

Using Telematics for Traffic Safety



Data Sources

Analyzing driving behavior based off of smartphone sensors



Accelerometer

Identifies phone position with axis-based motion sensing.

Gyroscope

Works with accelerometer to determine position of phone.

Magnetometer

Measures magnetic fields.

GPS

Identifies phone location with multiple satellites.

Barometer

Measures air pressure.

Proximity sensor

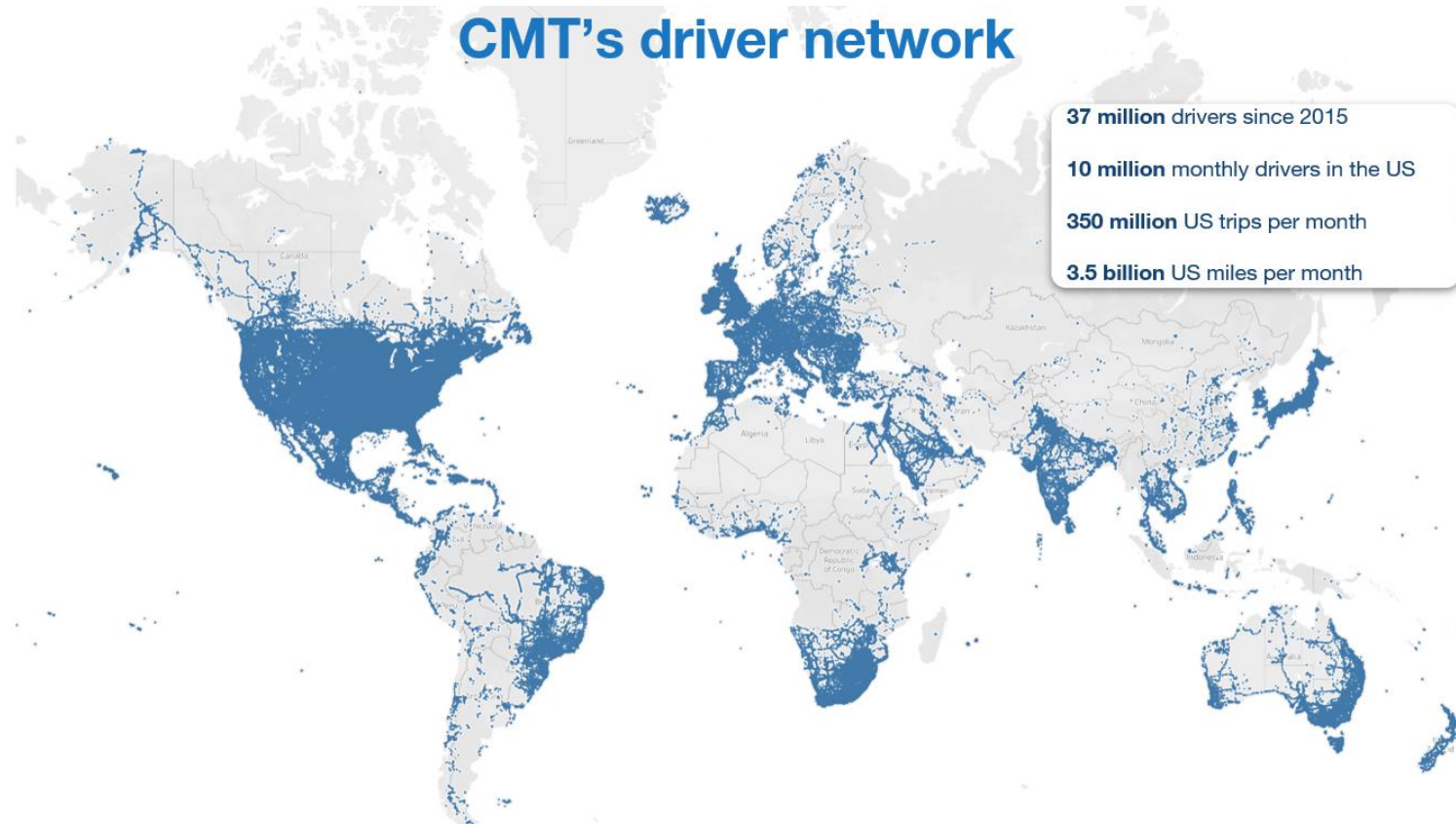
Determines the proximity of the phone to nearby objects.

Ambient Light

Measures the amount of light near the phone.

Telematics data uses **smartphone sensors** to detect hard braking, acceleration, speeding and distracted driving.

Large Data Set



In depth research on distracted driving for four years



The cover features a blue-tinted photograph of a person's hands holding a smartphone while driving. The text is overlaid in white and yellow.

The Harsh Realities of Phone Distraction

The U.S. is ill-equipped to address this slow-moving disaster and needs smarter solutions.

A DATA-DRIVEN ANALYSIS FROM CAMBRIDGE MOBILE TELEMATICS



The cover features a blue-tinted photograph of a hand holding a smartphone. The text is overlaid in white.

Measuring and Pricing Phone Distraction Risk

A telematics-based analysis of U.S. driver behavior and its impact on the insurance industry



The cover features a blue-tinted photograph of a hand holding a smartphone. The text is overlaid in white.

2022 US Distracted Driving Report



The cover features a blue-tinted photograph of a hand holding a smartphone. The text is overlaid in white.

The State of Distracted Driving in 2023 & the Future of Road Safety

4TH EDITION
A DATA-DRIVEN ANALYSIS FROM CAMBRIDGE MOBILE TELEMATICS



2020-2024

2020-2023

US Road Risk Behaviors

	2020	2023	Change
Screen interaction time per hour	1:47	2:06	17.8%
Phone motion time per hour	1:26	1:31	5.8%
Phone motion above 50 mph	33.3%	35%	5.1%
Handheld call time per hour	0:31	0:27	-12.9%
Hands-free call time per hour	3:19	3:47	14.1%
Speeding time per hour	2:05	2:02	-2.4%
Hard braking per 100 miles	3.34	2.96	-11.4%



The utility of telematics data for estimating the prevalence of driver handheld cellphone use, 2019–2022

August 2023

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Table 1

Estimates of drivers on handheld cellphone calls during daytime, 2019–2022: NOPUS percentage of drivers holding phones to ears compared with CMT percentage of trips and percentage of total trip time with handheld calls

	2019			2020			2021		
	NOPUS drivers (%)	CMT trips (%)	CMT total trip time (%)	NOPUS drivers (%)	CMT trips (%)	CMT total trip time (%)	NOPUS drivers (%)	CMT trips (%)	CMT total trip time (%)
Region									
Northeast	2.0	3.4	0.7	1.1	2.8	0.5	1.8	2.6	0.5
South	3.8	4.8	1.1	4.4	4.3	1.0	3.1	4.1	0.9
Midwest	3.3	4.2	1.0	2.0	3.5	0.8	2.9	3.3	0.7
West	1.5	3.1	0.6	1.5	2.6	0.5	1.6	2.4	0.5
Weekdays ¹	3.2	4.6	1.1	3.0	4.0	0.9	2.6	3.7	0.9
Rush hours ²	3.2	4.5	1.1	3.0	3.9	1.0	2.6	3.7	0.9
Non-rush hours	3.1	4.6	1.0	3.0	4.1	0.9	2.6	3.8	0.8
Weekends ³	2.0	3.4	0.6	1.6	3.0	0.6	2.2	2.9	0.5
Overall	2.9	4.1	0.9	2.6	3.5	0.8	2.5	3.3	0.7

¹ Weekdays include Monday through Friday from 7:00 a.m. to 5:59 p.m.

² Rush hours include 7:00 a.m.–9:29 a.m. and 3:00 p.m.–5:59 p.m.; non-rush hours include 9:30 a.m.–2:59 p.m.

³ Weekends include Saturday and Sunday from 7:00 a.m. to 5:59 p.m. on both days.

Table 2

Estimates of drivers manipulating cellphones during daytime, 2019–2022: NOPUS percentage of drivers manipulating phones compared with CMT percentage of trips and percentage of total trip time with phone motion

	2019			2020		
	NOPUS drivers (%)	CMT trips (%)	CMT total trip time (%)	NOPUS drivers (%)	CMT trips (%)	CMT total trip time (%)
Region						
Northeast	2.3	31.5	2.3	2.8	30.6	2.4
South	3.4	34.5	2.5	3.1	35.2	2.6
Midwest	2.4	29.3	2.0	2.4	30.0	2.1
West	3.0	31.5	2.1	2.5	31.0	2.1
Weekdays ¹	3.1	32.4	2.3	2.9	32.5	2.4
Rush hours ²	2.9	33.4	2.2	2.8	33.1	2.3
Non-rush hour	3.3	31.4	2.3	3.1	32.0	2.4
Weekends ³	2.3	31.0	2.1	2.3	31.3	2.2
Overall	2.9	32.2	2.2	2.8	32.5	2.4

¹ Weekdays include Monday through Friday from 7:00 a.m. to 5:59 p.m.

² Rush hours include 7:00 a.m.–9:29 a.m. and 3:00 p.m.–5:59 p.m.; non-rush hours include 9:30 a.m.–2:59 p.m.

