Texting-While-Driving Bans and Motor Vehicle Crash–Related Emergency Department Visits in 16 US States: 2007–2014

Alva O. Ferdinand, DrPH, JD, Ammar Aftab, BSc, and Marvellous A. Akinlotan, BDS, MPH

Objectives. To examine the impact of state texting bans on motor vehicle crash (MVC)–related emergency department (ED) visits.

Methods. We used ED data from 16 US states between 2007 and 2014. We employed a difference-in-difference approach and conditional Poisson regressions to estimate changes in counts of MVC-related ED visits in states with and without texting bans. We also constructed age cohorts to explore whether texting bans have differential impacts by age group.

Results. On average, states with a texting ban saw a 4% reduction in MVC-related ED visits (incidence rate ratio = 0.96; 95% confidence interval = 0.96, 0.97). This equates to an average of 1632 traffic-related ED visits prevented per year in states with a ban. Both primary and secondary bans were associated with significant reductions in MVC-related visits to the ED regardless of whether they were on all drivers or young drivers only. Individuals aged 64 years and younger in states with a texting ban saw significantly fewer MVC-related ED visits following its implementation.

Conclusions. Our findings suggest that states' efforts to curb distracted driving through texting bans and decrease its negative consequences are associated with significant decreases in the incidence of ED visits that follow an MVC. (*Am J Public Health.* 2019;109:748–754. doi:10.2105/AJPH.2019.304999)

See also Flannagan, p. 663, and Galea and Vaughan, p. 672.

Over the past decade, distracted driving has been heralded as an intensifying public health issue with which to contend. According to the National Highway Traffic Safety Administration, distracted driving entails any activity that diverts attention away from the primary task of driving, including, but not limited to, using a cell phone to talk or text, talking to passengers, or engaging with a car's navigation system.[1]

In 2016, almost 3500 individuals lost their lives and 391 000 were injured but survived a crash in which distracted driving was involved.[1] An industry-based study on distracted driving that entailed a 3-month analysis of 570 million trips completed by 3 million drivers found that drivers engaged with their phones during 88 of every 100 trips.[2] Moreover, a systematic review of the peer-reviewed literature on distracted driving found that of 165 studies exploring the relationship between cell phone use and driving performance, 163 (98%) found that cell phone use was associated with detrimental driving performance.[3] According to the Centers for Disease Control and Prevention (CDC), upward of 2.5 million persons were treated in emergency departments (EDs) following motor vehicle crashes (MVCs) in 2015.[4] In addition, the CDC estimates that annual costs associated with medical care and lost productivity attributable to MVC injuries and deaths exceed $63 billion.[4]

A growing literature has emerged on the role that distracted driving laws have played in roadway safety. Some studies have found that universal hand-held bans were associated with fewer hand-held cell phone conversations across the United States[5] and across all driver demographic subgroups,[6] including novice drivers.[7] Others have found that hand-held bans were not associated with significant reductions in texting behavior among high-school students, but that texting-specific bans were.[8] Researchers have additionally examined changes in MVC-related fatalities as a function of the implementation of distracted driving laws. Studies have generally indicated that states that have implemented these laws, particularly stronger ones (i.e., bans that are applied to all drivers and entail primary enforcement—meaning that law enforcement officers do not need to have a reason other than cell phone use for pulling a driver over), have seen significant reductions in this particular outcome.[9–11]

Findings from Abouk and Adams suggested that between 2007 and 2010, states with strong texting bans consistently had lower single-vehicle, single-occupant fatal crashes than did states without such bans, especially if the state also had a hand-held ban.[11] The findings of Abouk and Adams were consistent with those of a subsequent study by Ferdinand et al., who found that states with primary texting bans saw significant reductions in fatal MVCs.[9] In 2010, the Highway Loss Data Institute published a report in which it disseminated findings on the association between texting bans and insurance collision claim rates in 4 states (California, Louisiana, Minnesota, and

ABOUT THE AUTHORS

At the time of this study, all authors were with the Department of Health Policy and Management at the Texas A&M University School of Public Health, College Station.

