New Evidence of Impacts of Cell Phone Use on Driving Performance: A Review

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ABSTRACT

Mobile phone use when driving is widely considered to be a major cause of car accidents. This paper attempts to review the existing literature by focusing on three key issues: (a) Whether and how seriously does mobile phone use impair driving? (b) How and why does mobile phone use impair driving? (c) What should be done to best prevent from accident? The authors identified a total of 90 epidemiological studies, experimental studies, and observational studies that were published during 2007 to 2012. These most recent studies were systematically reviewed in three major categories, (a) the effect of using a mobile phone when driving on drivers’ performance in terms of information processing and vehicle control, (b) variables related to driving, such as characteristics of drivers and mobile phone types, and (c) context and content of conversation during driving. Both limitations of existing research and future research directions are discussed.

Keywords: Car Accidents, Cell Phones, Distraction, Literature Review, Unsafe Driving

According to a trend analysis of distracted driving and their relation to cell phone use in United States (Wilson & Stimpson, 2010), the number of fatalities increased from 4572 in 2005 to 2870 in 2008. In 2009, the distracted driver fatalities and injuries have reached 6,000 and 515, 000 respectively, according to the National Highway Traffic Safety Administration (Dildy, 2012). In contrast, in a nationwide online survey study in New Zealand (Hallett, Lambert, & Regan, 2011), over 60% of participants reported their use cell phone while driving, however, only 5% of participants believed phoning while driving is “extremely unsafe”, 30% believe it to be “moderately unsafe”, and 40% of them even believed it to be “moderately safe”. Similarly, as found in United State (Horrey, Lesch, & Garabet, 2008), most of the participants over-estimated their actual driving performance on lane keeping, brake response time, and accuracy in responding to traffic light when having a cell phone conversation.

DOI: 10.4018/ijcbpl.2013070104
With both the dramatic increase in the traffic accident caused by drivers’ cell phone use and substantial lack of understanding of significant danger involved among the public, researchers across various disciplines have conducted a great number of studies in the past 30 years to investigate the impact of cell phone use on driving. Research into mobile phone use when driving becomes the earliest and most productive area in the science of cell phone behavior (Yan, Chen, & Yu, 2013). As one of a series of planned reviews on cell phone behavior, this article attempts to present the most recent research findings from 2007 to 2013 in order to answer the following three questions: Whether and how seriously does mobile phone use impair driving? How and why does mobile phone use impair driving? How should we do to best prevent from accident? The reason why the year of 2007 has been set as the starting point of this review is that five published review articles (Collet, Guillot, & Petit, 2010a, 2010b; Horrey & Wickens, 2006; Lee & City, 2008; McCartt, Hellinga, & Bartim, 2006; Strayer, Watson, & Drews, 2011) have comprehensively reviewed studies that were conducted and published before 2007. Therefore, this paper built upon these review articles and summarized new findings from studies conducted and published after 2007.

**METHOD**

Multiple search strategies were used to locate the existing research literature, such as computer search of electronic databases, manual search of references of identified articles, and consultation with identified experts. Four databases were searched, including PsycINFO, Scopus, ERIC, and Education Research Complete. Key words, such as cell phone use, mobile phone using, cellular phone use, smartphone use and driving, were used in the initial literature search.

Four criteria have been used to select the studies under review. Firstly, as discussed above, we included studies published between 2007 and 2012 only. Secondly, the studies included in the review must explicitly study the cell phone use while driving in at least one of the following ways: cell phone conversation, text messaging, any physical operation of cell phone (e.g., picking up the phone or dialing the phone), or any operation associated with finding online information through cell phone (e.g., locating an address or reading news). Thirdly, technical reports on how to design cell phones have been excluded.

A total of 90 studies were found. These studies, including epidemiological studies, experimental studies, and observational studies, were published from 2007 to 2012, averaging about 16 articles published per year, and explicitly examined the impact of cell phone on driving.

**WHETHER AND HOW SERIOUSLY DOES CELL PHONE USE IMPAIR DRIVING?**

Numerous studies on impact of cell phone use on driving have reported the association between cell phone use and decreased driving performance in various aspects, such as longer reaction time, lower detection rate, and poorer vehicle control, including lane-keeping, headway distance keeping, driving speed controlling, and following distance keeping (Benedetto, Calvi, & D’ Amico, 2012; Collet, Guillot, & Petit, 2010; Horrey & Wickens, 2006; Lee & City, 2008; Strayer, Watson, & Drews, 2011). In the two meta-analyses on effects of cell phone use on driving performance (Horrey & Wickens, 2006; Caird, Willness, Steel, & Scialfa, 2008), for example, Horrey’s team and Caird’s team reported the similar findings in strong associations between cell phone conversation, for both hand-free and hand-held, and the increase in reaction time and observed associations between cell phone conversation and lane-keeping tasks. Copper and his collaborators (Cooper, Vladislavjevic, Medeiros-Ward, Martin, & Strayer, 2009) indicated that the cell phone use not only distracted drivers but also had the serious consequence even to the overall traffic flow. Consistently with previous publications before 2007, robust scientific