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Publication by FHWA & NHTSA



DOT HS 813 210

Behavioral Safety Research

October 2021

Continuation of Research on Traffic Safety During the COVID-19 Public Health Emergency: January – June 2021

The National Highway Traffic Safety Administration continues to explore traffic safety during the COVID-19 public health emergency. This work is crucial to further understanding changes in dangerous driving behaviors and letting us expand or evolve countermeasures to meet current needs in States and across the country. This Research Note updates traffic safety behavioral research findings during the COVID-19 public health emergency through the first half of the 2021 calendar year.

To date, NHTSA has released three reports synthesizing traffic safety data in 2020. NHTSA also released an interim report on research examining the presence of drugs and alcohol in road users who were seriously and fatally injured in crashes, which noted increased prevalence of alcohol and some other drugs among these individuals. These reports provided context to preliminary 2020 data that showed increases in the number and rate of fatalities per 100 million vehicle miles traveled (VMT) (National Center for Statistics and Analysis, 2021a). Given the importance of these findings, NHTSA immediately convened workshops and meetings with national partners, State highway safety professionals, and researchers. In these meetings, NHTSA led conversation on how to address these increases in traffic fatalities, especially focusing on risky driving behaviors. NHTSA continued to collect and synthesize data. New findings are described below. Data limitations identified in the earlier reports also apply to the data reported here.

Background

After the declaration of the public health emergency in March 2020, driving patterns and behaviors in the United States changed significantly (Wagner et al., 2020; Office of Behavioral Safety Research, 2021a, 2021b). Of the drivers who remained on the roads, some engaged

in riskier behavior, including speeding, failure to wear seat belts, and driving under the influence of alcohol or other drugs. Traffic data cited in these reports showed average speeds increased during the last three quarters of 2020, and extreme speeds, those 20 miles per hour (or more) higher than the posted speed limit, became more common. These findings were supported by analyses of data from fatal crashes that show an estimated 11% increase in speeding-related fatalities (NCSA, 2021b). Other data suggested fewer people in crashes used their seat belts. Earlier research reports showed changes in the prevalence of alcohol and other drugs during the pandemic among seriously or fatally injured road users at different phases of the pandemic (Thomas et al., 2020; Office of Behavioral Safety Research, 2021a, 2021b). For example, the Thomas group found that almost two-thirds of the seriously or fatally injured drivers in their study tested positive for at least one active drug, including alcohol, marijuana, or opioids between mid-March and mid-July 2020. They also reported the proportion of drivers testing positive for opioids nearly doubled after mid-March 2020, compared to the previous 6 months, while marijuana prevalence increased by about 50%.

This Research Note includes analyses from the Bureau of Transportation Statistics (BTS) and the Federal Highway Administration's (FHWA) National Performance Management Research Dataset (NPMRDS). These sources use telematic data that captures large volumes of information but does not permit analysis of individual performance. To address this limitation, researchers sought other data sources through traditional literature as well as "gray literature" such as blog posts to identify potential emerging behavioral safety trends that occurred during the public health emergency. They identified research reports documenting changes in distracted driving and other risky driving behaviors,

NHTSA's Office of Behavioral Safety Research

1200 New Jersey Avenue SE, Washington, DC 20590

APRIL 2020 | FHWA-SA-20-006

VISION ZERO SUCCESS STORY — BEHAVIORAL

Safest Driver Contest — Boston, Massachusetts

FHWA is pleased to present this vision zero success story. While behavioral initiatives don't typically fall under FHWA's purview, they play a critical role in reaching our goal of zero deaths, and our part of our shared responsibility to reduce fatal or serious injuries. For more information on safe driving behaviors, please visit our partner agency, the National Highway Safety Administration (NHTSA) at: <https://www.nhtsa.gov/road-safety>.

Key Successes

Two seasons of the Boston "Safest Driver Contest" yielded the following results. During the **first season**, the top 25% of drivers showed:

47% -reduction in distraction.

37% -reduction in harsh braking.

35% -reduction in speeding.

During the **second season**, 35 days after registration, participants showed:

48% -reduction in distraction.

57% -reduction in harsh braking.

38% -reduction in speeding.

Mayor Martin J. Walsh commented, "I'm proud of our winners and their contribution to make our streets safer. The City of Boston is committed to ensuring our streets work for everyone, and by investing in programs such as Boston's Safest Driver, we will continue to emphasize the importance of safe streets, and safe driving habits."

There was positive public response to the contest. "Interest in the contest was contagious," said the 2019 Slow and Steady Driver prize winner Jenn Brandel. "Once my family and friends learned about the competition, they started trying to outdo each other and get higher scores. While I'm bracing myself for jokes about being the Slow and Steady winner, I've learned to become a more patient and careful driver."

Background

The City of Boston's Mayor's Office of New Urban Mechanics (MONUM) championed the inaugural "Safest Driver Contest." As a partnership between the Vision Zero Task Force, MONUM, and the Transportation Department, the Safest Driver Contest held its first season in 2016 and a second season in 2019. Similar contests have been held in other cities including Seattle, San Antonio, and Los Angeles.

The contest aimed to change driver behavior by offering incentives to participants who adopted safe practices while behind the wheel. Participants downloaded an app that used five performance evaluation metrics to assess each driver including braking, acceleration, speeding, cornering, and distraction. The app made calculations for these metrics based on the phone's GPS, accelerometer, and gyroscope. The app collected and stored the monitored behaviors of individual drivers for each trip.

Contest Details

Season 1 (2016): The first season of Boston's Safest Driver Contest occurred from October 3, 2016 to December 3, 2016 and included nearly 5,000 participants. The app assessed and ranked the drivers by their overall safety scores. Weekly prizes included the top three drivers of the week and the most improved driver.

¹ <https://www.boston.gov/departments/new-urban-mechanics/bostons-safest-driver-competition>



What does CMT data say?



Cell Phone Distractions Under Reported



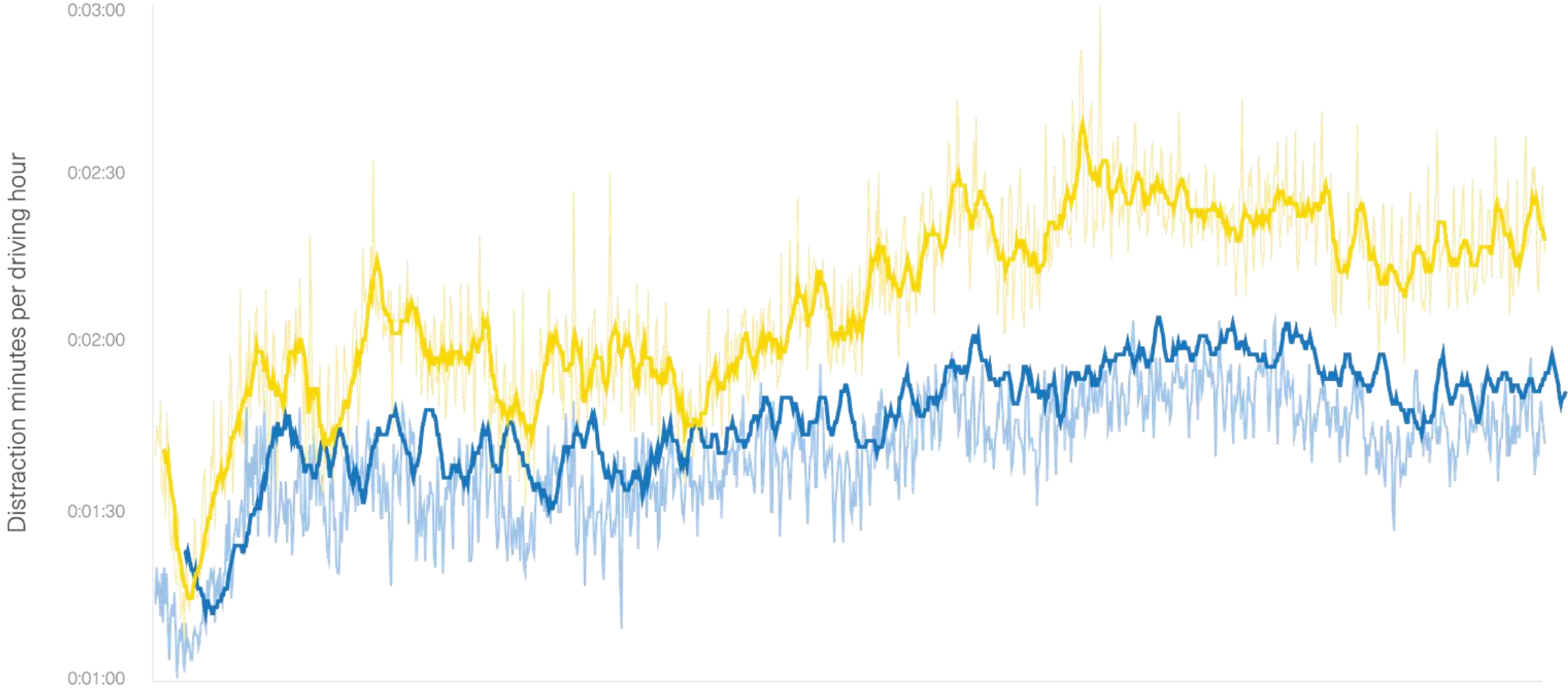
34%

**OF DRIVERS WERE DISTRACTED
THE MINUTE BEFORE THEY CRASHED**



Distracted driving surged in the pandemic

Phone motion time Average phone motion Screen interaction Average screen interaction



