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Watch for motorcycles! The effects of texting and handheld bans on motorcyclist fatalities

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ABSTRACT

Motorcyclists account for a much higher proportion of traffic fatalities relative to the share of motorcycles among all motor vehicles and vehicle miles driven in the U.S. In this paper, we posit that motorcyclists may be particularly vulnerable to the risks of distracted driving by others. Specifically, we examine whether state-specific texting/handheld bans significantly influence motorcyclist fatalities in the U.S. We use state-specific traffic fatality data in the U.S. (2005–2015, $N = 550$) from the Fatality Analysis Reporting System (FARS) merged with state-specific characteristics, texting/handheld device laws, and other traffic policies. Although research is mixed on the effectiveness of texting/handheld bans for overall traffic fatalities, our findings indicate that motorcyclists are at elevated risk of being a victim of distracted driving and thus could greatly benefit from these policies. This result is driven mainly by multiple-vehicle crashes (e.g., car hitting motorcycle) as opposed to single-vehicle crashes. Policy makers should consider strengthening texting/handheld bans along with their enforcement to improve safety and save lives, especially among motorcyclists.

1. Introduction

Distracted driving is now recognized as one of the most serious safety concerns for motor vehicle occupants, bicyclists, and pedestrians (e.g., Ferdinand and Menachemi, 2014). The National Highway Traffic Safety Administration (NHTSA, 2017a) reports that in the U.S., about nine people are killed and more than 1000 injured daily in traffic crashes that involve distracted drivers. Drivers engage in many different forms of distracting behaviors (e.g., eating, drinking, tuning a radio), but the most alarming form is using mobile devices while operating a vehicle (Wilson and Stimpson, 2010). For example, more than two-thirds of drivers ages 18–64 in the U.S. report talking on a cellphone while driving and almost a third of them report texting while driving (Centers for Disease Prevention and Control [CDC], 2013).

Driving while using a mobile phone (handheld or hands-free) has been shown to restrict driver's movements, distract their attention from the road, and impair their reaction time (e.g. McCartt et al., 2006; Caird et al., 2008; Simmons et al., 2016). A recent meta-analysis concludes that typing and reading text messages while driving compromises traffic safety (Caird et al., 2014). It is estimated that across the U.S. in 2015, 476 people died and an additional 30,000 were injured in motor vehicle crashes involving drivers distracted by cellphone use alone (NHTSA, 2017a). As the prevalence of using a mobile phone while driving has increased and public concern has mounted (94% of drivers support a ban on texting while driving and 74% are in favor of a ban on handheld cellphone use [Schroeder et al., 2013]), individual states have passed laws to discourage some or all of these practices. The first state to pass such a law was New York in 2001, where drivers were banned from talking on a handheld cellphone while operating a motor vehicle (Cheng, 2015). As of September 2018, 16 states plus Washington, D.C. prohibit all drivers from talking on a handheld cellphone while driving and 38 states plus Washington, D.C. ban any cellphone use by novice drivers. The legislative process has been more active for texting, with 47 states plus Washington, D.C. establishing a ban on text messaging for all drivers. Currently, the only state without a texting ban of any form is Montana.

Research on the effectiveness of texting/handheld device policies has flourished in recent years. McCartt et al. (2014) provide a systematic review of the studies examining the effectiveness of texting/handheld bans in the U.S. The findings are largely mixed, however,

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with some studies showing a limited or short-lived positive impact of these policies on traffic fatalities (e.g. Abouk and Adams, 2013; Ferdinand et al., 2014; Rocco and Sampaio, 2016) and others showing small or non-significant effects (e.g., Bhargava and Pathania, 2013; Lim and Chi, 2013). Crash-related hospitalizations seem more responsive to such policies than traffic fatalities (Ferdinand et al., 2015), which could simply be an artifact of a relatively larger number of hospitalizations in comparison to the number of fatalities. Although some researchers find that texting/handheld bans significantly reduce drivers' cellphone use (e.g., Cheng, 2015; Zhu et al., 2016), these bans do not seem to translate into meaningful reductions in traffic crashes and fatalities.

One potential explanation is that drivers engage in compensatory behavior when they are using their cellphones, such as reducing their speed and/or keeping more space between them and other vehicles (Choudhary and Velaga, 2017). Another explanation is that the crashes caused by drivers distracted by their cellphone use may be leading mostly to non-fatal injuries rather than fatal ones, hence the lack of significant estimated effects of texting/handheld bans on mortality risk. Moreover, differences may be present in the effects of such bans on new versus experienced drivers. Texting/handheld policies could have a more pronounced effect on new drivers relative to more experienced drivers given that the latter group may have more established driving habits. New drivers, however, are typically younger individuals who may be more active mobile device users—especially texting—and also less likely to process the risks of distracted driving (Cazzulino et al., 2014). Ferdinand et al. (2014) report that texting laws for either group of drivers do not significantly reduce traffic fatalities unless coupled with primary enforcement. Primary enforcement allows police officers to issue a ticket to a driver without any other traffic offence taking place. Secondary enforcement, a much weaker criterion, allows law enforcement officers to issue a ticket to a driver only when another citable traffic violation is observed (e.g., speeding, illegal turn).

