Zendrive

# Zendrive's 2018 Distracted Driving Snapshot

## What We Learned from Driving 100 Billion Miles

April 2018

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# INTRODUCTION

To mark Zendrive's 100-billionth mile of driver behavior data measured and analyzed, our team looked into one of the most vexing traffic safety challenges today: driver phone use.

The recent spike in traffic deaths was unabated in 2017. Experts at the National Safety Council estimate that there were 40,100 fatalities in 2017 versus 40,327 in 2016[1], a half-percent decrease. This level of preventable deaths marks a 10-percent increase in the five years between 2012 and 2017 and a 14-percent increase in the five years between 2011 and 2016[2]. According to the National Highway Traffic Safety Administration (NHTSA), there hasn't been a similar spike since the late-1970s, when road deaths shot up 13-percent from 45,196 in 1974 to 51,093 in 1979[3].

Given this alarming trend in preventable fatalities and the ever-presence of mobile phones in our lives, Zendrive analyzed our growing dataset to help understand the problem of distracted-driving and develop strategies to prevent this risky behavior. **Experts *think* that mobile phones are playing a major role in the high number of road deaths, but they need a massive dataset to know what's going on.**

This spring, Zendrive dug into our vault of 100-billion miles of driving data to look at three months of driver phone use. From December 2017 through February 2018, we studied anonymized data from 4.5-million drivers, who covered 7.1-billion miles on the road. This is the same time period we looked at in our 2017 study of driver phone use, so we are able to see what's changed in the last year.

The question remains: After many years of reductions in traffic deaths and the growing consensus to end them, what's contributing to this increase, and what can we do about it?

[1] http://www.nsc.org/learn/NSC-Initiatives/Pages/Fatality-Estimates.aspx
[2] http://www.nsc.org/NewsDocuments/Dec-2014-fatality-estimates.pdf
[3] https://en.wikipedia.org/wiki/Motor_vehicle_fatality_rate_in_U.S._by_year

# YOU NEED TO MEASURE IT TO MANAGE IT

To answer these questions, you need to be able to measure driving behaviors and analyze how they're changing over time.

We know that driver phone use is a big problem, but we barely have a handle on it. While there are small scale studies of driver phone use, no other organization has the technology and the dataset to conduct a nationwide analysis of this risky behavior. The National Highway Traffic Safety Administration believes that during daylight hours, approximately 660,000 drivers are using cell phones while driving[4].

**By looking into our repository of 100-billion miles of driving data, Zendrive found that on an average day, over 60-percent of people use their phones at least once while behind the wheel. Based on US Census data, this means that at least 69,000,000 drivers use their phones while driving each day.**

### CASE STUDY: DRUNK DRIVING

Using data to prevent drunk driving has saved over 200,000 lives since 1982. Before then, drunk driving accounted for over 60-percent of traffic deaths in the U.S.[6] That year, Mothers Against Drunk Driving (MADD) was founded, and the National Highway Traffic Safety Administration (NHTSA) began recording alcohol-related statistics. In 1982, NHTSA recorded 21,113 alcohol-related traffic deaths[7] (48-percent of all traffic deaths that year[8]). By 2016, that number had dropped 51-percent to 10,497[9] (28-percent of all traffic deaths that year[10]).

During these 34-years, communities, experts and public officials used data to develop high-impact strategies to stop drunk driving. They targeted young people, passed zero tolerance laws, and raised the minimum drinking age to 21. Without data, decision-makers would not have known to focus on these areas and could not have saved so many lives.

[5] https://www.brookings.edu/blog/the-avenue/2017/10/03/americans-commuting-choices-5-major-takeaways-from-2016-census-data
[6] https://report.nih.gov/nihfactsheets/ViewFactSheet.aspx?csid=24
[7] https://www.responsibility.org/wp-content/uploads/2018/02/Alcohol-Impaired-Driving-Fatalities-1982-2016.pdf
[8] http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/overview-of-fatality-facts
[9] https://www.responsibility.org/get-the-facts/research/statistics/drunk-driving-fatalities/
[10] https://www.nhtsa.gov/risky-driving/drunk-driving

# FINDINGS

Overall, Zendrive found more driver phone use in our 2018 analysis than we did in our 2017 study. Distracted driving increased in every state except for Vermont. It also increased in every city we studied. The average amount of driver phone use per hour also increased.