January 2020

January 2021

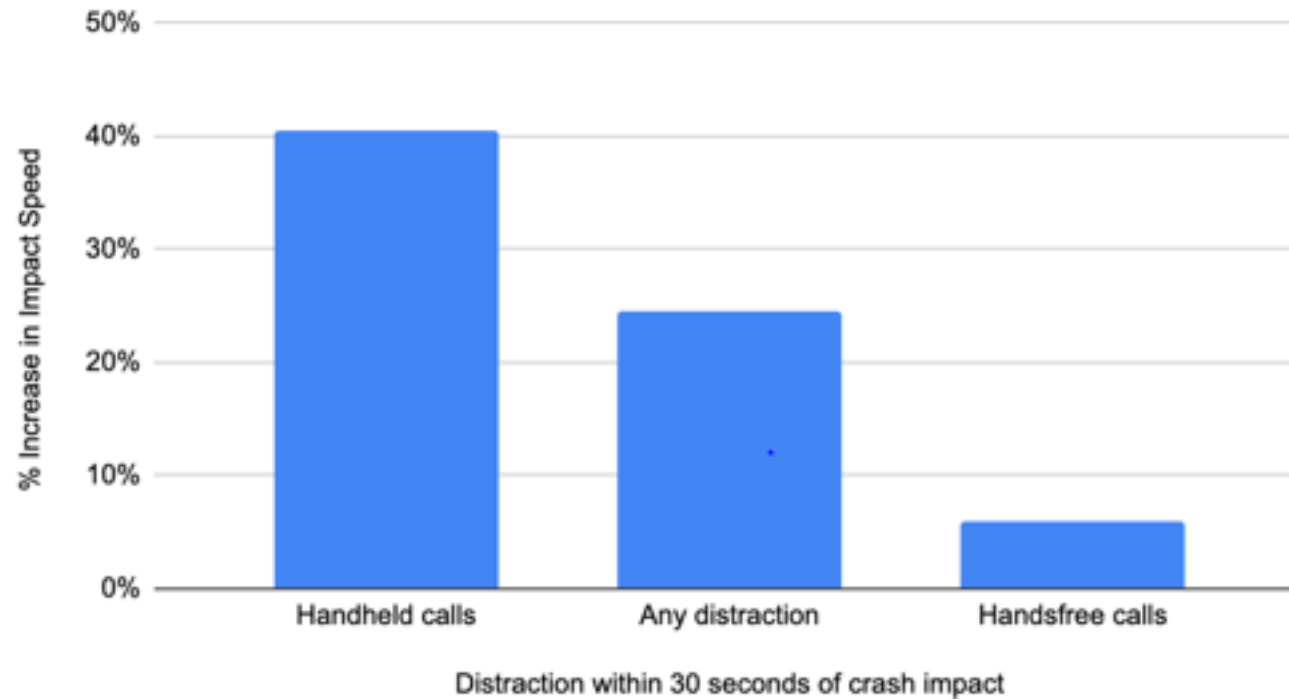
January 2022

January 2023



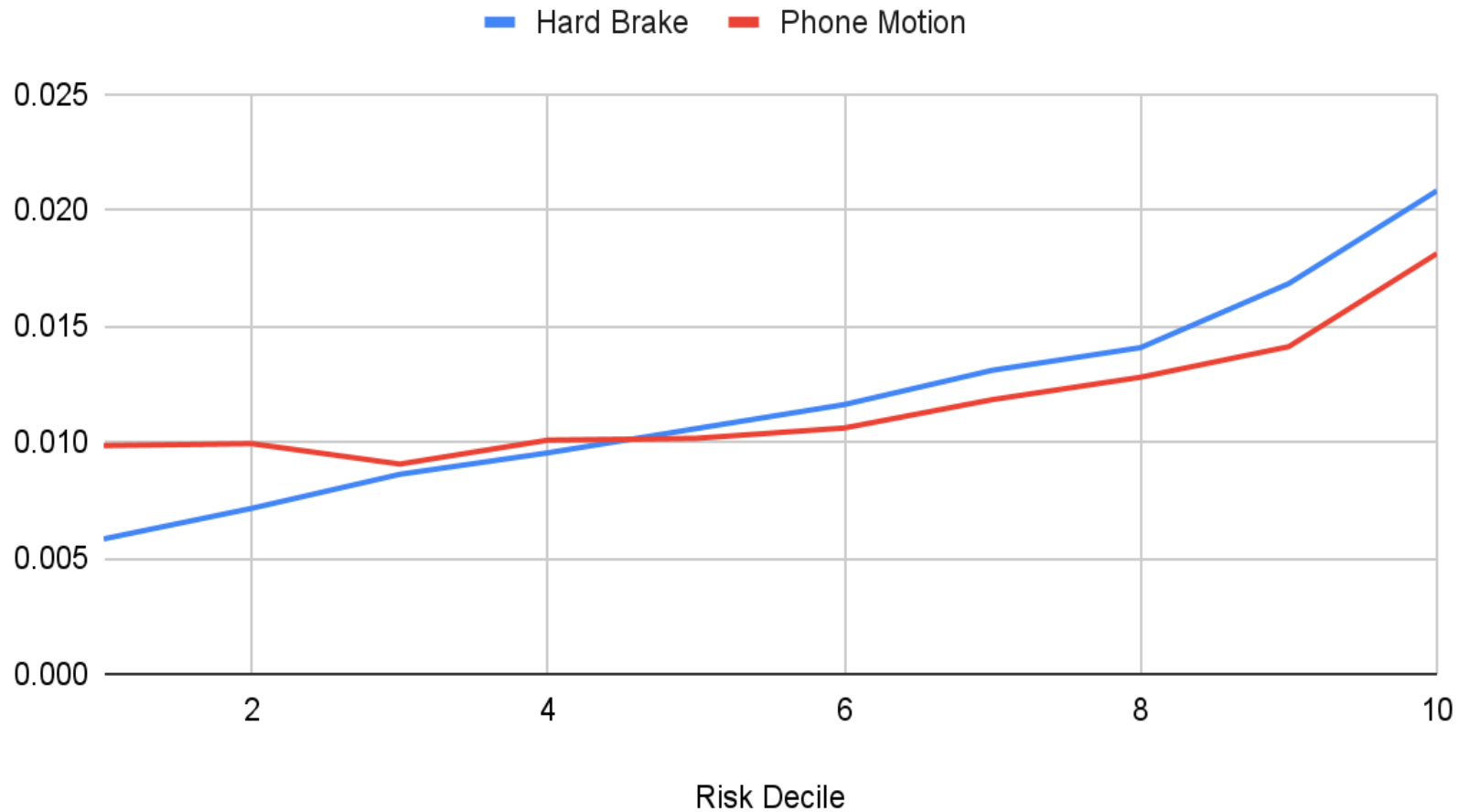
Distraction Increases Speed & Severity

Phone Distraction Impact on Crash Speed Severity



Smartphone based distraction is highly predictive of crashes with insurance claims

Frequency by Risk Decile



Does Legislation Work?



Impact of 2023 Hands-Free Laws

	Ohio	Alabama	Michigan	Missouri
Drivers	8.2M	4.0M	7.9M	4.2M
Law start	Apr 4, 2023	Jun 16, 2023	Jun 30, 2023	Aug 28, 2023
Phone motion reduction	-8.7%	-5.7%	-10.3%	-4.1%
Crashes prevented	3,659	926	3,118	512
Injuries prevented	2,049	519	1,747	287
Fatalities prevented	17	4	14	2
Economic damage prevented	\$144,879,782	\$36,667,427	\$123,487,073	\$20,282,530

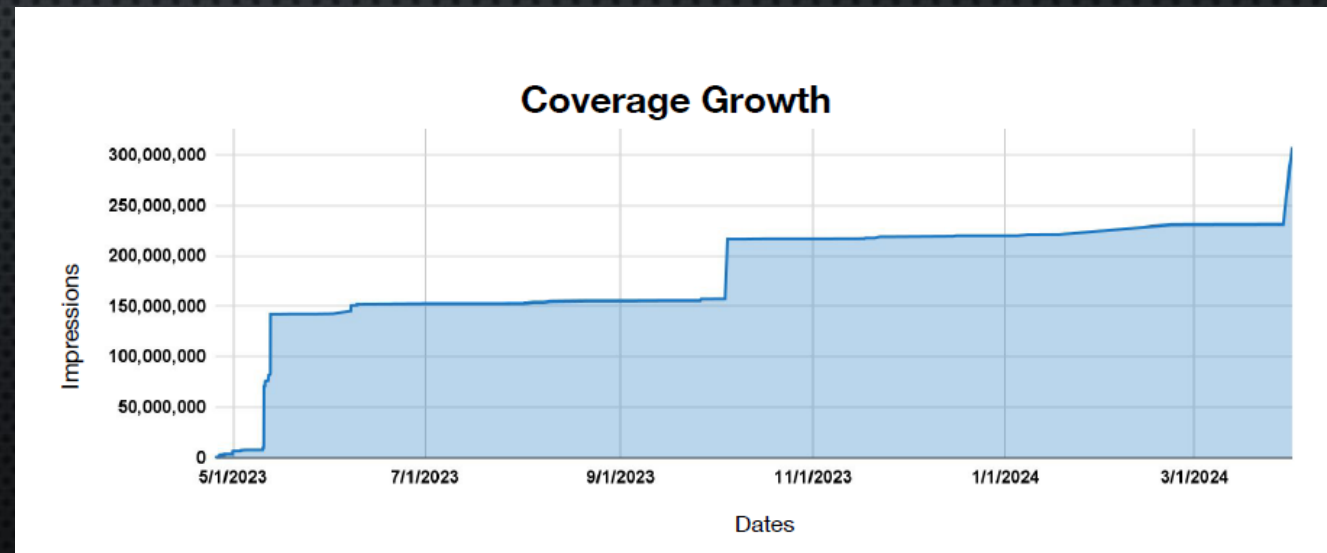


Media Coverage is Key!

