A Study of the Effectiveness of the Hands- Free Ordinance in San Antonio, Texas

By

Jacob Roper

Applied Research Project

Submitted to the Department of Political Science

Texas State University

In Partial Fulfillment for the Requirements for the Degree of

Master of Public Administration

Spring 2017

Abstract

Purpose: The purpose of this research is to explain whether or not the city San Antonio, Texas' Hands-Free ordinance has had an effect on reducing motor vehicle collisions. Explaining the effect, or lack thereof, could help administrators understand the implications of such a law that is aimed at reducing cellphone use related vehicle collisions. ***Method:*** This study utilizes an interrupted time series approach where monthly accident rates was the dependent variable. Vehicle accidents attributed to cellphone use for the years 2014 and 2016 were collected for San Antonio and Dallas. Dallas was the control city which has similar population size, and does not prohibit phone usage while driving. Furthermore, this study controls for factors such as precipitation and temperature. ***Results:*** The results of time series analysis showed that San Antonio's Hands-Free law did not have any significant impact on the reduction of motor vehicle collisions attributed to cellphone usage. In contrast, the results showed an increase in vehicle collisions in San Antonio as well as Dallas, during the years of 2014 & 2016. ***Conclusion:*** Since the City of San Antonio's hands-free law did not have the intended effects in reducing motor vehicle collisions, this suggests that drivers are failing to comply with the law, or engaging in more discreet, but less safe mobile device use while driving. Potential reasons for the ineffectiveness of this law are discussed.

Introduction

"Technology can be our best friend, and technology can be a huge party pooper" (Schofield, 2014, p.399). This quote by Steven Spielberg sums up the dilemma that many cities are facing nationwide. 10 years ago, cellphone usage (especially smartphones), amongst Americans was significantly lower than it is today, and as a result many people have become lost in their electronic devices no matter what the setting is. In a country that runs on social connectivity, coming to possess one of these devices has become relatively easy. As of December 2010, the number of wireless subscribers residing in the U.S. has exceeded 302.9 million (Jacobson et al., 2012). The sheer marketing power that these major cellphone companies utilize has been effective given that their devices find their way into the hands of many U.S. citizens. While burying one's face into their phone in certain settings may be seen as rude, offensive or even plain amusing, in other settings such behavior poses a threat to someone else's life. Texting while driving is one such scenario where the consequences of a momentary lapse in concentration can be life threatening.

In 2008, 1 in 6 fatal motor vehicle crashes were a direct result of the driver being distracted behind the wheel via cellphone use (Wilson & Stimpson, 2010). In a more recent study conducted in 2012, an estimated 421,000 people were injured in a motor vehicle crash involving a distracted driver- a 9% increase from the estimated 387,000 injured in 2011 (Hands Free, 2015a). The U.S. Department of Transportation defines *distracted driving* as, "a type of inattention that occurs when drivers divert their attention from the activities critical for safe driving, consequently increasing the risk of a motor vehicle crash" (Sherin et al., 2014, p.682). Additionally, distracted driving fatalities

increased 28% (4572 deaths to 5870), from 2005 to 2008 (Wilson & Stimpson, 2010). Further evidence shows that the overall prevalence of cellphone use while driving increased 95% in drivers older than 25 from 2011 to 2013 in several Texas cities (See Wilkinson et al., (2015). These dramatic increases lead many people to believe that similar levels of increased cellphone related accidents will take place as time passes. The dangers of cellphone use while driving are evident and obvious, however as the statistics show, this threat is a major concern for U.S. citizens, and is an important topic of inquiry.

Many cities such as San Antonio, Texas, have recognized this apparent concern and have implemented laws banning use of such activity while operating a motor vehicle. "As of 2010, 39 states have one or more laws restricting the use of telecommunication devices while operating motor vehicles" (Ibrahim et al., 2011, p.661). New York was officially the first state to enact a statewide hands-free law, banning all cellphone usage while driving, in 2001 (Ibrahim et al., 2011). When viewing the statistics on distracted driving which show that it plays a role in nearly 17% of all crashes resulting in injury (Sherin et al., 2014), it is clear why many states and cities have made efforts to pass legislation in hopes of deterring this activity. Texting and driving is a major concern of hands-free laws, since users eyes are shifted from the road to their devices, rendering his/her eyes oblivious to the road. "Texting" is defined as reading, manual composition, or sending of electronic communications via portable device, including mobile phones (Ferdinand et al., 2014). In Texas alone, 453 fatalities are caused each year due to cellphone related accidents (Schofield, 2014), thus, Texas has recently implemented ordinances in 40 statewide cities including San Antonio, Galveston, Austin, Arlington, and many more (TxDOT, 2015). Researchers often compare hands-free laws to seat belt

law as well as motorcycle helmet law, in that, eventually hands-free laws will continuously progress and become more apparent as was the case of seat belt and motorcycle helmet ordinances in the past (Ibrahim et al., 2011; NHTSA, 2016). Statistically speaking, Olsen et al., (2016) found that by pooling data from 11 states- 5 which possessed mandatory laws requiring motorcycle riders to wear helmets, and 6 states which only required a subset of riders to wear helmets- that the states requiring riders to wear helmets had much higher rates of helmet use with significantly less head, face, and brain injuries than states that did not require all riders to wear helmets. One observable difference between a law such as this and hands-free laws, is that it is much easier for law enforcement to notice a helmetless rider.

Unfortunately, the crash risk associated with drivers using cell-phones while driving is not well understood (McCartt, 2014). Finding out exactly what caused a motor vehicle accident, when it comes to cellphone related accidents, is difficult to pinpoint, as it basically comes to the statement of the driver who caused the crash. Furthermore, it is difficult to enforce these laws, as there are many ways one can hide a phone from plain view: most drivers text with the phone below eye level, or on their lap, making it difficult for law enforcement to detect the action (Farris, 2011). However, many state and law enforcement officials alike are hopeful in the passing of more city/state ordinances prohibiting this activity as will be discussed later on.

