence, KS 66044. E-mail: patchley@ku.edu

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The reactions of University of Kansas students in an introductory media class asked to give up media for 48 hours reveal what many parents worry about for their children's device-filled future: "I have come to realize that 5 minutes without checking a text message is like the end of the world"; "I went a solid 5 hours without media, and I was a wreck"; "The withdrawals were too much for me to handle"; and "It showed me that my cell phone and computer are basically my best friends" (student reactions, personal communications).

We know much about how rapidly behavior patterns have changed with respect to "small screen," Internet-enabled devices (ie, smart phones) but little about the longer-term repercussions of these new patterns of behavior. In the United States, 92% of people have a cell phone and 68% own a smart phone,¹ which is a clear demonstration that this is a problem that will certainly have far-reaching implications. The purpose of the current work is to describe what we know about the extent of small screen use and how compelling it is, to provide examples of its implications for health and safety, and to suggest what needs to be established by ongoing research.

CURRENT STATE

As new technologies with the power to attract human attention and change behavior emerge, concerns are often raised about the implications for health and safety. Television, for example, produced concerns about the development of a more sedentary lifestyle and a greater exposure of children to inappropriate information. But the new generation of portable Internet-enabled devices is different. They contain millions of applications (apps) that are designed to hijack as much of the user's attention as possible, often as a tool to gather data

in support of marketing. They enable users to access the Internet, which allows for even more of a diversion of attention. And they enable greater mass communication of personal information and opinion, which is itself an attractive feature of the technology.

This results in extensive use, even in the general population. A recent survey of phone use habits of a cross-section of ages in the United States, for example, revealed that 497 of the 500 people surveyed reported owning a cellular phone.² They reported spending an average of 96 minutes per day using their phone. They averaged 3 calls per day and 40 texts per day, and when they were told, "Evaluate your level of dependence on your cellular phone, keeping in mind that the larger the percentage, the higher the level of dependence," they reported a perceived dependence of 53%. Among teenagers, the smartphone is the device they spend the most time with per day (an average of 2 hours and 42 minutes per day).³

One area in which the conflict between attention to what is interesting on the small screen and attention to the "real world" is prevalent is in the realm of traffic safety. Distractions are a common cause of crashes for teenagers. In a 2015 naturalistic study of 1691 teen-aged crashes for which video records were obtained,⁴ distractions of one sort or another were observed in 59% of the crashes in the 6 seconds preceding the crash. Some of the most common sources of distraction were as follows:

- 15% were interacting with 1 or more passengers;
- 12% were using a cell phone;
- 10% were looking at something in the vehicle;
- 9% were looking at something outside the vehicle;
- 8% were singing/dancing to music;

- 6% were grooming; and
- 6% were reaching for an object.

A selected sample of the crash videos can be viewed at the following link: <https://www.aaafoundation.org/using-naturalistic-data-assess-teen-driver-crashes>.

Despite hundreds of studies spanning 5 decades of work and highly publicized media accounts of the risks of distracted driving, more drivers than ever before are using small screens while they drive, resulting in disastrous safety consequences. The National Safety Council estimates that approximately one-quarter of the crashes in the United States are because of small-screen distraction.⁵ Drivers often know about these risks, even reporting that some activities with a small screen are worse than driving drunk,⁶ but knowledge of the risk does not seem to generally translate into a change in behavior.^{7,8} And, when small screens are built into the vehicles, the risk is not mitigated but may even be less obvious to the driver.^{9,10}

Examination of the factors underlying this unsafe choice is a relatively new area of research. Drivers now operate in an "attention economy" with more things vying for their attention than ever before.⁸ The environment of the vehicle itself may lead to reduced willpower by engaging the prefrontal cortical mechanisms that support inhibition of poor choices, resulting in automatic checking of a small screen while driving.¹¹ On an individual level, those with lower executive control and greater sensation-seeking tend to be high multitaskers.¹² And heavier multitaskers tend to actually be unskilled at multitasking or performing singular tasks.¹³

On a more general level, studies of the ability to delay responding to prompts from the small screen, such as to an incoming text, reveal that the information conveyed by

a small screen holds great sway on a user's attention. The authors of recent studies who have assessed the ability of younger adults to delay responding to a text, for example, have shown that the value of information decays rapidly.¹⁴ This constant need to interact to avoid the "fear of missing out" can lead to inappropriate behavior and worrying patterns of use. In 1 survey,² nearly one-third (31%) of the respondents reported texting when they were distressed (including being bored), one-quarter (24%) reported texting when it was socially inappropriate, one-fifth (20%) reported texting when it was dangerous, and nearly one-fifth (17%) reported feeling the need to increase how much they texted.

FUTURE RESEARCH

Who Multitasks and Why?

The science associated with media multitasking can benefit from a deeper understanding of who multitasks and when and why they engage in this behavior. This research need would benefit from a sharpening of our methodological instruments for assessing the behavior (eg, media multitasking, engaging in these activities while driving, etc) and the individual difference profiles that are predictive of this behavior (eg, sensation seeking, impulsivity, boredom, working memory capacity, etc). Addressing this research need is a critical first step in helping to develop empirically-based policies that curb the use of technology with the potential to distract when operating a motor vehicle.