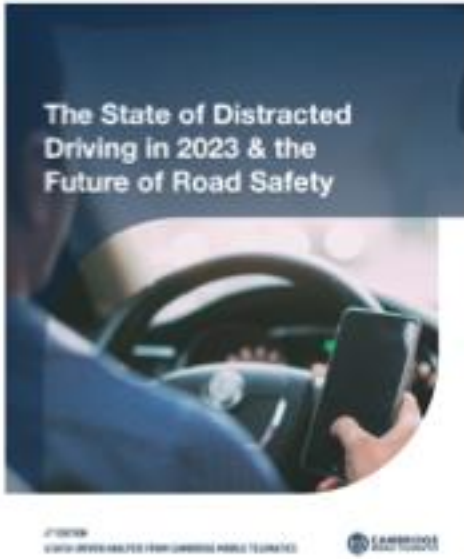


The image shows a screenshot of the Dayton Daily News website. The main headline reads "Report: Drivers spent over 8% less time on phones after distracted driving law". Below the headline is a photograph of a woman driving a car while holding a phone. The Dayton Daily News logo is visible in the bottom left corner of the screenshot.

Date	Publication	Headline	Reach
5/10/2023	Yahoo! News	Drivers using phones less on Ohio roads after new law, study shows	58.8 million
5/12/2023	Yahoo! News	Report: Drivers spent over 8% less time on phones after distracted driving law	58.8 million
10/4/2023	Yahoo! News	Distracted driving warning period ends today: Here's what you need to know when ticketing begins Thursday	58 million
3/31/2024	Forbes	Distracted Driving Fell After States Implemented Hands-Free Laws	76.2 million

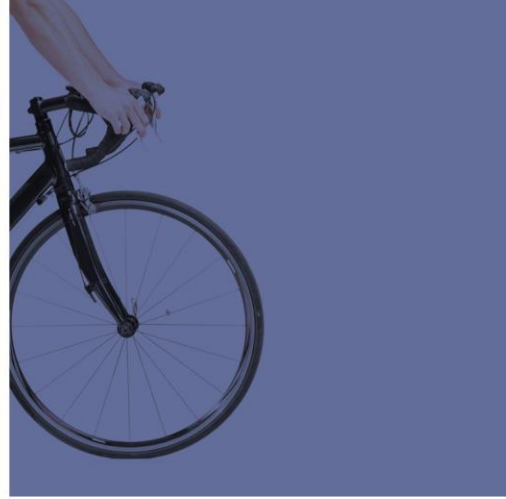
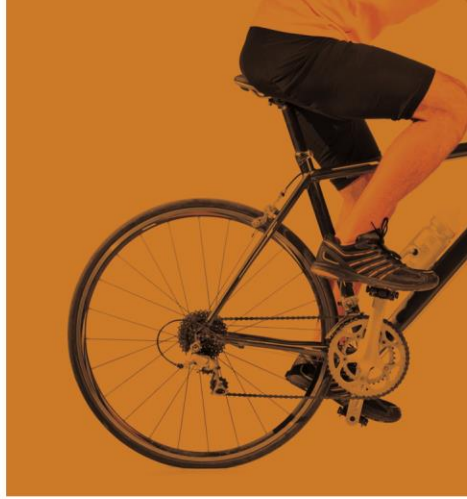


Contact:
Ryan McMahon
Cambridge Mobile Telematics



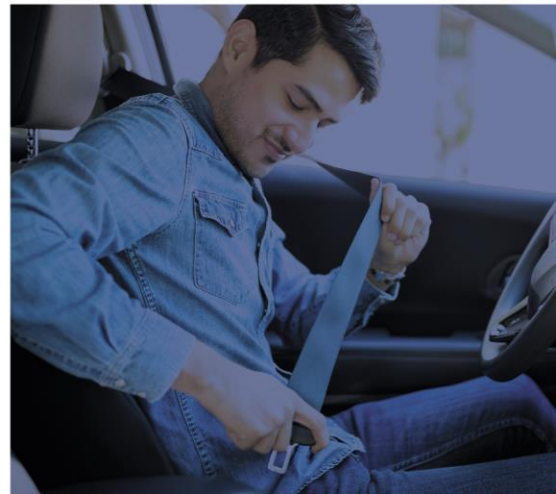
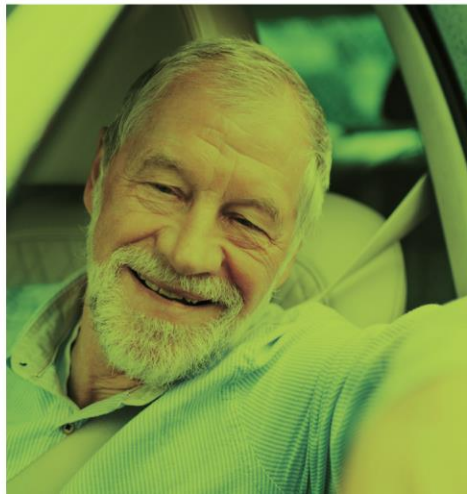
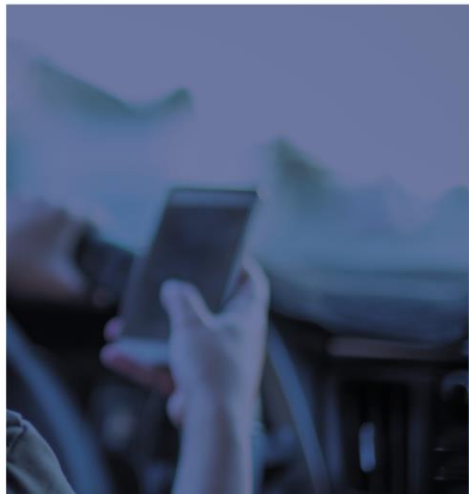
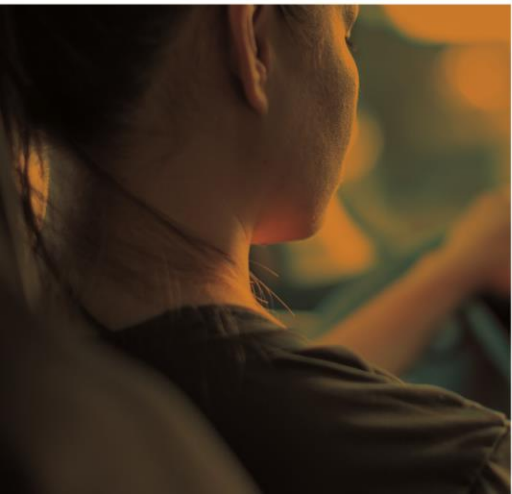
Confidential & Proprietary | Cambridge Mobile Telematics