Scholars and practitioners alike, agree that cellphone use while driving is becoming more of an apparent problem surrounding our roads, especially when considering the growing numbers of cellphone users (TxDOT, 2015; Matthew et al., 2014; Weaver 2014). To address this, many cities, such as San Antonio, have begun

implementing laws that fully or partially prohibit phone usage while driving (TxDOT, 2015). However, because these laws have only recently been implemented, there is a gap in the results of whether or not these laws effectively lower accident rates (Jacobson et al., 2012; Nikolaev et al., 2010; Sampaio, 2010; McCartt et al., 2014; McCartt et al., 2006). Furthermore, there has been a lack of evidence-based studies on this topic at the state or city level, which this applied research project sought out to address.

San Antonio passed its hands-free ordinance in 2014 as an amendment to a previous section, 19-255 of article VII of the city code of San Antonio, and the law became effective January 1, 2015, with the signature of San Antonio's current mayor, Ivy Taylor. This law prohibits the use of a hand-held mobile communication device, to engage in any other use of the device while operating a moving motor vehicle, whether the vehicle is moving or stopped in traffic (Hands Free, 2014b). This ordinance was justified by the city of San Antonio's statement that reads, "the city council finds that the use of … is a traffic hazard and danger to the public, which creates a particular danger or probability of danger in the City of San Antonio" (Hands Free, 2014b, p.1).

The purpose of this research was to evaluate whether or not Texas texting and driving laws have had a significant impact on the reduction of driving-while-texting automobile related accidents within San Antonio, Texas, through an explanatory study. The results of an interrupted time series research design will illustrate whether or not these laws have had a positive or negative effect on the frequency of automobile accidents.

The study of effectiveness of this traffic law can be used as a reference for transportation officials in passing or denying legislation on hands-free law, as this study

serves as benchmark in assessing the usefulness of this type of legislation, since a law such as this has not statistically shown to have any effect (McCartt et al, 2014). Furthermore, this study will be a viable example to use in graduate-level research courses, utilizing an interrupted time series research methodology.

Literature Review

Statistics of Cellphone Use While Driving

The most critical bearings of cellphone use while driving are the fatalities and injuries that result from it. The research shows that this activity is only increasing, with fatalities resulting from the action increasing 29% from 2005 to 2008 (Matthew et al., 2014; Weaver, 2014; McCartt et al., 2006). Furthermore the increase in texting volumes between the years 2001-2007 has resulted in over 16,000 additional vehicle fatalities, assessing that texting while driving is more dangerous than talking while driving (Mathew et al., 2014). In a more recent study, showing an estimated 32,788 deaths resulting from cellphone related accidents in 2010, further displays that this pandemic continues to rise, as more users are engaging in this activity (Ferdinand et al., 2014). The Texas Department of Transportation states that approximately 1 in 5 crashes involve driver distraction; drivers who use cellphones in vehicles have higher risk than drivers who do not, whether the user is simply holding the device or using a hands-free device, such as a Bluetooth headset (Cell Phone Ordinances, 2015). This is further backed by Sherin's statement which found that according to the National Highway Traffic Safety Administration, nearly 12% of all crashes involving a distracted driver were estimated to be closely related to cellphone use while operating a vehicle (2014). This activity is only

predicted to increase as stated by He (2015): “prevalence of distracted driving is increasing- recent studies have found .9% of drivers were visibly manipulating hand-held devices while driving in 2010, and this percentage increased to 1.3% in 2011” (p. 251). Cellphone use while driving not only effects users on roadways, but the railways as well. On September 12, 2008, it was found that a train conductor in Los Angeles was responsible for the deaths of 25 people, while injuring 135 other passengers, as a result of texting while operating the train (Noder, 2009).

When trying to delve into a dilemma such as cellphone related accidents, it is important to note the different age groups associated with it. A 2009 national telephone survey of drivers found that amongst 18-24 year olds, 45% reported texting while driving in states that had enacted texting bans, and 48% of these drivers engaged in texting in states without bans (McCartt et al., 2014). Pertaining to this college age group, 91% of college students were reported to have sent text messages while operating a motor vehicle, despite recognizing the dangers (He et al., 2015). Evidence of younger drivers participating in this activity is further supported by ATT’s teen driver survey from 2012. In a survey administered to 1200 teenagers ranging from 15-19, 43% admitted to texting and driving, while 61% admitted to reading text messages while driving, all the while knowing the implications of this action (Teen Driver Survey, 2012). This is consistent with the National Highway and Traffic Safety Administration’s report that found that 10% of teens (aged 15 to 19) were involved in cellphone related accidents. Concurrently, it was also found that young drivers, aged 18-20, were reportedly involved in more crashes involving phone usage while driving, than any other age group (NHTSA).

It is also crucial to understand the underlying causes behind cellphone use while driving. In a study investigating the underlying processes associated with texting and driving, it was found that texting while driving is an impulsive decision made by the drivers (Caird et al., 2014). This research shows that many of the users that text while driving haphazardly answer phone calls and texts as a subconscious action. Peering further into why this activity is so apparent, a 2008 Nationwide Insurance poll found that 48% of participants from a 1500 driver study, multitasked behind the wheel as an "urgent need" to respond to a work or school issue, whereas 33% felt a subconscious need to "stay connected socially" (Farris, 2011, p. 256).

Perhaps one of the biggest constraints behind cellphone use while driving is the lack of recognition of the considerable dangers involved, especially when pertaining to texting while driving. Studies have shown that texting while driving demonstrates similar levels of violations as those who are driving while intoxicated and delays reaction times by as much as if the driver had a blood alcohol concentration of .08%- the legal limit in Texas (Schofield, 2014; Mathew et al., 2014). Furthermore, one study showed that a texting driver's eyes were diverted from the road for an average of 4.6 – 6 seconds, in which a considerable distance can be covered depending on the speed of the vehicle (Weaver, 2015).