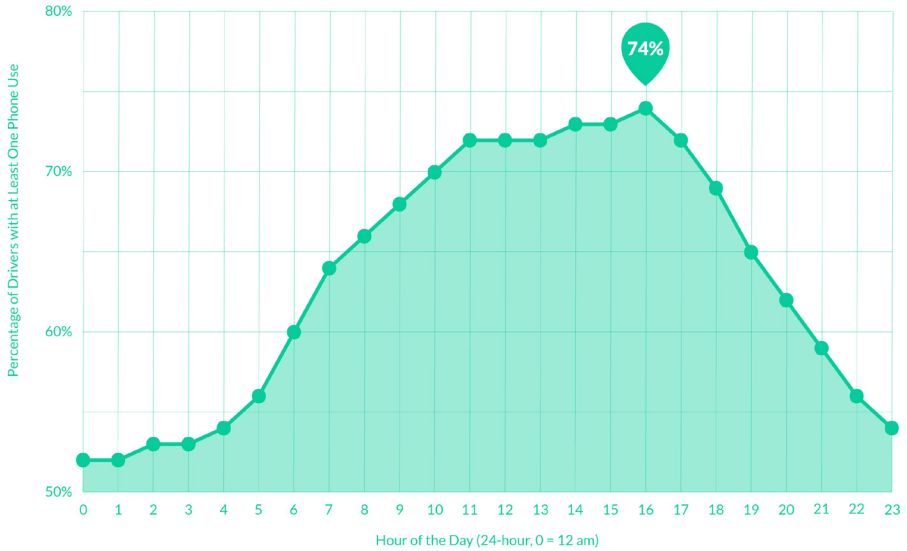
Every day, 60-percent of drivers use their phones at least phone. At any given hour during the study, Zendrive found about 40-percent of people nationwide used their phones at least once while driving. According to NHTSA, 6-percent of drivers were observed using a handheld phone or texting in 2015[11]. Over the course of the entire study, we found that 86-percent of drivers used their phones at least once.

Across all 4.5-million people we studied, we found that they average 1-minute, 52-seconds of phone use per hour of driving. When you take out the drivers who didn't use their phones at all and just look at the habitual phone users, Zendrive found that they use their phones for 3-minutes, 40-seconds every hour. This is 10-seconds longer than Zendrive's 2017 study, which found that drivers spend an average of 3-minutes, 30-seconds on their phones each hour.

On Christmas Eve 2017, Christmas Day 2017, New Year's Eve 2017, New Year's Day 2018, Super Bowl Sunday 2018, and Valentine's Day 2018, we found that when drivers used their phones, they use them about 15-percent, or roughly 9-seconds, longer than on a non-holiday.

Not surprising, Zendrive found that 70-percent of driver phone use occurred between 10am and 5pm.