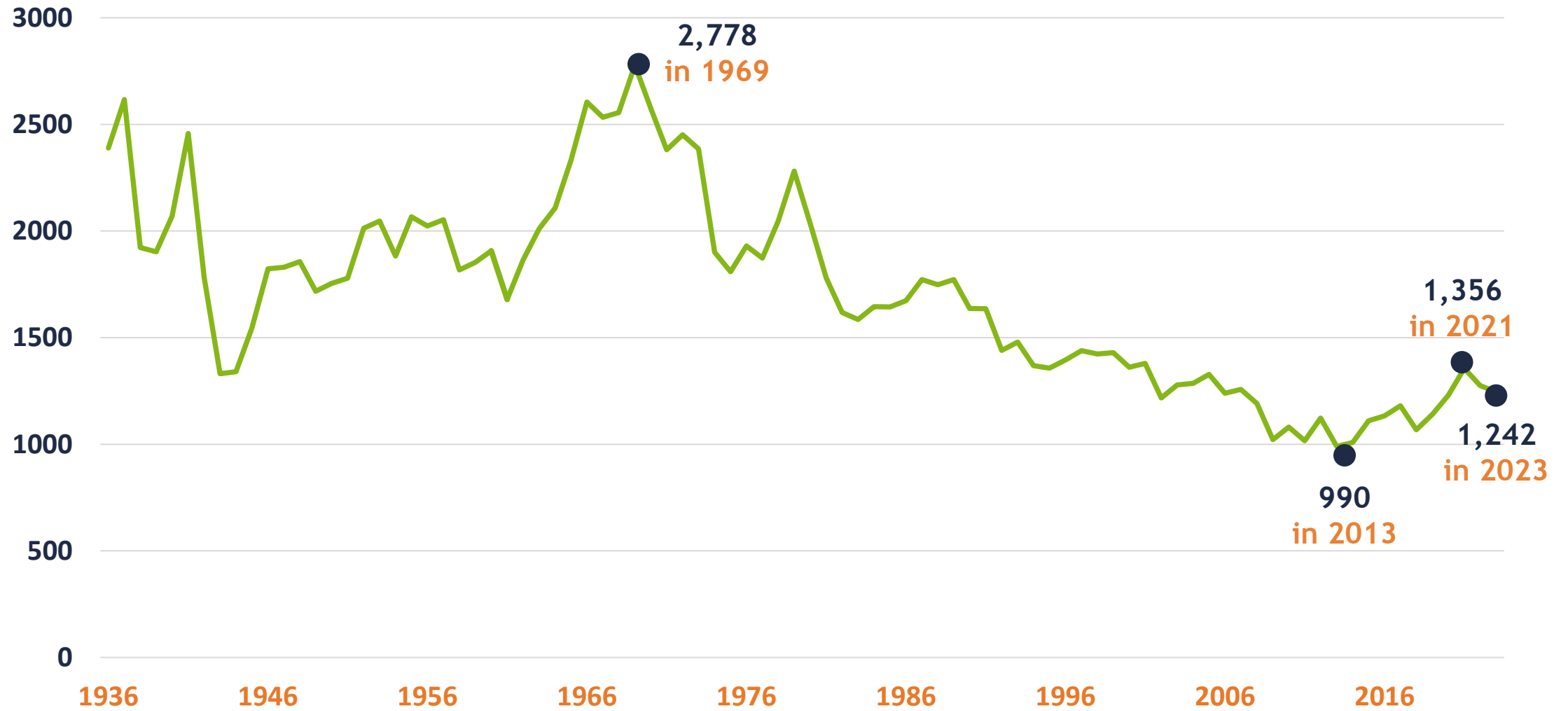
Ohio's Story

August 2024



(VERY)
BRIEF HISTORY

OHIO TRAFFIC DEATHS



Building the Case



- Smart phones are more dangerous than other distractions
- People underestimate the danger because the technology is addictive.
- **States with primary, hands-free laws have reduced traffic deaths.**

March 29, 2019

Prepared for
Governor Mike DeWine



Legislative Success!



Governor Mike DeWine ✓

@GovMikeDeWine



One year ago today, I signed Ohio's enhanced distracted driving law, which makes the use of a cell phone while driving a primary offense. Learn more about the law at phonesdown.ohio.gov.



IS IT WORKING?

A dark red SUV is overturned on its side on a road. The front of the vehicle is heavily damaged and crumpled. Debris is scattered on the pavement around the car. In the background, a fire truck and several other vehicles are parked, with a few people standing nearby. The scene is outdoors with trees and a utility pole visible.

Traffic Deaths
dropped 2%

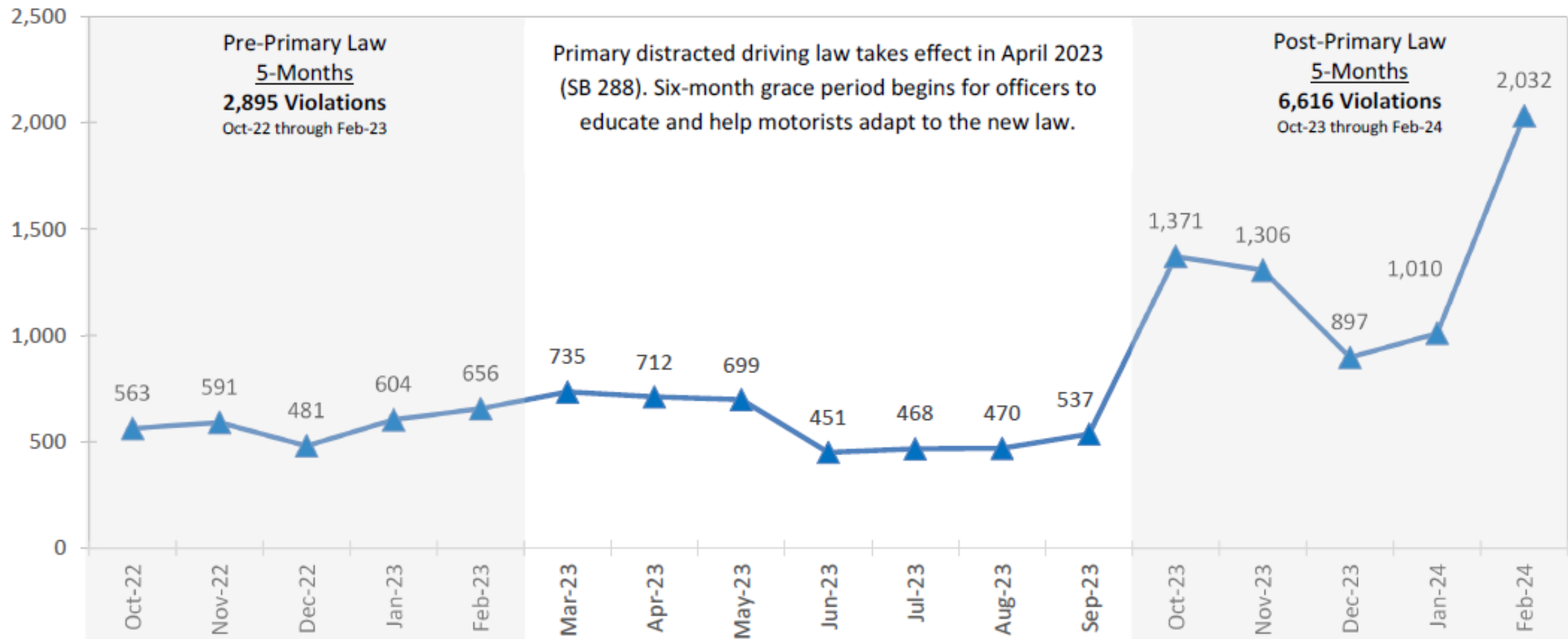


Ohio State Highway Patrol

Statistical Analysis Unit



OSHP Distracted Driving Violations by Month

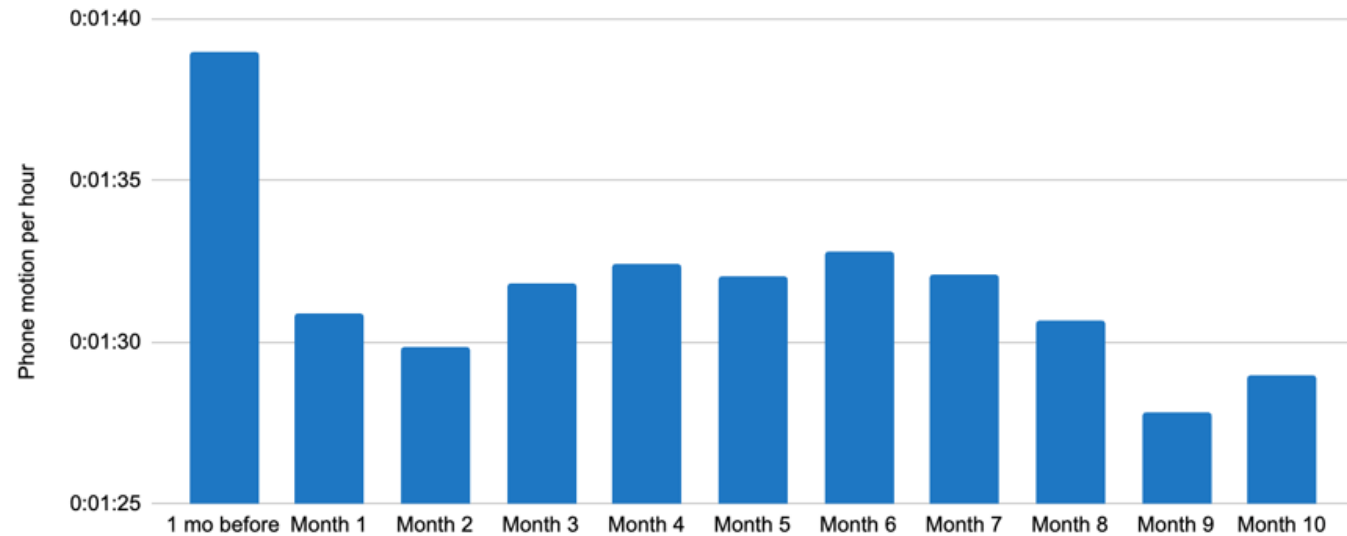


Source: OSHP computer-aided dispatch (CAD) system. Distracted driving violations include incidents with one of the following violations: 4511.204, 4511.205, 4511.991, or 392.82A1 (federal motor carrier).