Considering motor vehicle crashes in the aggregate, however, may obscure how these policies impact motorcyclists—a group of motor vehicle operators that is particularly vulnerable to the risks of distracted driving by others. According to a recent NHTSA (2017b) report, motorcyclists account for 14% of all traffic fatalities in the U.S. even though they make up only about 3% of all motor vehicles and 0.6% of all vehicle miles traveled. Adjusting for vehicle miles traveled, motorcyclist fatalities are almost 29 times more frequent than passenger car occupant fatalities (NHTSA, 2017b). According to our own calculations using Fatality Analysis Reporting System (FARS) data, the share of motorcyclist deaths among all motor vehicle fatalities has gone up by more than 30% in just 11 years from 2005 to 2015. Finally, at least part of the explanation could be that motorcyclists are harder to see and avoid, even for experienced and attentive motor vehicle operators. Motorcyclists are particularly vulnerable to crashes caused by distracted divers because motorcycles suffer from the so-called "low conspicuity" problem given their smaller size compared to other motor vehicles, and they can easily get obscured by narrow sight lines and blind spots in modern cars and trucks (Hurt et al., 1981). Without many of the safety features present in late-model automobiles and light trucks (e.g., air bags, seat belts, anti-lock brakes, steel shell), motorcycles provide little protection for their occupants in the case of a crash.

To the best of our knowledge, the present research is the first study to quantify the impact of texting/handheld laws on motorcyclist fatalities. Using 11 years of FARS data, we estimate the effects of texting/handheld bans on both motorcyclist and non-motorcyclist fatalities. In addition, we disaggregate the analyses into fatalities involving both single- and multiple-vehicle crashes. We also contribute to the literature by categorizing various texting/handheld policies into a four-level rating system—*strong*, *moderate*, *weak*, and no bans.

2. Data and methods

The motor vehicle fatality data used in this study come from FARS, a publicly available data source maintained by NHTSA. FARS is a census of all motor vehicle traffic crashes that occur on public roads in the U.S. and result in a fatality within 30 days. We obtained annual data on total and motorcycle-specific traffic fatalities for the period of 2005–2015 for all 50 states (Washington, D.C. is excluded). Given that we use publicly-available files of secondary data aggregated at the state level, it was not necessary to obtain institutional review board approval for research involving human subjects. Crash characteristics, including the number and type of vehicle(s), come from police reports. Motorcyclist fatalities refer to both motorcycle operators and passengers, excluding occupants of scooters, mopeds, and off-road vehicles. Traffic fatalities in crashes involving no motorcycles refer to other motor vehicle occupants (i.e., drivers and passengers) as well as non-occupants (e.g., pedestrians, bicyclists) killed in traffic crashes. Appendix Table A1 provides detailed definitions and a list of data sources for all variables used in the analyses.

It is highly unlikely for motorcycle operators to use mobile devices while riding because motorcycle riding requires manual shifting, additional motor and perceptual skills, as well as balance and coordination (Motorcycle Safety Foundation, 2009). In fact, several studies report very low prevalence of talking or texting on cellphones while riding among bicyclists and motorcyclists. In a recent study, researchers observed only 0.64% of 4244 motorcyclists in Mexico using their mobile phones while riding (Pérez-Núñez et al., 2014). In another study of 7102 bicyclists in the Netherlands, only 3% of them were observed making calls, texting, or typing on their cellphones (de Waard et al., 2015). The insights from these studies, however, are somewhat limited given the vast differences between the U.S. and these countries. For example, self-reported cellphone use while driving is lower both in the Netherlands (less than 50%) and in Mexico (about 11%) than in the US (CDC, 2013; Vera-López et al., 2013). On the other hand, the share of motorcycle, bicycle, and scooter rider deaths make up more than half of all traffic fatalities in the Netherlands—a reflection of both shorter distances traveled and a greater popularity of these vehicles in comparison to the US (Bicycle Dutch, 2018). Mexico is less developed than the US, which leads to many differences in both driving and commuting patterns as well as traffic fatalities between these countries. In particular, the shares of pedestrian and urban traffic fatalities are much higher in Mexico (Híjar et al., 2003; Inclán et al., 2005) compared to the US (NHTSA, 2018a, 2018b).

More recently, Wolfe et al. (2016) observed the practices of bikers in Boston, MA—a metropolitan city in Northeastern U.S. They reported only 29 out of 1974 bikers (i.e. less than 1.5%) holding a cellphone in their hand or positioned on handlebars (but not necessarily using these devices). Hence, we conjecture that texting/handheld device policies are much more likely to protect motorcycles from being hit by distracted drivers of other vehicles than to prevent motorcyclists from causing crashes. In our empirical analysis, we conduct sub-analyses separately for motorcyclist fatalities in single-versus multiple-vehicle crashes. As a benchmark for the motorcycle findings and the literature at large, we also estimate the effectiveness of these laws for all other fatalities in single- and multiple-vehicle crashes involving no motorcycles.

Information on state-level texting/handheld policies was collected from several sources including Anderson et al. (2013), Cheng (2015), and McCartt et al. (2014). Effective dates were confirmed using various local news articles and state websites as listed in Appendix Table A1. Handheld device bans prohibit drivers from talking on cellphones while operating motor vehicles. Texting bans prevent drivers from text messaging on their cellphones. While some early handheld bans (e.g., Connecticut and the District of Columbia) were worded such that they covered text messaging as well, most states generally adopted specific texting bans separately from the handheld bans starting with Washington state in 2008. Most states that have both bans typically implemented them simultaneously. Texting/handheld bans can assume several forms, including primary versus secondary enforcement for all