In further examination of the crash-risks associated with phone use while driving, one study from 2014 obtained cellphone billing records to verify phone use of drivers involved in driver-injured crashes, using a case-crossover design, it was found that there was a fourfold increase in crash risk associated with phone use while driving (McCartt et al., 2014). Moreover, Klauer et al. (2006, as cited in McCart et al., 2014) collected 1

years' worth of data from 109 drivers and found a correlation stating the risk of an at-fault crash or near crash was 1.3 times as high when drivers were talking on hand-held phones and 2.8 times as high when drivers were dialing compared with just driving. A separate study by Olson et al., found that drivers of large trucks were 23 times as likely to drift in and out of lanes and result in near-crash or crashes when compared to non-distracted driving (McCartt et al., 2014). Additionally, it was found in two separate studies, with data being pulled from phone company records, that phone use was associated with a fourfold increase in both property-only and injurious crashes (McCartt et al., 2006). In McCartt et. al.'s (2014) review of studies on this topic, newly licensed teenagers were found to be 4 times as likely to result in an at-fault crash or near-crash while sending and receiving text messages, compared to non-distracted driving. He et al. (2015, p. 115) emphasize the negative repercussions of texting while driving by stating that, "Texting while driving increases hazard response time, lane deviations, mental demand, collision rate, and raises risks of traffic accidents, by as much as 8-23 times. More statistical analysis states that the rate of crashes and near-crashes as compared to the rate with no driver distraction, is 180% greater while dialing, 30% greater while talking, and 40% greater while reaching for a mobile-device (Jacobson et al., 2012). It has also been found that users that frequently engage in this activity shower a higher risk of dangerous motor vehicle activity. In a study conducted by Olsen et al. (2014), focusing on high school students, it was found that students who texted while driving were more likely to not always wear their seatbelt, ride with a driver who had previously been drinking alcohol, and drink alcohol while driving. This result is of particular public health concern as teenagers have the highest rates of fatal crash involvement and lowest rate of

seatbelt use of any age group (Olsen et al., 2014). It is also interesting to note that aside from texting, engaging in conversation, while on the phone, skews the drivers vision by as much as 50% (New Approaches, 2013).

State Law

Currently, 14 states possess statewide bans that prohibit all drivers from using hand-held cellphones while driving, and 46 states possess citywide bans that prohibit texting while driving (GHSA, 2015). The penalties for engaging in phone use while driving can vary substantially. Federal employees are prohibited from using cellphones while driving a government-supplied or official business vehicle (Farris, 2011). In most states, a driver that causes an accident as a result of texting and driving can face consequences as minimal as a fine, while in some states such as Utah, the driver can be considered “criminally negligent”- a second-degree felony. Furthermore, In Alaska, this same occurrence can result in up to four years of imprisonment depending on if the accident is injurious or fatal, posing the same consequences as if the driver was intoxicated. (Farris, 2011; Noder, 2009). Yet in Maine, first time offenders can be fined a maximum of $250, and in California- a $20 fee (Weaver, 2014; Farris, 2011). Efforts have been made to set a more standardized approach to fines pertaining to this law such as the Avoiding Life-Endangering and Reckless Texting by Drivers Act of 2009. This act would require that states adopt a federal minimum penalty for texting while driving, or forfeit 25% of their federal highway financing, however, the bill did not pass (Farris, 2011). Many people believe that simply implementing laws prohibiting this activity will cease the usage rates, resulting in effective efforts. Currently, forty-one states have

primary enforcement support of cellphone bans, while the rest, including Texas, have secondary enforcement support. In primary enforcement states- officers can stop and issue citations after observing a driver using an electronic device while driving. In secondary enforcement states- the driver can be pulled over only for a traffic violation, such as speeding, and then and only then, be additionally ticketed for illegal cellphone use (Farris, 2011). It is also noteworthy to mention that all states with device bans allow emergency calls, and some allow talking while stopped in traffic (McCartt et al., 2014). However, passing statewide legislation is a rather arduous task. As Carrie Webster, House Judiciary Chairwoman of West Virginia stated, "trying to pass that kind of legislation is like hitting a political brick wall" (Noder, 2009, p. 255). More barriers to passing this kind of legislation occur in some areas where officials do not agree with passing this type of legislation, states can pass legislation that preempts the laws into making them unenforceable (Noder, 2009).

Pertaining to the effectiveness of such laws- in a study of New York and Connecticut, (both of which implement statewide bans on phone use while driving), conducted by Jacobson et al. (2012) it was found that device usage rate in New York decreased by 2.2% (pre-ban) in 2001, to 1.1% (post-ban) in 2002, but increased back to 2.1% in 2003. In Connecticut, device usage was 2.9% in 2001 as well a 2002, but increased to 3.3% in 2003, however there was no ban in place at this time, in Connecticut. These increases could also be attributed to the fact that more people are acquiring phones as time goes on. Another example of the advantages to implementing such law is found in Nikolaev et al. and Sampaio (2010, as cited in Jacobsen et al., 2012)'s findings which stated that after studying the long-term effects of statewide device

bans in New York on accident rate, personal injury and fatal accidents were significantly lower in the post-law period, than pre-law. In a separate study further observing New York and Connecticut as well as the District of Columbia, driver hand-held phone use was estimated to be 25-76% lower up to 7 years after the bans were put in place, than would have been expected without the bans (McCartt et al., 2014). It has also been shown that users divert to a safer alternative in areas prohibiting phone use while driving. For instance, a 2009 national phone survey stated that in implementing phone bans, more people were using hands-free devices in states with a phone ban than in states without one (McCartt et al., 2014). These laws also extend to younger drivers as well. McCartt et al. (2014) also found that areas implementing phone-bans while driving have resulted in significantly lower motor vehicle fatalities than in states without the bans. When comparing hands-free laws to other traffic laws, it can be theorized that the rate of reductions will be discernible, as laws that focus on increases in seat belt use, decreased alcohol impaired driving, and reductions in crash related deaths have proven to be an effective countermeasure in deterrence (McCartt et al., 2014; Noder, 2009).