What Is the Underlying Neurobiology of Multitasking Behavior?

The primary focus of this research should be the underlying neurobiology of the developing brain, with a particular focus on the different attentional networks

supporting cognition (ie, how do multitasking behaviors change in younger drivers?). Given the compulsion of many to engage in media multitasking behavior, understanding the role that the inhibitory networks play in regulating these behaviors is important, particularly as motorists are exposed to a rapidly increasing array of digital technology in the vehicle. Does media multitasking rise to the level of an addiction for some drivers, producing worrying implications for safely operating a vehicle?

How Cognizant Is the Public of the Risks of Multitasking While Operating a Motor Vehicle?

To what extent do motorists understand the current state of the science of distraction? Many drivers operate from a variety of assumptions, some of which are empirically false (eg, the common assumption that hands-free cell phone conversations are safer than hand-held cell phone conversations; empirically, they do not differ).¹⁵ Many also support laws that would prohibit multitasking by other drivers, yet they admit to engaging in these same activities when they drive (an example of overconfidence and a failure of self-regulation). It will be important for future research to understand the self-regulatory factors of multitasking. This information could help drivers better align their attitudes about other motorists' multitasking behavior with their attitudes about their own multitasking behavior.

What Are Effective Strategies for Getting Teenagers (and Older Adults) to "Hang Up and Drive"?

Changing the culture of distracted driving will require sustained effort on several fronts. First, the science needs to be in place for effective decision-making. Second, proper education needs to be provided to inform motorists of the hazards

associated with different sorts of interactions. What sorts of public service campaigns can change teen-aged drivers' attitudes and behaviors? Can social media be used as an effective tool to combat driver distraction? Are there technological solutions to address or curb driver distraction? Finally, regulations need to be crafted that target the root causes of driver distraction, and these regulations need to be enforced.

RECOMMENDATIONS

Policy Makers Should Write Teen-aged Driver Laws That Discourage the Use of Sources of Digital Distraction in the Vehicle

Driving an automobile is probably the riskiest activity undertaken by teenagers. In fact, vehicle crashes are the number 1 source of accidental death for teen-aged drivers.¹⁶ Alarmingly, the Centers for Disease Control and Prevention estimates that 6 teenagers are killed in motor-vehicle crashes every day in the United States. Teen-aged drivers have less experience, take greater risks, and are more likely to multitask or engage in concurrent activities. The combination of novice drivers and a growing variety of digital distractions is often a deadly mix. When teenagers are learning to operate a motor vehicle, we recommend that all sources of digital distraction be eliminated from the vehicle.

Require Automakers to Provide an Easy Way to Disable Infotainment Features

Many new vehicles come equipped with wireless technology, voice commands, and touchscreen liquid crystal displays that allows motorists to place calls, send voice-based text messages, navigate with the GPS, stream music, search the Internet, engage in using social media, and interact with other "infotainment" systems. The majority of these

interactions are significant sources of driver distraction,¹⁷ and none have been evaluated with teen-aged drivers. Drivers may assume that interactions with these infotainment systems are safe because these systems came installed in the new vehicle; however, this assumption not supported by the scientific data. We recommend that regulators establish requirements that allow easy disabling of some of these infotainment features, especially those that have nothing to do with the safe operation of the vehicle. This would give parents and fleet managers who purchase vehicles the ability to turn off distracting features that are not related to safe operation of the vehicle.

Smartphone Application Developers Should Disable Gaming Features if They Detect That the User Is Operating a Motor Vehicle

There are millions of applications that users can download to their smartphones. Some of the gaming applications may encourage use in the context of driving. For example, Snapchat has a Geofilter that allows users to overlay their speed. Motorists using this Snapchat filter have been enticed into engaging in dangerous driving behavior.¹⁸ In a similar vein, Pokémon GO is an augmented reality game that encourages players to move about, thereby moving their avatar within the game. However, drivers who play the game have an elevated risk of crashes and serious injury.¹⁹ Developers of these mobile games should be cognizant that the driver of a motor vehicle may use them. In these instances, the game should be disabled when the vehicle is in motion.

Regulatory Policies Should Target Causes of Driver Distraction

One important message that can be derived from the scientific literature is that regulatory policies and educational campaigns should target

the primary causes of distraction, rather than singling out individual technologies. For example, 44 states in the United States prohibit texting while operating a motor vehicle.²⁰ However, many allow the driver to type in a 10-digit phone number, scroll through a playlist, or send and receive an e-mail message. With respect to taking drivers' eyes off the road, their hands off the wheel, and their minds off the drive, there is little difference between sending and/or reading a text message and sending and/or reading an e-mail message. Rather than targeting texting, regulation should prohibit drivers from manually entering, sending, reading, or viewing any written or visual communication, including the following: (1) a text message, (2) an instant message, (3) an e-mail, (4) a phone number, (5) the Internet (reviewing or recording a video), or (6) data for a handheld wireless communication device (eg, Utah State law 41-6a-1716). In this instance, the Utah law is consistent with the science on driver distraction as it relates to visual, manual, and cognitive sources of distraction. These properly targeted laws are also much easier to enforce.

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