Correspondence should be sent to Alva O. Ferdinand, DrPH, JD, Department of Health Policy and Management, Texas A&M University School of Public Health, 132 SPH Administration Building, College Station, TX 77843 (e-mail: aferdinand@tamu.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

This article was accepted January 3, 2019.
doi: 10.2105/AJPH.2019.304999

Washington).[12] The institute found that texting bans were associated with increases in collision claims and conjectured that this may have been attributable to drivers hiding their phones from view to avoid repercussions from law enforcement personnel. Ferdinand et al. compared changes in MVC-related hospitalization counts in states with primary texting bans to contemporaneous changes in such hospitalizations in states without primary texting bans.[13] The authors found that states that had implemented primary texting bans saw a significant 7% reduction in MVC-related hospitalizations. To our knowledge, no studies have examined the impact that texting bans have had on MVC-related ED visits.

Therefore, the purpose of this study was to examine the overall effectiveness of cell phone bans in reducing MVC-related ED visits. As such, we will add to our current understanding of the efficacy of distracted driving laws, particularly by considering various stringency levels—primary or secondary enforcement, and banning all drivers or novice drivers only. In addition, given evidence that there are age variations in the proclivity to engage in distracted driving that is cell phone–based[14] and variations in the adverse impacts of distracted driving by age,[15] we examined the laws' impacts by age cohort. Overall, our study will be of interest to policymakers, advocacy groups, law enforcement, and other stakeholders who are interested in improving population health by decreasing roadway hazards that are primarily driven by distracted driving.

METHODS

We employed a strategy in which we used the Healthcare Cost and Utilization Project State Emergency Department Databases[16] and State Inpatient Databases[17] from 16 states to estimate the effects of distracted driving cell phone laws on MVC-related ED visits. The State Emergency Department Databases capture emergency visits that occur at hospital-affiliated EDs that do not result in hospital admission from Healthcare Cost and Utilization Project participatory states, while the State Inpatient Databases include all inpatient discharge records from participatory states.

We identified emergency visits for which the *International Classification of Diseases, Ninth Revision* (*ICD-9*),[18] external cause of injury codes (E-codes) for MVCs were indicated (E810—E819). Because E-code reporting requirements are not consistent across states, we restricted the study sample to states with E-code reporting completion rates of 85% or higher.[19] To quantify E-code reporting rates, we calculated the proportion of hospital ED discharges with an injury prevention code as a primary diagnosis for which there was a valid E-code.[20] We also considered the cost of the data for each state meeting these criteria, especially because we set out to ideally analyze changes in MVC-related ED visits over multiple years.

Sixteen states met our criteria for E-code reporting completion rates of 85% or higher and were not cost-prohibitive for the research team. These states were Arizona, Arkansas, California, Kentucky, Maryland, Massachusetts, Nebraska, New Jersey, New Mexico, New York, North Carolina, Rhode Island, Utah, Vermont, Washington, and Wisconsin. We had access to State Emergency Department Database data for all included states except Arkansas, New Mexico, and Washington. For these states, we identified MVC-related ED visits that did not result in a hospitalization from the State Inpatient Databases. For 9 of the 16 states, we had data from 2007 to 2014 (Arizona, Nebraska, New Jersey, New York, North Carolina, Rhode Island, Vermont, Washington, Wisconsin). California became nonparticipatory in the State Emergency Department Databases in 2011. As such, for this state, we obtained data from 2007 to 2011. For Massachusetts and Utah, we obtained data from 2007 to 2013. For Kentucky and New Mexico, we acquired data from 2008 to 2014, while for Maryland we had data from 2008 to 2011. Finally, for the state of Arkansas, we had data from 2012 to 2014. Thus, the final data set contained 1344 months of data from 16 states.

Texting and Hand-Held Bans

Several states had distinct texting-while-driving bans and handheld bans. We first accessed a list of state bans, which included official statute codification numbers, from a data set compiled and disseminated by The Policy Surveillance Program at Temple University.[21] This data set provides key information on which cell phone activities are prohibited while driving, the types of drivers that are restricted from such activity, the date each ban went into effect, and the enforcement nature of the ban. To verify the information obtained from this data set, we accessed the text of each statute from the Westlaw legal database.[22] A list of included states and their effective dates for texting and handheld bans can be found in Appendix A (available as a supplement to the online version of this article at http://www.ajph.org). In our analyses, texting and handheld bans were differentiated and characterized as binary indicators for whether, in a particular month–year, a state had a primary handheld ban in effect for all drivers and whether in a given state–month–year, a primary texting ban on all drivers, a primary texting ban on novice drivers only, a secondary texting ban on all drivers, or a secondary texting ban on novice drivers only was in effect.