However, the implementations of these laws have also shown to provide mixed results according to the literature. In a multi-state study compiled by Bhargava and Pathania (2013, as cited in McCartt et al., 2014), researchers analyzed state-level monthly fatal crashes per 100,000 persons before and after phone bans were implemented in New York, New Jersey, Connecticut and Chicago. The results found that accident rates were not significantly different after the implementation of device-use bans (McCartt et al., 2014). In fact, California, Louisiana and Minnesota were found to have increases in collision claim rates, while Southern California had an increase in texting while driving,

after the bans took effect (McCartt et al., 2014; Noder, 2009). Further evidence of the lack of effectiveness of these laws is evident in some areas such as the District of Columbia, where drivers complied at the beginning of the law, but as time passed, they returned to their normal phone use while driving (Noder, 2009). Additionally, a recent 2012 study compared high school students in North Carolina (a state which has teenage driver cellphone restriction laws), two years after the law's implementation, to South Carolina (which has no comparable law), found no discernible difference between cellphone usages by high school students, in both states (Goodwin et al., 2012). Moreover, it is worth noting that this study also found that teenagers were shifting more towards texting while driving, rather than talking while driving (Goodwin et al., 2012).

Active enforcement of hand-held bans is required to have the desired effect on driver behavior in the long term. According to the National Safety Council public opinion poll, 73% of respondents think enforcement of texting laws should be stronger; while 22% believe enforcement is satisfactory as is. However, research has shown that enforcing these laws is difficult. Most derivers text with the phone below eye level, or in their lap, making it harder for law enforcement to detect the action. As a result, there are a relatively low number of tickets issued to drivers for texting while driving in texting-ban states; these lax penalties equate to low deterrence (Farris, 2011). Furthermore, McCartt et al., (2006) concludes that even if the public is willing to fully comply with hand-held device bans, crash risk will only decrease to the extent that drivers continue to use or switch to hands-free devices. Additionally, McCartt et al., (2006, p. 102) states that "although the enactment of laws limiting drivers' use of all phones is consistent with research findings, it is unclear how such laws could be enforced…more effective

countermeasures are needed but are not known at this time". In regard to the difficulty of passing legislation, Bowling, Ohio has adopted a solution, which lets its citizen's vote on the matter, instead of just the local officials. Bowling's citizens are encouraged to vote on whether or not to prohibit cellphone use while driving, within the city's borders (Noder, 209). Additionally, Noder explains that when seatbelt laws are enforced as primary laws instead of secondary, users are more likely to follow them, leading one to believe that more primary enforcement is needed (Noder, 2009). This is also backed by Abouk & Scott (2013)'s study that found that cellphone bans worked best in primary enforcement states, by effectively reducing the number of cellphone related accidents, rather than secondary states, which showed to have almost no significant differences in vehicle collisions regarding cellphone use while driving. In regards to statewide legislation, Noder advises that more statewide legislation is needed, since states can essentially overwrite local law's hands-free legislation (2009). In addition to this, many judges have cited the need for uniformity in driving laws across the states (Noder, 2009). It is also important to note that the NHTSA admits that fatalities recorded through the NHTSA's Fatality Analysis Reporting System (FARS), under-reports important risk factors such as the involvement of phone use while driving in fatal car collisions, which presses the need for a more effective means of data collection at vehicle crash sites (Ige et al., 2016). With this in mind, one can only speculate that if more accurate data were recorded, there would be a greater push for legislation on this topic. Furthermore, it was only recently required that law enforcement officers collect data on the involvement of mobile-devices in a motor vehicle collision (WHO, 2011).

Texas Law

Presently, Texas does not have a statewide ban on cellphones, but utilizes a "partial ban", based on where they are, such as a school zone, and the age of the driver (under 18). Additionally, 28 municipalities prohibit drivers from using hand-held devices while driving. Many house & senate bills in Texas have been attempted, but none have passed under the governing prowess of Rick Perry, who in defense, stated that these laws are a government attempt to micromanage behavior (Schofield, 2014). However, as more time passes, the momentum for creating statewide bans is increasing (Schofield, 2014). Currently Texas Department of Public Safety officers can only issue citations to commercial vehicle drivers for texting while driving- a fine resulting in up to $2,750. This due to the fact that Texas does not consider texting-while-driving-related vehicle accidents as criminally negligent. Current statewide cell phone prohibitions in Texas state that drivers under the age of 18, school bus operators, and any drivers travelling in a school zone are prohibited from using cellphones while driving. Fines for doing so can range from $200-500 (Cell Phone Ordinances, 2015). Currently, Texas law enforcement is for the implementation of state legislature that would prohibit phones; while some drivers that text and drive are hard to notice, many others are easier to spot, as it appears that they are drunk (swerving), according to DPS officials (Schofield, 2014).

Austin and San Antonio were the first cities in Texas to implement a prohibition of portable electronic devices, taking effect on January 1, 2015. This law also extends to Austin's bicyclists, as the dangers are presumed to be similar to motor vehicle operators. Texas defines a "portable electronic device" as any: mobile phone, music player, electronic reading device, computer, GPS or navigation system, or portable gaming

device (Hands Free, 2015a). Criticism of legislation directed at prohibiting cellphone use while driving is further stimulated by the conclusions found by Nicole Hines' study. It was found that the city of Austin, Texas' hands-free law is ineffective in regard to reducing motor vehicle collisions. Moreover, the number of reported collisions did not differ significantly in the 60 days before and after the implementation of the law (Hines, 2016). The ineffectiveness of the legislation can perhaps be correlated with the public's apathy towards the issue. Texas laws, along with U.S. Law, are the basis for the working hypotheses illustrated in Table 1.