CELL PHONE ANALYSIS

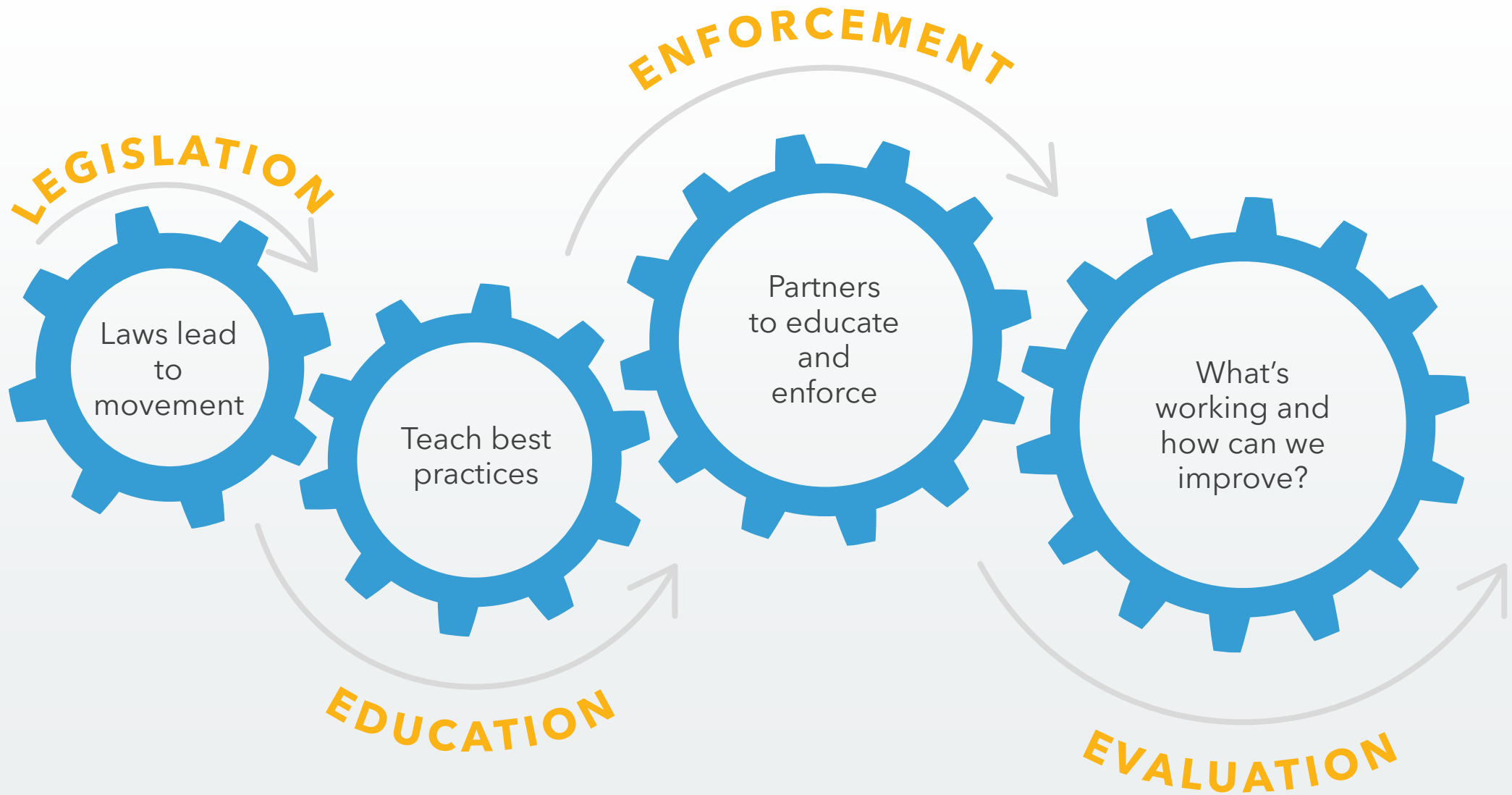
8% reduction in hand-held phone use and screen interaction.

Ohio Hands-Free: Phone Motion Per Hour After Law



WHAT'S THE CATCH?

Long-Term Plan



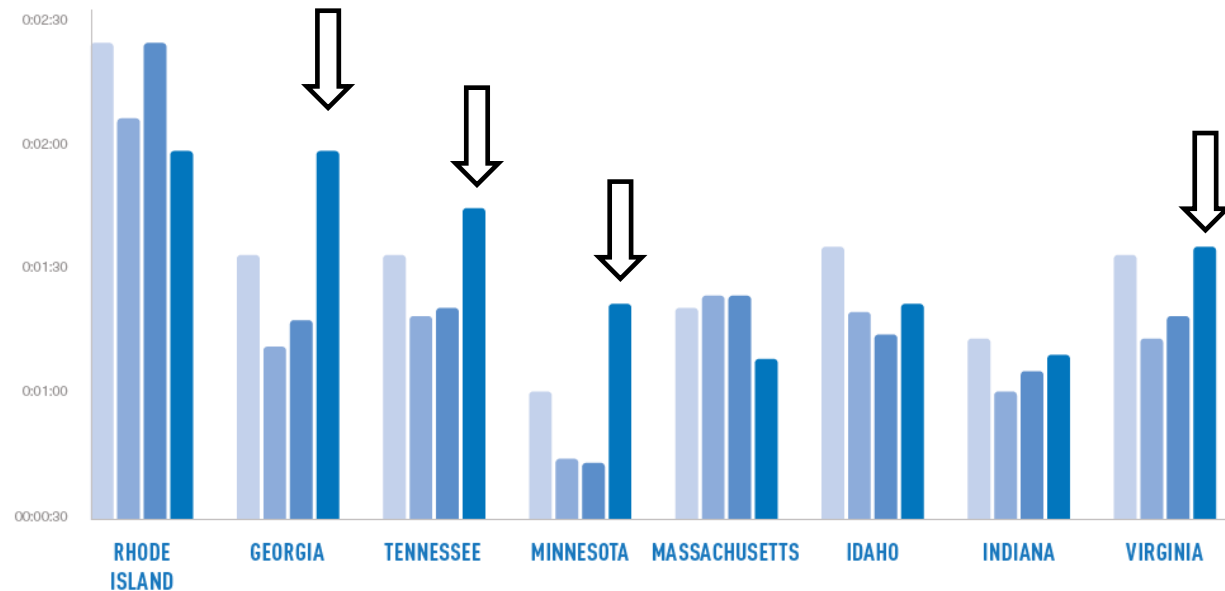
CELL PHONE ANALYSIS

Most states see an initial decrease, then a regression in behavior.

HANDHELD BANS & PHONE MOTION

Source: Cambridge Mobile Telematics

1 month before law 1 week after law 3 mos after law Oct.-Dec. 2022



WHY?

Most states get a boost in awareness after the law passes – but awareness can fade over time.



BY BEN NADLER
Published 11:38 AM EDT, June 30, 2018

Share

ATLANTA (AP) — Several new laws will go into effect in Georgia on Sunday, which marks the beginning of a new fiscal year for the state budget.

Among them is a highly publicized measure that will make it illegal to hold or operate a cellphone by hand while driving. Dozens of other bills and resolutions passed by the state legislature during the 2018 session will also take effect.

Police begin enforcing Virginia's new hands-free driving law

The new law went into effect on Friday



BEDFORD COUNTY, VA. — Virginia's new hands-free driving law began Friday.

It's the most restrictive law we've seen here in the Commonwealth and it means no phone in your hand while driving for any reason.

STATE

Ohio's new distracted driving law starts this week: What you need to know

Laura A. Bischoff
The Columbus Dispatch

Published 10:00 p.m. ET April 2, 2023 | Updated 2:40 p.m. ET April 3, 2023



Ohio is putting up new signs enforcing the states new distracted driving law. Ohio Department Of Public Safety

STATE

R.I. bill banning drivers from talking on hand-held cellphones signed

Katherine Gregg The Providence Journal
Published 7:00 p.m. ET July 10, 2017 | Updated 4:55 p.m. ET July 10, 2017



PROVIDENCE — By this time next year, driving while talking on a hand-held cellphone will be illegal in Rhode Island.

On Monday, Governor Raimondo signed legislation to outlaw the use of any held-held "personal wireless communication device" for talking while driving, except in emergency situations. (Texting while driving was already illegal.)

Drivers would still be able to talk on cellphones, but they would have to use a "hands-free" device.

SUSTAINED MEDIA COVERAGE

Public awareness impact



Governor Mike DeWine @GovMikeDeWine · 15h
Ohio's new [#PhonesDown](#) law is making a difference! The law went into effect earlier this month, and [@cmtelematics](#) estimates that it has already helped prevent over 300 crashes. [📍](#) [📺](#)

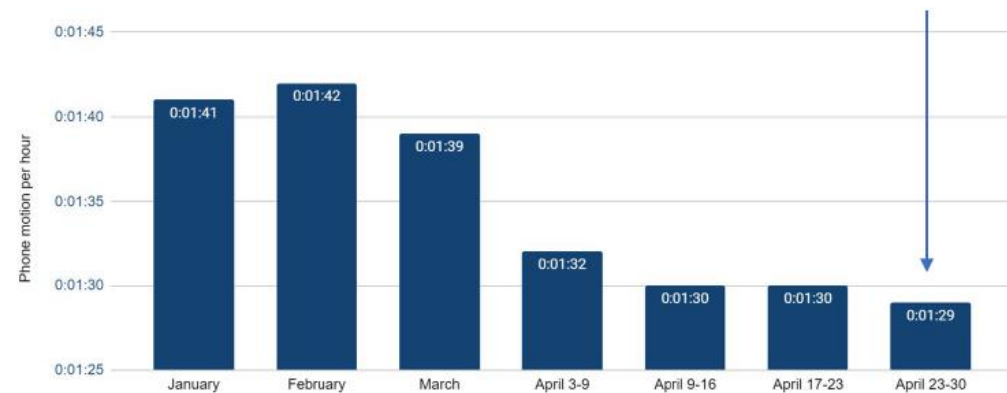
Cambridge Mobile Telematics @cmtelematics · 19h
New analysis: Ohio's new [#handheldban](#) has reduced distracted driving by 8%.