Other Variables

We included several variables that have been shown to be important for consideration in this area of research. Several papers have identified gasoline prices, state per-capita income, and state unemployment rates as having bearing on the number of miles driven and, ultimately, crash risk.[23–25] Previous research has shown the state of the economy to be important because when gasoline prices are high or when the state unemployment rate is at elevated levels and state per-capita income is down, fewer drivers are found on the road because of suppressed economic activity.[26] We obtained monthly average gasoline prices per state–year, yearly state per-capita income, and state unemployment rate averages from the Oil Price Information Service, the US Census Bureau, and the US Bureau of Labor Statistics, respectively. We inflation-adjusted gasoline prices and state per-capita income to 2014 dollars.

In past decades, states enacted laws in an effort to improve roadway safety. Some of these laws included blood alcohol concentration limits, administrative license suspension, speed limits, and seatbelt and graduated driver licensing (GDL) laws. Previous studies have noted that speed and blood alcohol concentration limits as well as administrative license suspension are associated with roadway safety.[27–29] We included a dichotomous variable indicating whether, in a given state–month–year, administrative license suspension was in effect. However, as there was no variation in blood alcohol concentration limits in our selected states during our study period, we did not include this variable in our final models. Seatbelt laws have been shown to lower motor vehicle fatality rates.[30] Thus, we included a binary indicator for whether, in a given state–month–year, there was a primary seatbelt law in effect. In addition, given the effectiveness of GDL programs[23] and the fact that GDL programs can take on various forms, we included a dichotomous variable indicating whether, in a given state–month–year, a state had a GDL program in which supervised driving for novice drivers was required. Information on seatbelt laws and GDL programs was obtained from the Insurance Institute for Highway Safety (IIHS) and from Westlaw. Finally, we included state population estimates by year to account for each state's exposure to crash risk.[31] We obtained population estimates from the US Census Bureau.

Models

Because there were some states with primary texting bans, some states with secondary texting bans, and a state that never passed a texting ban during the study period (Arizona), we conducted a quasi-experiment to compare the changes within states that had adopted distracted driving bans to contemporaneous changes in a state that did not during the study period. We used a difference-in-difference approach and pooled cross-sectional time series data with state, month, and year fixed effects to examine the relationship between MVC-related ED visits and the presence of texting-while-driving bans. It is the difference-in-difference that is depicted in the value of the coefficients of interest in our regressions.

The state fixed effects controlled for state-specific factors that are largely time invariant and may be correlated with crash risk and its associated outcomes. These factors might include a state's level of enforcement, roadway conditions, and weather patterns. We included the month dummy variables to control for phenomena such as periods of widespread travel, and we included the year fixed effects to control for unobserved or unmeasurable factors that vary from year to year that may have some bearing on roadway safety such as improved automotive technologies and car safety standards.

Our model specifications took the following generalized form:

$$(1)\quad \mathrm{Y}_{\mathrm{imt}} = \mathrm{f}(\mathrm{Text}_{\mathrm{imt}}, \mathrm{Handheld}_{\mathrm{imt}}, \mathrm{L}_{\mathrm{imt}}, Z_{imt}, \mathrm{S}_{\mathrm{i}}, \mathrm{M}_{\mathrm{m}}, \mathrm{T}_{\mathrm{t}})$$

where Y_{imt} represents the MVC-related ED count for state *i* at month *m* and year *t*. $Text_{imt}$ is the presence of a texting-while-driving ban. $Handheld_{imt}$ is the presence of a ban on all handheld use of cell phones while driving. L_{imt} is a vector of previously enacted roadway safety laws such as primary seatbelt laws and GDL programs. Time-varying covariates are captured in Z_{imt} and include factors such as gasoline prices, state per-capita incomes, and state unemployment rates. S_i, M_m, and T_t are state, month, and year fixed effects, respectively. The state fixed effects capture unobservable factors such as the robustness of a state's law enforcement. The month fixed effects account for time variations in widespread travel throughout the year. Finally, the year fixed effects account for factors such as improved car safety technologies.