Preventive Measures

Many ideas and alternative measures have already been put into motion in an effort to curb cellphone use while driving. Many awareness programs have been created such as TxDOT's "Talk. Text. Crash.", which consists of radio advertisements, press events, and posters in expense of $224,215; however the program lacked funding (TxDOT, 2015). Additionally, TxDOT has spent $785 million in 600 highway projects over the last 3 years, renovating and updating highway structures, estimated to save 183 lives each year for up to thirty years (Schofield, 2014). In a more federal approach, the "U Drive. U Text. U Pay." Campaign was launched in 2014 to encourage undistracted driving. In 2010, the NHTSA and the U.S. Department of Transportation launched a campaign called "Phone in One Hand, Ticket in the Other" which showed to have its intended results in reducing cellphone use by 4% in Hartford and 1.4% in Syracuse (Sherin et al., 2014).

Alternative technology is also being developed, such as PhoneGuards's Drive Safe software- a preventative tool that disables texting, emailing, and keyboard functions of a cellphone while a vehicle is moving faster than 10 mph, by utilizing GPS. While this smartphone application is completely voluntary, it may be a starting point in helping create a more effective kind of software (Farris, 2011.) Other smartphone developments like PhoneGuard have also been constructed such as a software that can observe when the user is in a "no cellphone zone" such as a school zone, and disables all actions of the cellphone, other than a "911" emergency mode. This technology could be set up by the parents of the teens prevalent to texting and driving, and perhaps eventually be implemented by major device carriers (Pantoja & Scott, 2011). More technological advances, such as the transverse rumble strip, a counter aimed at reducing motor vehicle collisions in work zones and roadways by alerting drivers of changing road conditions (Cox & Kohlberg, 2014). By alerting the driver of changing road conditions, one can only speculate that these benefits could be carried over to alerting distracted drivers, forcing them to concentrate on the road, if only for a brief moment.

Many recommended solutions include encouraging safe driving practices and educating the population on the dangers of using a cellphone while driving. This is further backed by the findings in Mathew et al., (2014)'s study which showed that many people were unaware of the existing texting ban in their city. According to Sherin et al. (2014), nearly every organization committed to deterring cellphone use while driving, including the AAOS, NHTSA, NSC and AMA, recommend educating the public and raising awareness on the dangers of cellphone use while driving. The

online journal of Professional Safety recommends implementing school presentations depicting the dangers and hazards of operating a cellphone while driving (New Approaches, 2013). Farris (2011, p. 250), states, "a good resolution is pursuing more anti-texting campaigns to aware the public of the dangers and precautions, as laws and prohibitions alone are essentially useless". The results of increased awareness and education of the public towards this topic has been shown to work when comparing to the effectiveness of groups such as Mothers Against Drunk Driving (Farris, 2011). Furthermore, the NHTSA notes that with further implementation and development of crash prevention technology, the effects of cellphone use while driving will be offset (NHTSA). Researchers such as Shannon Noder press the need for higher penalties when violating hands-free laws, which she states is essential for compelling compliance in addition to federally mandating the prohibition of phone use while driving (Noder, 2009). One solution is concurrent with all major organizations and researchers- at the very least states should be implementing statewide bans on phone use while driving. The literature lays the foundation for the conceptual framework and hypothesis illustrated in the next section.

Conceptual Framework

This research is explanatory in nature, and thus a formal hypothesis was tested. According to the purpose of the law, it is hypothesized that the citywide hands-free law imposed by San Antonio, Texas, will effectively reduce cellphone related accidents. Alternatively, the null hypothesis implies that the hands-free law will have no effect in

reducing the number of crashed within the city's limits. To my knowledge, no other research study thus far has evaluated the effectiveness of this San Antonio legislation. This research uses the 2016 study of Austin, Texas' hands-free ordinance, conducted by Nicole Hines, a former Texas State MPA graduate (Hines, 2016) as a conceptual foundation. Table 1 provides the hypotheses tested in this study and supporting literature that helped tease out this hypothesis.

Table 1. Hypothesis and Supporting Literature

Hypothesis	Supporting Literature
San Antonio's texting and driving laws will reduce the number of motor vehicle accidents in San Antonio	Schofield, 2014; Jacobson et al., 2012; McCartt et al., 2014; Ferdinand et al., 2014); Rahi & Scott, 2013

Many states and cities alike have implemented hands-free ordinances banning the use of cell-phones while driving, yet impacts of these acts are still largely unknown. It is immensely difficult to tease out the singular effects of such laws on reducing crashes. Although extant research on this topic (Schofield, 2014; McCartt et al., 2014) has indicated that such laws have been successful in certain contexts and not so effective in other contexts, as much of the literature has supported this statement.

Methodology

The purpose of this chapter is to illustrate the methodology behind the data collection strategy that was implemented in this research. The data was collected from The Texas Department of Transportation (TxDOT), through the department's Crash Records Information System query (CRIS), which is an automated process for obtaining

vehicle collision data files, for each month of 2014 and 2016. This study uses the interrupted time series research design. Time series analysis is an effective strategy in determining the outcomes, and evaluating a newly imposed policy or programs, when multiple data points are present before and after their implementation (Pickup, 2015; Johnson, 2014). This design utilizes a comparison group to reference aggregated accident rates, in Dallas, which has no hands-free ordinance in place, in comparison to accident rates in San Antonio, which does have a hands-free ordinance, in an effort to address whether or not the ordinance has had an effect. Other studies such as Abouk & Adam (2013) have used a similar research design in which vehicle accidents were collected. This model is strengthened by the frequency of observations over a 12-month period before and after the imposed law. In each month before and after the laws passing, monthly accident rates will be recorded and assessed through regression analysis. This method was chosen because it has shown to be an accurate method of data analysis when explaining the effectiveness or ineffectiveness of such a law (Wilson & Stimpson, 2010; Abouk & Adam, 2013).

San Antonio, Texas was the treatment group in this study. San Antonio was one of the first Texas cities to enact a citywide ban prohibiting any kind of mobile-device usage while driving, in January 2015. Dallas will be the comparison group, as it is equivalent in population size to San Antonio, thus resulting in similar traffic flow, and does not currently have any kind of ban prohibiting phone use while driving.