In March, Ohio drivers spent an average of 1 minute and 39 seconds per hour on their phones. That number has dropped to 1 minute and 31 seconds since the handheld ban started.

cmtelematics.com/distracted-dri...

43 9 45 58.6K

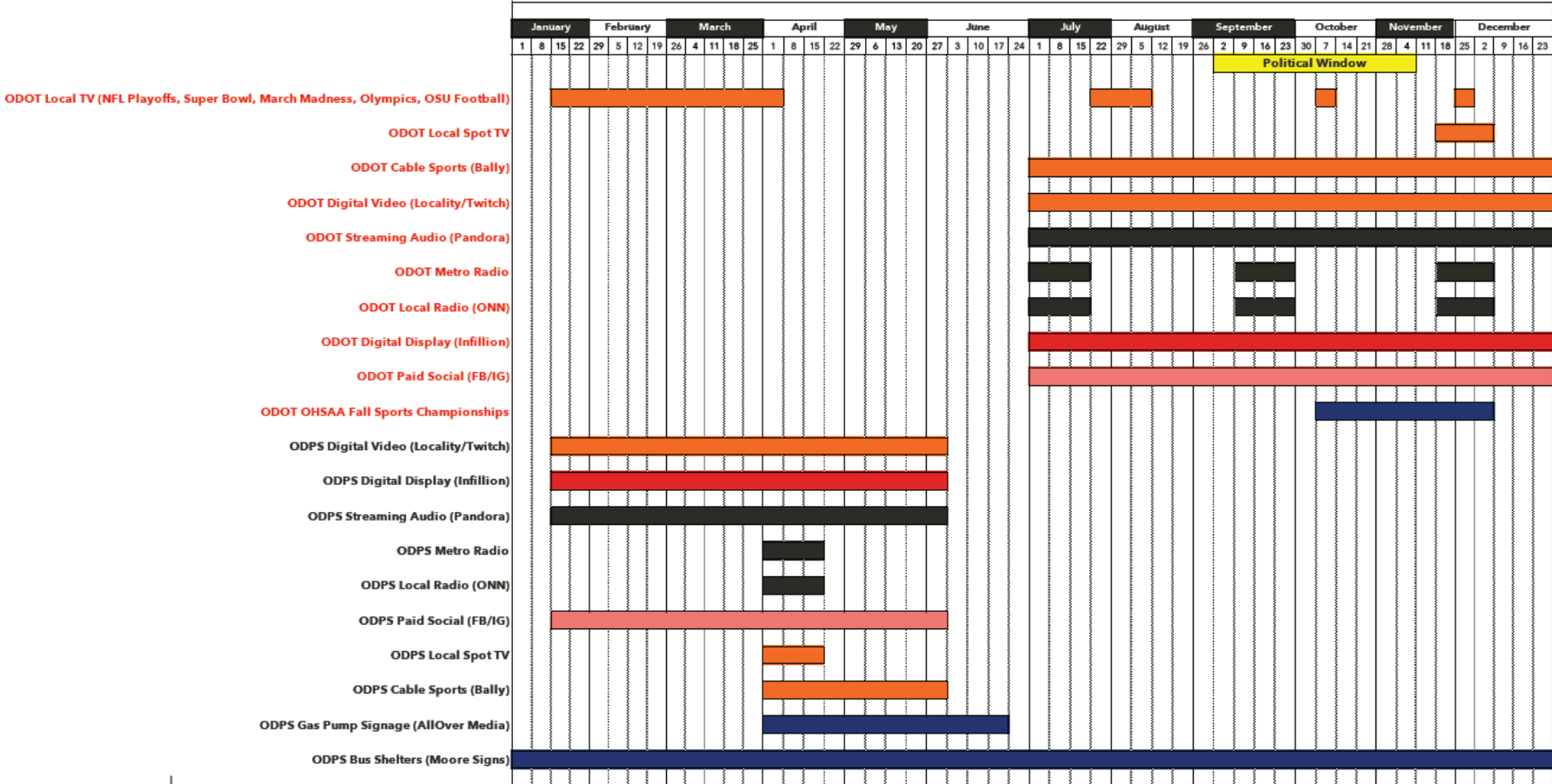
Ohio: Phone Motion Distraction After Handheld Ban



SUSTAINED MEDIA COVERAGE

flowchart

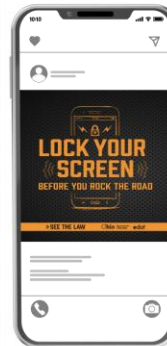
2024 ODOT ODPS Distracted Driving Paid Media Plan



HOW DO WE BUILD ON SUCCESS?

YEAR-LONG MEDIA PLAN

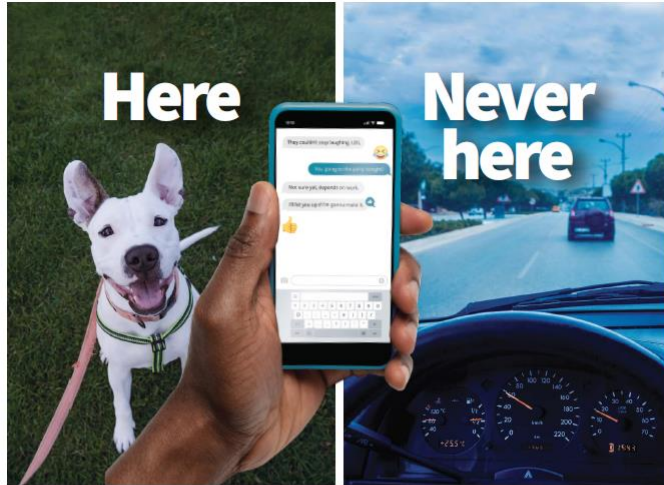
For more information and downloadable assets, visit:
PhonesDown.Ohio.gov



Lock Your Phone

In Ohio, it's not okay to interact with your phone screen while driving. So, lock that screen before you rock the road.

YEAR-LONG MEDIA PLAN




Here **Never here**

April is Distracted Driving Awareness Month

Ohioans can choose to use their phones in lots of places – but never behind the wheel. Phones Down It's the Law. Ohioans are counting on you to pay attention.

Phones down behind the wheel. It's the law.
Fines start at \$150

PhonesDown.Ohio.gov





It's ok to use your phone at the game
Never behind the Wheel

Ohioans can choose to use their phones in lots of places – but never behind the wheel. In Ohio, it's illegal to interact with your phone screen and electronic devices while driving. In most cases, anything more than a single touch or swipe is against the law.

If an officer sees a violation, they can pull you over.

Phones Down It's the Law
Fines start at \$150

PhonesDown.Ohio.gov




It's ok to use your phone at the game
Never behind the Wheel

Ohioans can choose to use their phones in lots of places – but never behind the wheel. In Ohio, it's illegal to interact with your phone screen and electronic devices while driving. In most cases, anything more than a single touch or swipe is against the law.

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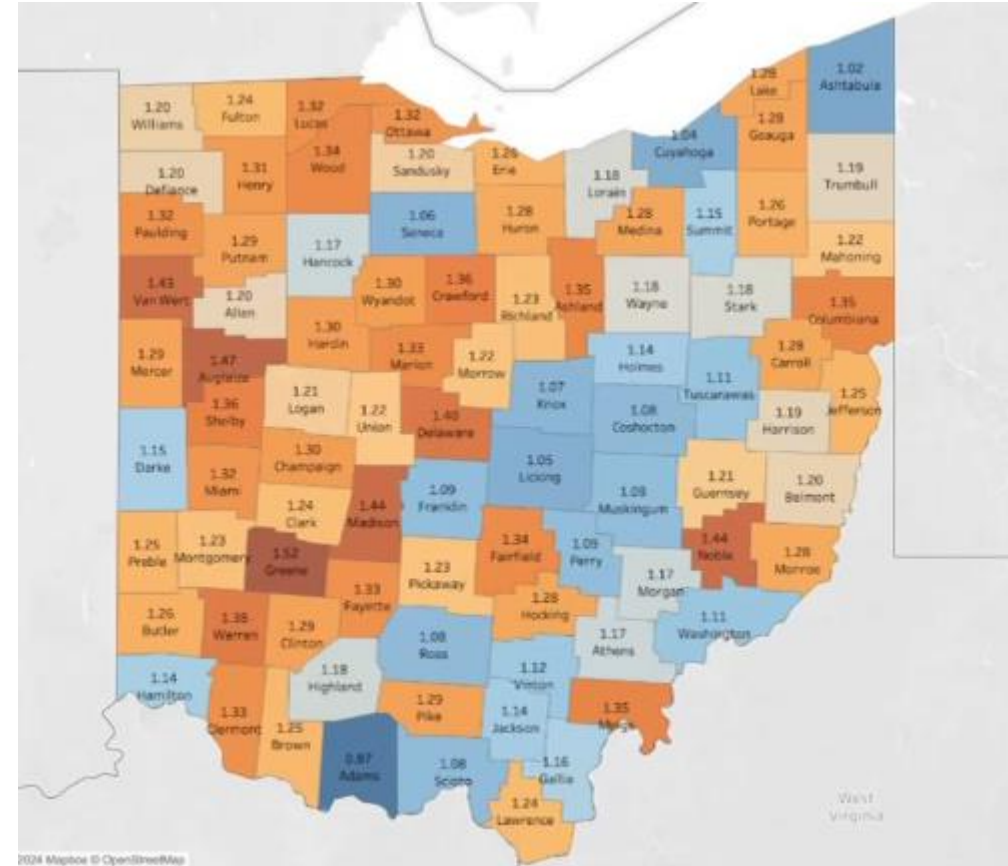
PhonesDown.Ohio.gov



YEAR-LONG MEDIA PLAN

Distraction by County Heatmap

Ohio counties show considerable variation in distraction according to the heatmap below (blue below the state average, orange above) with the most populous counties (and the major cities) tending to have lower rates of distraction compared to the more rural counties.