We estimated all equations as count data models because of the nature of our dependent variable. We constructed the dependent variable finely to include the number of MVC-related ED visits occurring in a given state–month–year and further disaggregated the outcome by age cohorts in sensitivity analyses. A sizeable proportion of our state–month–year cells had substantially fewer MVC-related ED visits relative to others. For example, more than 7% of our state–month–year observations had fewer than 100 MVC-related ED visits. As a consequence, because our dependent variable was not normally distributed and always took an integer value, the results presented in this study are based on count-data modeling. In addition, we employed the conditional maximum likelihood approach for negative binomial models because conventional count data models generate inconsistent estimates when cross-sectional fixed effects are utilized.[32] Adding further justification for the conditional negative binomial approach is the fact that the conditional means and condition variances for our dependent variable were dissimilar, indicating overdispersion. We accounted for within-state correlation of observations in the calculation of standard errors by using the VCE clustering option in the Stata version 15 regression module (StataCorp LP, College Station, TX).

We additionally performed a series of subgroup analyses by stratifying MVC-related ED visits by age cohorts. Moreover, we conducted falsification analyses to examine the robustness of our results. These falsification analyses included an examination of the relationship between texting bans and the occurrence of ED visits for "other accidents" (e.g., firearm accidents), hypertension, tuberculosis, and unspecified sexually transmitted infections. The logic for

TABLE 1—Descriptive Statistics for State Panel Data: 16 US States, 2007–2014

Variable	Mean (SD)
No. MVC-related ED visits	3400.43 (4020.48)
No. MVC-related ED visits by age, y	
15–21	648.65 (747.12)
22–33	1043.87 (1239.99)
34–45	703.71 (826.98)
46–64	765.80 (934.02)
≥ 65	238.40 (289.41)
Gasoline prices in 2014 dollars	3.23 (0.58)
State per capita income in 2014 dollars per $10 000	4.50 (0.73)
State unemployment rate, %	7.10 (2.30)
Texting law	
Any	0.55 (0.50)
Primary for all	0.47 (0.50)
Primary for novice	0.11 (0.31)
Secondary for all	0.10 (0.31)
Secondary for novice	0.25 (0.15)
Handheld ban, all drivers	0.14 (0.35)
Primary seatbelt law	0.61 (0.49)
Graduated driver licensing law	0.92 (0.28)

Note. ED = emergency department; MVC = motor vehicle crash. The sample size was 1344 state–month–year observations. The mean values for legal factors are interpreted as the proportion of the 1344 state–month–year observations in which the specified law was in effect.

TABLE 2—Conditional Negative Binomial Regression Results for the Effects of Texting Laws on Motor Vehicle Crash–Related Emergency Department Visits: 16 US States, 2007–2014

Variable	Model 1, IRR (95% CI)	Model 2, IRR (95% CI)	Model 3, IRR (95% CI)	Model 4, IRR (95% CI)
Texting law	0.90 (0.85, 0.95)	0.97 (0.94, 0.99)	0.95 (0.92, 0.98)	. . .
Texting law, primary	. . .	. . .	. . .	. . .
Bans all drivers	. . .	. . .	. . .	0.92 (0.89, 0.95)
Bans novice drivers only	. . .	. . .	. . .	1.00 (0.97, 1.04)
Texting law, secondary	. . .	. . .	. . .	. . .
Bans all drivers	. . .	. . .	. . .	1.15 (1.06, 1.24)
Bans novice drivers only	. . .	. . .	. . .	0.60 (0.52, 0.68)
Graduated driver licensing law	. . .	0.52 (0.45, 0.60)	0.54 (0.47, 0.63)	0.55 (0.48, 0.63)
Administrative license suspension	. . .	0.01 (0.01, 0.01)	0.01 (0.01, 0.02)	0.01 (0.01, 0.02)
Seatbelt law, primary enforcement	. . .	0.90 (0.85, 0.94)	0.87 (0.83, 0.92)	0.87 (0.82, 0.93)
Speed limit ≥ 70 mph	. . .	27.3 (20.03, 37.07)	30.9 (22.19, 43.04)	31.06 (21.8, 43.32)
Handheld ban, all drivers	. . .	0.94 (0.91, 0.98)	0.95 (0.92, 0.98)	1.12 (1.03, 1.21)
Gasoline prices (2014 $)	. . .	. . .	0.98 (0.96, 0.99)	0.97 (0.95, 0.99)
State unemployment rate, %	. . .	. . .	0.98 (0.97, 0.98)	0.97 (0.96, 0.98)
State per capita income (2014 $ per $10 000)	. . .	. . .	1.09 (0.98, 1.22)	0.89 (0.78, 1.01)