This study also takes into account other variables that are considerable when observing accident rates, such as temperature and precipitation. Wilson & Stimpson (2010) state that weather plays a significant role in vehicle collision rates, as it alters the

condition of the roads. Using the National Oceanic Atmospheric Association's (NOAA) database, precipitation will be measured in inches received monthly.

One perceived weakness of using the interrupted time series technique for data analysis is the possibility that other forces can play a significant role in the outcomes of the measured data. For instance, in this study, research cannot be controlled for other driver's behaviors that could result in an accident, such as a driver falling asleep or focusing on something other than what is in front of them. For these reasons, measurement can be difficult.

Table 2. Operationalization Table

Hypothesis: San Antonio's citywide hands-free law will have a positive effect in reducing the number of accidents within the city

Variables	Definition	Unit of Measurement
Dependent		
Monthly Accidents	Number of accidents per month due to the use of a cellphone by a driver	Number of monthly accidents due to cellphone use
Independent		
A. Month	Month counter for both cities	A counter from 1-12 representing Months Jan. – Dec.
B. Change of level (Dummy)	Level of change after the program went into effect	0 = Before the cell-phone ban went into effect (year 2014) 1 = After the cell-phone ban went into effect (year 2016)
C. Change of trends (Program)	Change of trend of in San Antonio from before to after the program went into effect.	0=All 2014 months 1, 2, 3, etc. = serial counter for all 2016 months.
D. Cities	Dummy variable that represents the two cities	0 = San Antonio 1 = Dallas
E. Difference in trends before program	Product of countries x year	D*A
F. Difference in short-term impact	Product of countries x change of level	D*B
G. Difference in program impact	Product of countries x change of trends	D*C
H. Temperature	Average monthly temperature	Average monthly temperature in Fahrenheit.
I. Precipitation	Average monthly precipitation	Average monthly precipitation in Fahrenheit.

The research design is notated below in Table 3. “O” is the observation of accident rates, which take place 12 months before the implementation of the ordinance, and 12 months after the year that the implementation of the ordinance.

Figure 1 – Schematic Research Design

	Before							After					
San Antonio	O_{-12}	O_{-11}	O_{-10}	…	O_{-2}	O_{-1}	X	O_1	O_2	…	O_{10}	O_{11}	O_{12}
Dallas	O_{-12}	O_{-11}	O_{-10}	…	O_{-2}	O_{-1}		O_1	O_2	…	O_{10}	O_{11}	O_{12}

Results

The results are based on the years 2014 and 2016, as the decision was made to take into account 1 year before and 1 full year after the passage of the hands-free law. We used the statistical method of interrupted time series with a comparison group. The results were corrected for autocorrelation using Prais-Winsten. Table 3 shows the linear comparison between San Antonio and Dallas’ vehicle collision rates, due to phone usage while driving.

Table 3: The Impact of Mobile-Devices on Motor Vehicle Collisions

	Unstandardized Coefficients †
A. Month	.974*
B. Change of level (Dummy)	.092
C. Change of Trends (Program)	.422
D. Cities	.481
E. Difference in Trends Before Program	.981*
F. Difference in Short-Term Impact	.150
G. Difference in Program Impact	.093
H. Temperature	.110
I. Precipitation	.815*
Constant	.001
R^2	.632
Durbin-Watson	2.076
Rho (AR1)	-.18

Dependent Variable = Natural log of monthly reported collisions
† Corrected for Autocorrelation. The Prais-Winsten method is used
** significance is reached at p>.05*

Figure 2: Linear Comparison of San Antonio & Dallas' Vehicle Collissions Due to Phone Use While Driving