TELEMATICS PILOT



Ohio is using telematics data – specifically cell phone data on speed and phone use – to help us better target our traffic safety resources.

TELEMATICS PILOT

ODPS and ODOT
Distracted Driving Corridor Project



8 corridors covering two time periods. **Before and after targeted enforcement**

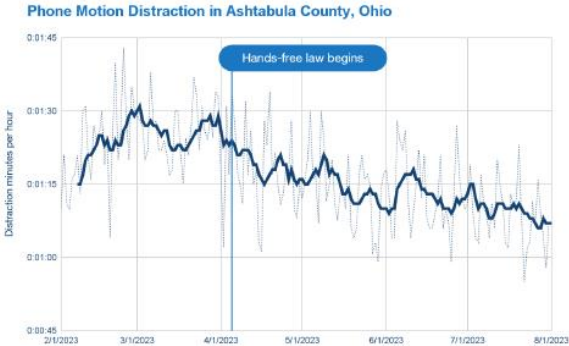
Comparing behavior change in heavily enforced vs. lightly enforced and non-enforced corridors

TELEMATICS PILOT

Distracted driving is down in Ashtabula County, Ohio

Phone motion distraction down 19.2% since handheld ban

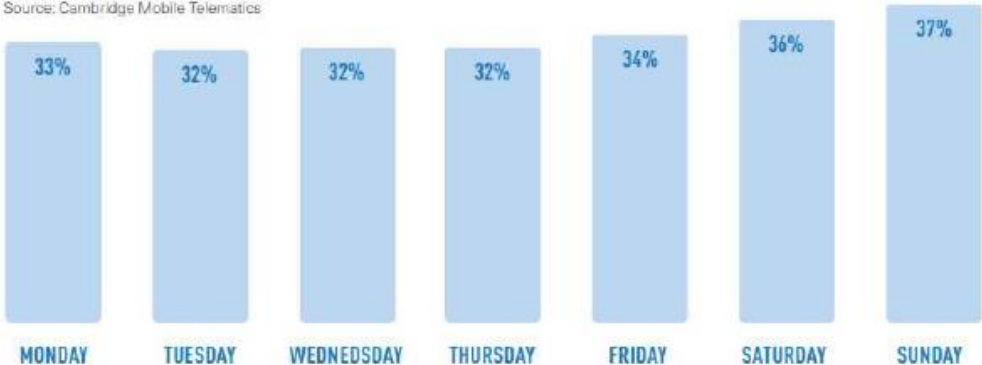
Month	Compared to March
April	8.0% reduction
May	13.1% reduction
June	13.9% reduction
July	19.2% reduction



- Mining the data for broad trends that can guide education and enforcement.

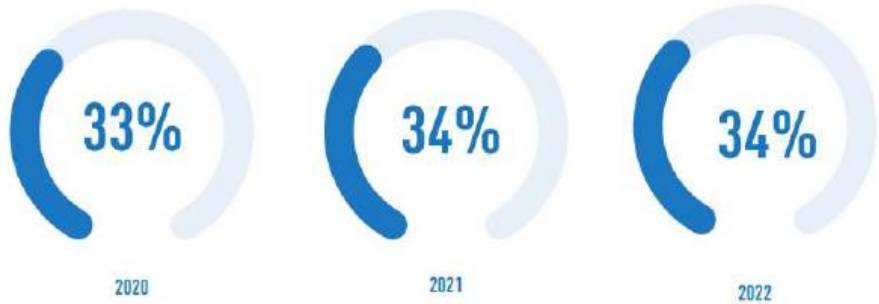
PERCENT OF PHONE MOTION ABOVE 50 MPH BY DAY

Source: Cambridge Mobile Telematics



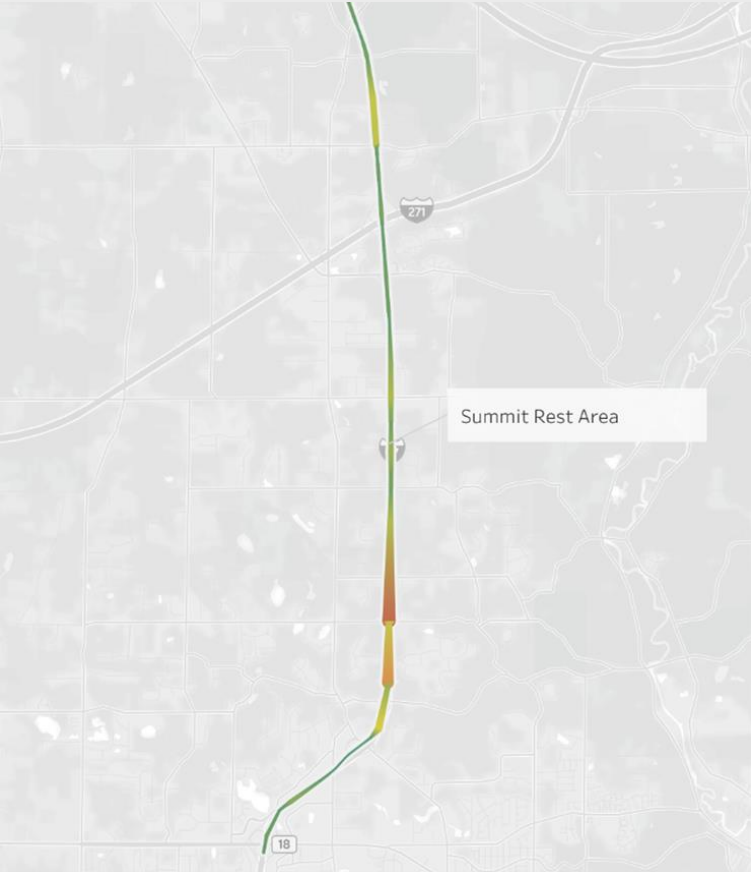
PERCENTAGE OF PHONE MOTION ABOVE 50 MPH

Source: Cambridge Mobile Telematics



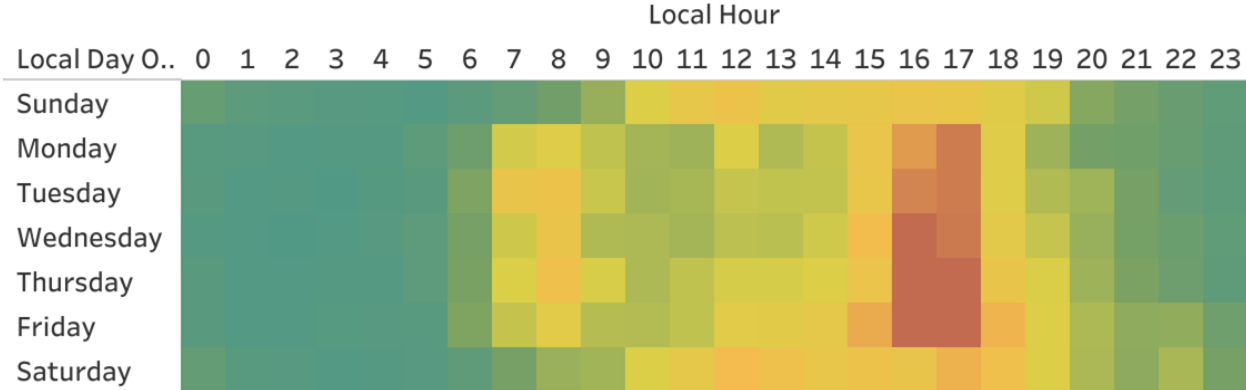
TELEMATICS PILOT

Speeding on I-77 S



- Mining the data for granular trends like hot spots and times of day when enforcement and media messaging will be more effective.

Phone Motion on I-77 N/S





TAKEAWAYS

LEGISLATION IS ONLY THE BEGINNING



Governor Mike DeWine
@GovMikeDeWine

...

One year ago today, I signed Ohio's enhanced distracted driving law, which makes the use of a cell phone while driving a primary offense. Learn more about the law at phonesdown.ohio.gov.



- **States need a long-term plan for success**
- **Telematics can help us** sharpen our traffic safety strategies to make them more effective.



Michelle May

Highway Safety Program Manager
Ohio Department of Transportation
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