Note. CI = confidence interval; IRR = incidence rate ratio; mph = miles per hour. Each model includes state, month, and year fixed effects and accounts for state population estimates (per 100 000). Given our average monthly motor vehicle–related crash count of 3400.43, an 8% reduction in states with a primary ban on all drivers equates to 272 fewer visits per month and 3264 fewer visits per year on average.

conducting these falsification examinations is that there should be no statistically significant relationship on these outcomes, as texting bans were not intended to reduce them.

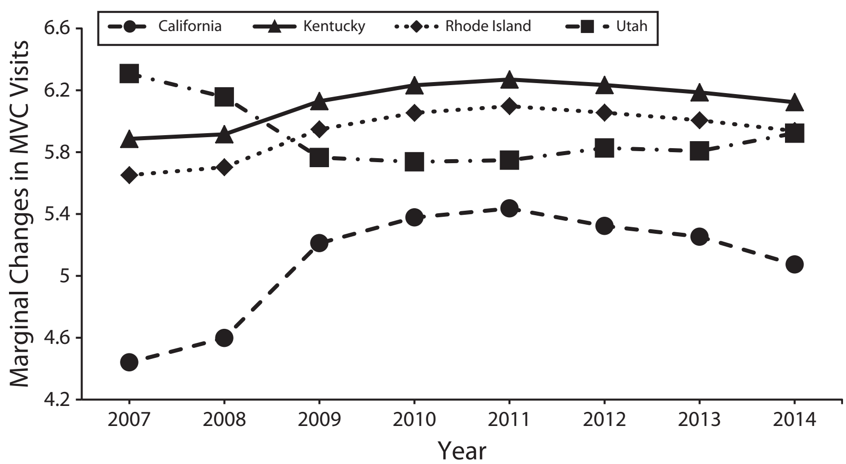
We conducted all analyses in Stata version 15, and statistical significance is reported at the .01 and .05 levels.

RESULTS

Of the 16 states included in this study, Arizona was the only state in which a texting ban was never passed during the study period (Appendix A). The effective dates for the texting bans in the other states were as early as July 1, 2004 (New Jersey), and as late as July 1, 2014. Nebraska's ban, which went into effect on July 15, 2010, continued to be a secondary ban on all drivers until the end of the study period. Maryland, New Jersey, and Washington changed their texting bans from secondary enforcement to primary enforcement during the study period.

On average, there were 3400 MVC-related ED visits each month (Table 1). Among those aged 15 to 21 years, there were an average of 649 MVC-related ED visits each month and 1044, 704, 766, and 239 such visits per month among those aged 22 to 33 years, 34 to 45 years, 46 to 64 years, and 65 years and older, respectively. The average gasoline price was $3.23, and the average state per-capita income was $45 041, both in 2014 dollars. The intraclass correlation coefficient of within-state responses was 0.986.

Results from our general models are presented in Table 2, and graphs depicting the marginal changes in MVC-related ED visits for all age groups are presented in Figure 1 and Appendix B (available as a supplement to the online version of this article at http://www.ajph.org). The first model presented in Table 1 provides results from our most parsimonious



Note. We used Arizona as the control state as it never passed a ban. These marginal changes also account for all control variables listed in our analyses. California passed a primary ban on all drivers on July 1, 2009; Kentucky on July 15, 2010; Rhode Island on November 9, 2009; and Utah on May 12, 2009.