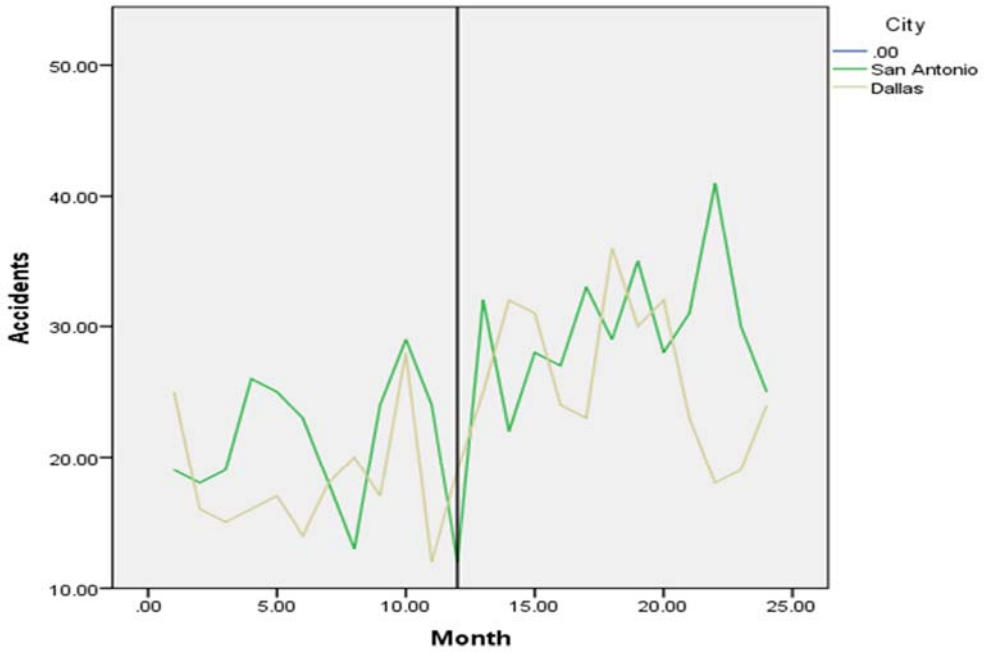

Table 3 shows the results of our analysis. The following explanation of the results should be considered in light of the two control variables of temperature and precipitation. Month (.974*): represents the slope of the intervention line (San Antonio) before the program went into effect. Because the coefficient is significant, we conclude that there was an upward trend in vehicle accident rate before the hands-free law went into effect in San Antonio. The Change of Level (dummy) (.092) represents changes in level for San Antonio, after the hands-free law. Because this coefficient is not significant, we conclude that there was no immediate constant drop in vehicle accidents related due to mobile device use, after the hands-free ordinance went into effect. The Change of Trends (program) (.422) represents the change in mobile device related vehicle accidents for San Antonio. Since the coefficient is not significant, we conclude that the accident rate after the program went into effect was not was not any different than the trend before the program. The Difference in Trends Before Program (.981*) represents the difference in trends of Dallas and San Antonio before the hands-free ordinance went into effect. Because this coefficient is positive and significant, we conclude that the rate of growth in accidents, before the program went into effect, was significantly higher in Dallas than San Antonio. The Difference in Program Impact coefficient (.093) is perhaps the most important coefficient in the analysis. Because the coefficient is not significant, we can conclude that the difference in changes in slopes is not significant. The rise in the rate of mobile device related accidents in San Antonio (the difference in accident rates before and after the ordinance in San Antonio) is not significantly more than the rise in vehicle accident rates in Dallas (the difference in mobile device related accidents before and after in Dallas). As a result of the hands-free ordinance, percentage of mobile device related

accidents in San Antonio is rising at a similar rate as Dallas. Our results do not support the hypothesis that San Antonio's citywide hands-free law would have a positive effect in reducing the number of accidents within the city.

Conclusion

The primary focus of this study was to accurately assess the impact of San Atonio's hands-free ordinance on auto accidents. This study utilized the interrupted time series style of regression analysis, using data gathered from the Texas Department of Transportation, along with the National Oceanic & Atmospheric Administration, and compared two cities, San Antonio and Dallas, with one another, in regard to collision rates under the scope of mobile phone use while driving.

The regression model failed to achieve significance for all, with the exception of the Precipitation variable, and the Difference in Trends before Program coefficient. This study concludes that there is no relationship between San Antonio's hands-free law, and reducing the number of mobile-device related crashes, given the amount of time that the law has been in effect.

This studies results are consistent with Nicole Hines study, which evaluated the city of Austin, Texas' hands-free law, which also found that there was no correlation between the law and reducing motor vehicle collisions (Hines, 2014).

One reason that could explain why San Antonio's hands-free law has had no effect on the reduction of mobile-device related accidents, might be that people are texting below eye-level, in order to conceal their activity, making it much more dangerous to engage in, rather than texting with the device near eye level (Farris, 2011).

Another reason is that the population for both cities has increased significantly, each year (Census Bureau). The population for San Antonio increased 2.3% from 2014 to 2015 (1,436,723 to 1,469,824), and 1.5% in Dallas (1,281,031 to 1,300,082). The United States Census Bureau will not publish population data until September, therefore we were unable to collect the population data for these cities, for the current year. However, we can gather that the percentage increase in population for both cities, can be applied to future years, which could also help explain the rising number of motor vehicle crashes for each city.

It is important to note that there is still no official consensus that states whether these hands-free laws are effective in their mission of reducing vehicle collisions, as multiple studies have provided us with varied results (McCartt et al., 2014; Noder, 2009). Since this law is relatively new, and data pertaining to it is limited, it is imperative that future studies continue to analyze this law and its effects, as its lifespan continues to grow. One variable we could not control for in this study, is the fact that obtaining monthly migrant data, for both Dallas and San Antonio, was impossible, as it is only recorded on an annual basis. Another noteworthy variable for future research, is finding out rates of crashes (how many cellphone use related accidents per thousand people), rather than just raw numbers. Furthermore, obtaining information on the exact number of drivers that use cellphones, should also be considered for future studies. Controlling for these variables would further contribute to the function and significance of this study by helping to answer the question of why this hands-free law analyzed, has had no effect on vehicle collisions.

Transportation officials and legislators alike will benefit from this research illustrating the results of a citywide law prohibiting phone use while driving. This research is important in establishing a benchmark for future legislation guided towards deterring phone use while driving. However, before an accurate assessment of this research can be made, it is important to note the limitations associated with this study.

Limitations

One significant limitation of researching this topic is the lack of longitudinal studies conducted due to the relatively recent implementation of these laws. Since San Antonio's law is so recent, accurate data assessments were harder to come by. Secondly, the exact cause of many motor vehicle crashes is particularly difficult to solve. Whether the crash is a result from cellphone usage or some other type of user error is a hard task to clarify, thus results can be skewed. Lastly, the time constraint that an MPA student faces can be a significant factor in the research. Graduate students have a brief period of time to utilize their data collection, and as a result, the accuracy of the findings can be rushed, resulting in inaccuracies.

References

Abouk, R., & Adams, S. (2013). Texting bans and fatal accidents on roadways: Do they work? Or do drivers just react to announcements of bans? *American Economic Journal-Applied Economics, 5*(2), 179-199.

AT&T Wireless. Teen Driver Survey. (2012). https://www.att.com/Common/about_us/txting_driving/att_teen_survey_ecutive.pdf.

Caird, J. K., Johnston, K. A., Willness, C. R., Asbridge, M., & Steel, P. (2014). A meta-analysis of the effects of texting on driving. *Accident Analysis & Prevention, 71*, 311-318.

Centers for Disease Control and Prevention.(2015). *Distracted Driving in the U.S. and Europe*. Atlanta, GA. http://www.cdc.gov/Features/dsDistractedDriving/.

City of Austin. (2015a). *Hands Free.* Austin, Texas. https://www.austintexas.gov/handsfree.

City of San Antonio. (2014b). *Hands Free Ordinance.* San Antonio, Texas. https://www.sanantonio.gov/portals/0/Files/SAPD/Hands-Free-Ordinance-2015.pdf

Cox, T., & Kolberg, K. (2014). Mitigating distracted driving. *Purdue University*.

Farris, A. M. (2011). LOL-Texting While Driving is No Laughing Matter: Proposing a Coordinated Response to Curb this Dangerous Activity. Wash. UJL & Pol'y, 36, 233

Ferdinand, A. O., Menachemi, N., Sen, B., Blackburn, J. L., Morrisey, M., & Nelson, L. (2014). Impact of texting laws on motor vehicular fatalities in the United States. *American journal of public health*, *104*(8), 1370-1377.

Goodwin, A. H., O'Brien, N. P., & Foss, R. D. (2012). Effect of North Carolina's restriction on teenage driver cell phone use two years after implementation. *Accident Analysis & Prevention, 48*, 363-367.

Governors Highway Safety Assocation. (2015). Distracted Driving Laws. *Washington, DC*. http://www.ghsa.org/html/stateinfo/laws/cellphone_laws.html.

He, J., Chaparro, A., Wu, X., Crandall, J., & Ellis, J. (2015). Mutual interferences of driving and texting performance. *Computers in Human Behavior*, 52, 115-123.

Hines, N. (2016). *An Evaluation of the Impact of City of Austin's Hands-Free Ordinance on the Number of Reported Collisions* (Applied Research Project, Texas State University).

Ibrahim, J., Anderson, E., Burris, S., & Wagenaar, A. (2011). State laws restricting driver use of mobile communications devices. *American Journal of Preventive Medicine, 40*(6), 659-665.

Ige, J., Banstola, A., & Pilkington, P. (2016). Mobile phone use while driving: Underestimation of a global threat. *Journal of Transport & Health, 3*(1), 4-8.

Jacobson, S. H., King, D. M., Ryan, K. C., & Robbins, M. J. (2012). Assessing the long term benefit of banning the use of hand-held wireless devices while driving. *Transportation research part A: policy and practice*, 46(10), 1586-1593.

Johnson, G. (2014*). Research methods for public administrators* (3rd ed.). Armonk, N.Y.: ME Sharpe.

Mathew, A. E., Houry, D., Dente, C. J., & Salomone, J. P. (2014). Texting while driving: does the new law work among healthcare providers?. *Western Journal of Emergency Medicine*, *15*(5).

McCartt, A. T., Kidd, D. G., & Teoh, E. R. (2014). Driver cellphone and texting bans in the United States: evidence of effectiveness. *Annals of Advances in Automotive Medicine*, 58, 99.

McCartt, A. T., Hellinga, L. A., & Bratiman, K. A. (2006). Cell phones and driving: Review of research. *Traffic injury prevention, 7*(2), 89-106.

National Centers for Environmental Information. National Oceanic and Atmospheric Administration. *Climate Data Online Search*. Retrieved from http://www.ncdc.noaa.gov/cdo-web/search?datasetid=GHCND

National Center for Statistics and Analysis (2015). Washington, DC: National Highway Traffic Safety Administration.

New Approaches to End Texting While Driving. (2013). Professional Safety, 58(9), 16.

Noder, S. L. (2009). Talking and texting while driving: A look at regulating cell phone use behind the wheel. *Val. UL Rev.*, *44*, 237.

NSC Poll: Most Want Stronger Enforcement of Texting & Driving. (2014). *Professional Safety, 59*(9), 16.

Olsen, C. S., Thomas, A. M., Singleton, M., Gaichas, A. M., Smith, T. J., Smith, G. A., ... & Kerns, T. (2016). Motorcycle helmet effectiveness in reducing head, face and brain injuries by state and helmet law. *Injury epidemiology, 3*(1), 1-11.

Olsen, E. O. M., Shults, R. A., & Eaton, D. K. (2013). Texting while driving and other risky motor vehicle behaviors among US high school students. *Pediatrics,* 131(6), e1708-e1715.

Pantoja, T., & Taylor, W. S. (2011). U.S. Patent Application No. 13/091,977.

Pickup, M. (2015). *Introduction to time series analysis*. Los Angeles, CA: Sage.

Rahi, A., & Scott, A. (2013). Texting bans and fatal accidents on roadways: Do they work? or do drivers just react to announcements of aans? *American Economic Journal: Applied Economics,* (2), 179.

Schofield, C. (2013). Texas, Are We There Yet-A Roadmap for Implementing and Enforcing a Future Texting-While-Driving Ban. *Tex. Tech. Admin. LJ*, *15*, 399.

Sherin, K. M., Lowe, A. L., Harvey, B. J., Leiva, D. F., Malik, A., Matthews, S., ... & American College of Preventive Medicine Prevention Practice Committee. (2014). Preventing texting while driving: a statement of the American College of Preventive Medicine. *American journal of preventive medicine, 47*(5), 681-688.

Shields, P., & Rangarajan, N. (2013). *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management*, Stillwater, OK: New Forums Press.

Texas Department of Transportation. (2015). Cell Phone Ordinances. Austin, TX. http://www.txdot.gov/driver/laws/cellphones.html.

Wagner, A., Soumerai, S., Zhang, F., & Ross-Degnan, D. (2002). Segmented regression analysis of interrupted time series studies in medication use research. *Journal Of Clinical Pharmacy & Therapeutics, 27*(4), 299-309.

Weaver, Russell L. (2014)."Unintentional killings (Negligent Homicide, Involuntary Manslaughter, Depraved-Heart and Felony Murder): Texting, Driving, And Punishment." *Texas Tech Law Review 47*(101). *LexisNexis Academic: Law Reviews*, EBSCOhost.

World Health Organization, (2011). Mobile phone use: a growing problem of driver distraction.⟨http://www.who.int/violence_injury_prevention/publications/road_traffic/distracted_driving_en.pdf⟩.

Wilkinson, M. L., Brown, A. L., Moussa, I., & Day, R. S. (2015). Prevalence and correlates of cell phone use among Texas drivers. *Preventive medicine reports*, *2*, 149-151.

Wilson, F. A., & Stimpson, J. P. (2010). Trends in fatalities from distracted driving in the United States, 1999 to 2008. *American Journal of Public Health*, *100*(11), 2213-2219

U.S. Concensus. (2017*).* San Antonio & Dallas population sizes. https://factfinder.census.gov.