FIGURE 1—Marginal Changes in Motor Vehicle Crash–Related Emergency Department Visits: 4 US States, 2007–2014

TABLE 3—Conditional Negative Binomial Regression Results for Motor Vehicle Crash–Related Emergency Department Visits by Different Age Cohorts: 16 US States, 2007–2014

Variable	Aged 15–21 y, IRR (95% CI)	Aged 22–33 y, IRR (95% CI)	Aged 34–45 y, IRR (95% CI)	Aged 46–64 y, IRR (95% CI)	Aged ≥ 65 y, IRR (95% CI)
Texting law, primary					
Bans all drivers	0.90 (0.86, 0.95)	0.89 (0.85, 0.92)	0.94 (0.90, 0.98)	0.92 (0.88, 0.95)	0.90 (0.86, 0.95)
Bans novice drivers only	1.04 (0.99, 1.09)	0.96 (0.92, 1.00)	1.02 (0.98, 1.07)	1.00 (0.96, 1.04)	1.02 (0.96, 1.08)
Texting law, secondary					
Bans all drivers	1.12 (1.02, 1.23)	1.14 (1.05, 1.23)	1.14 (1.05, 1.25)	1.14 (1.05, 1.23)	1.15 (1.05, 1.26)
Bans novice drivers only	0.58 (0.51, 0.67)	0.60 (0.52, 0.68)	0.60 (0.52, 0.69)	0.60 (0.53, 0.68)	0.60 (0.52, 0.69)
Graduated driver licensing law	0.55 (0.48, 0.62)	0.57 (0.49, 0.65)	0.57 (0.50, 0.66)	0.55 (0.48, 0.63)	0.61 (0.53, 0.70)
Administrative license suspension	0.03 (0.02, 0.04)	0.02 (0.02, 0.03)	0.02 (0.02, 0.03)	0.02 (0.01, 0.03)	0.03 (0.02, 0.05)
Seatbelt law, primary enforcement	0.78 (0.72, 0.85)	0.84 (0.78, 0.91)	0.81 (0.75, 0.87)	0.86 (0.80, 0.92)	0.77 (0.70, 0.83)
Speed limit ≥ 70 mph	25.35 (16.17, 39.77)	34.03 (21.95, 52.76)	35.97 (22.89, 56.52)	34.12 (20.99, 55.45)	16.17 (10.01, 26.14)
Primary handheld ban, all drivers	1.08 (0.98, 1.19)	1.14 (1.05, 1.25)	1.07 (0.98, 1.17)	1.11 (1.02, 1.21)	1.16 (1.05, 1.27)
Gasoline prices (2014 $)	0.95 (0.93, 0.98)	0.98 (0.96, 1.00)	0.96 (0.94, 0.99)	0.97 (0.95, 0.99)	0.97 (0.94, 0.99)
State unemployment rate, %	0.96 (0.95, 0.97)	0.97 (0.96, 0.98)	0.97 (0.96, 0.98)	0.97 (0.96, 0.98)	0.95 (0.94, 0.96)
State per capita income (2014 $ per $10 000)	0.76 (0.65, 0.88)	0.89 (0.78, 1.03)	0.86 (0.74, 0.99)	0.90 (0.78, 1.03)	0.72 (0.62, 0.85)

Note. CI = confidence interval; IRR = incidence rate ratio.

specification in which we examined the relationship between the presence of a texting ban, regardless of stringency level, and MVC-related ED visits while we controlled for state, month, and year fixed effects only. This model indicated a statistically significant 10% reduction in MVC-related ED visits (incidence rate ratio [IRR] = 0.90; 95% confidence interval [CI] = 0.85, 0.95). In model 4, we replaced the dichotomous variable indicating the presence of any type of texting with 4 more nuanced dichotomous variables indicating the presence of a primary texting ban on all drivers, a primary texting ban on novice drivers only, a secondary ban on all drivers, and a secondary ban on novice drivers only. The findings indicated that states with a primary texting ban on all drivers saw an 8% reduction (IRR = 0.92; 95% CI = 0.89, 0.95), and states with a secondary ban on novice drivers only saw a 40% reduction (IRR = 0.60; 95% CI = 0.52, 0.68) in MVC-related ED visits. Notably, states with a secondary ban on all drivers saw a 15% increase (IRR = 1.15; 95% CI = 1.06, 1.24) in MVC-related ED visits.

Results from our age-stratified specifications are presented in Table 3 and Appendix C (available as a supplement to the online version of this article at http://www.ajph.org). States that had a primary texting ban on all drivers saw statistically significant reductions in MVC-related ED visits during the study period (IRR = 0.90 [95% CI = 0.86, 0.95]; IRR = 0.89 [95% CI = 0.85, 0.92]; IRR = 0.94 [95% CI = 0.90, 0.98]; IRR = 0.92 [95% CI = 0.88, 0.95]; and IRR = 0.90 [95% CI = 0.86, 0.95]) for those aged 15 to 21 years, 22 to 33 years, 34 to 45 years, 46 to 64 years, and 65 years and older, respectively. We also saw statistically significant reductions in states with secondary texting bans on novice drivers.

Our findings (data not shown) indicated that texting laws were not associated with reductions in ED visits for hypertension (IRR = 1.01; 95% CI = 0.88, 1.02), sexually transmitted infections (IRR = 1.00; 95% CI = 0.98, 1.03), tuberculosis (IRR = 1.00; 95% CI = 0.86, 1.17), and "other accidents" (IRR = 0.86; 95% CI = 0.65, 1.19).

DISCUSSION

Some main findings emerged from our analyses. The first is that we observed a 4% reduction in total MVC-related ED visits when we looked at the effect of texting bans generally. This equates to an average of 1632 traffic-related ED visits prevented per year (132 such visits averted per month) in states with a texting ban during the study period.

Second, when we looked at texting bans in a nuanced way, all 4 versions of them (i.e., primary bans on all drivers, primary bans on novice drivers only, secondary bans on all drivers, and secondary bans on novice drivers only) were associated with significant reductions in MVC-related ED visits. Thus, whereas previous studies have shown that secondary bans have not been effective in reducing traffic-related fatalities and hospitalizations,[9,13] these bans do appear to be effective in reducing a more common roadway outcome—minor injuries not warranting a hospitalization after an MVC.

Third, texting bans are effective in reducing such visits among all age groups. On average, states with a primary ban on all drivers averted hundreds of MVC-related ED visits. On average, among those aged 15 to 21 years, states with a primary ban on all drivers averted 778 MVC-related ED visits per year during the study period. Among those aged 22 to 33 years, 1378 such visits were averted during the study period. For those aged 34 to 45 years, there were 507 fewer MVC-related ED visits during the study period.

Limitations

Our study contained some limitations. To explore the relationship between cell phone bans and MVC-related ED visits, one would ideally obtain all records of such visits in each state–year. However, such national data are not available. MVC-related ED visits can be extracted from the Health Cost Utilization Project's Nationwide Inpatient Sample. However, starting in 2012, state identifiers were removed to maintain the spirit of the data set, which is meant to be nationally representative and not necessarily representative of each state within the United States. In theory, one could request hospital discharge data from each state to aggregate a national data set, but such requests can be cost- and time-prohibitive. Thus, we employed the use of less ideal data.

The second limitation was that our study did not include all US states. Several studies that have examined the impact of laws on crash-related outcomes have been national in scope. However, given our data restrictions, this study only included a handful of states. Inclusion of all states would have allowed us more power and the ability to further generalize our results.

Another limitation was that our study exclusively focused on the occurrence of a crash-related injury for which ED treatment was sought and managed without a hospitalization. In this study, we did not examine the effect of the laws on the occurrence of minor crash-related injuries for which ED treatment was not sought. In addition, the decision to seek treatment following a crash may also vary by several individual-level factors such as unemployment, insurance status, and income. Given our controlling of macroeconomic factors at the population level, our study did not provide insight into these individual-level factors.

Moreover, it is worth noting that our study examined the efficacy of the presence of a texting ban in a given state and not the extent to which these bans were actually enforced during the study period. As more states join the effort to combat distracted driving and its negative consequences through citations and data collection, future research should aim to uncover the impact of improved enforcement efforts for a more comprehensive understanding of how these bans are working to improve population health.

Public Health Implications

These limitations notwithstanding, our study contributes to the limited research on the effects of texting bans on roadway outcomes. Our findings suggest that states' efforts to curb distracted driving by prohibiting cell phone use while driving have not been in vain. More specifically, bans on cell phone use while driving have been effective in improving public health through decreased ED visits and treatment subsequent to an MVC. AJPH

CONTRIBUTORS

A. O. Ferdinand conceptualized the study design, conducted and interpreted analyses, and drafted the article. A. Aftab participated in the analysis and interpretation of data. M. A. Akinlotan participated in the analysis and interpretation of data and revised the article. All authors approved the final version of the article.

CONFLICTS OF INTEREST

None of the authors have any conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

Institutional review board approval was not needed for this study because of the use of publicly available secondary data and the lack of interactions with any human participants.

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