**FROM 10AM TO 5PM OVER 70% OF DRIVERS USE THEIR PHONES AT LEAST (IN THE THREE MONTHS WE STUDIED)**

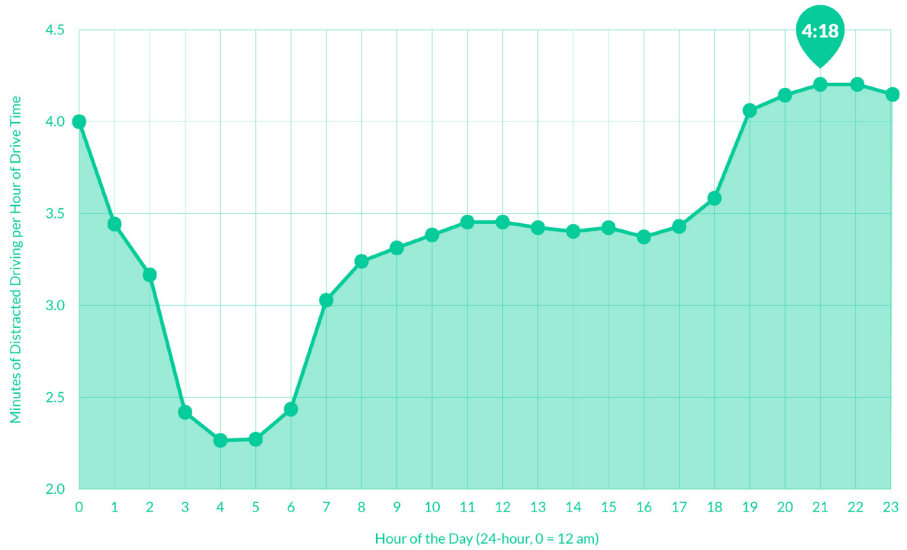



[11] https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/driver_electronic_device_use_in_2015_0.pdf

## FINDINGS (CON'T)

Throughout the day, the hours with the longest periods of driver phone user are between 9pm and 12am. Then, drivers use their phones 20-percent, or 30-seconds, longer than the 1-minute, 50-second average.

### NIGHTTIME PHONE USE IS 20% LONGER THAN DAYTIME PHONE USE

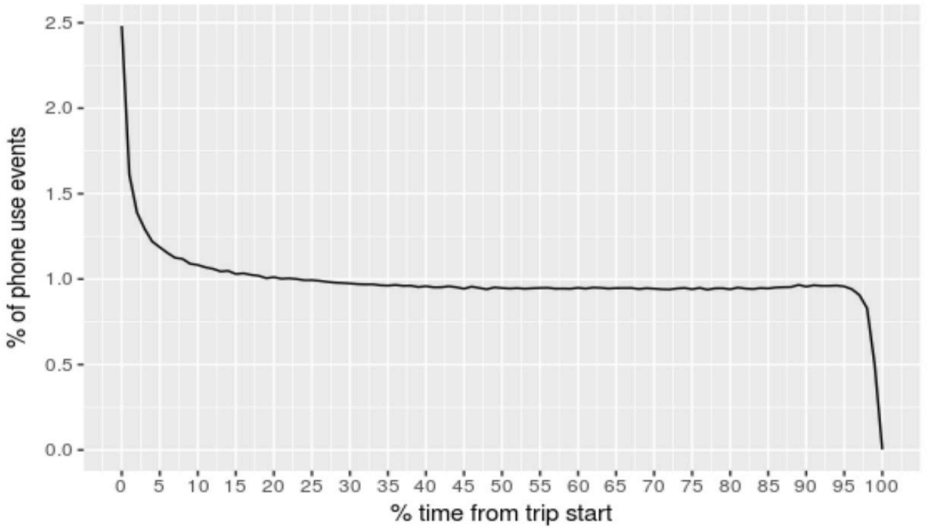



Most driver phone use happens at the start of the trip. Looking at the amount of time people are distracted as a percentage of their overall trip, the vast majority of phone use starts in the first 5-percent of a trip. This shows no matter how far people travel, they are more likely to be distracted multitasking with their phones while setting out on a trip rather than throughout the entire journey.

One simple tip for drivers: finish that call, send that text, set your music and map before putting the car into drive.

Interestingly, Zendrive found that drivers with iPhones use their phones nearly twice as much and for more than twice as long as Android owners. Android owners use their phones behind the wheel for about 1-minute per hour. iPhone owners users their phones for an average of 2-minutes, 45-seconds per hour of driving.

### MAJORITY OF PHONE USE HAPPENS IN THE FIRST 5% OF A TRIP



# STATE RANKINGS

Do laws that prohibit drivers from using handheld phones work? Was there more distracted driving in your state this year? Zendrive analyzed our data by state to find out where to find the least and most distracted driving.

Our new analysis found that there was more driver phone use this year in every state except Vermont. In our 2017 analysis, Vermont was the state with highest level of distracted driving, with drivers spending almost 7.5-percent of their time behind the wheel on the phone each day. In our 2018 analysis, Vermonters spent 6.5-percent of their driving time on the phone, and the state went from the most distracted in the nation to the 37th least distracted.

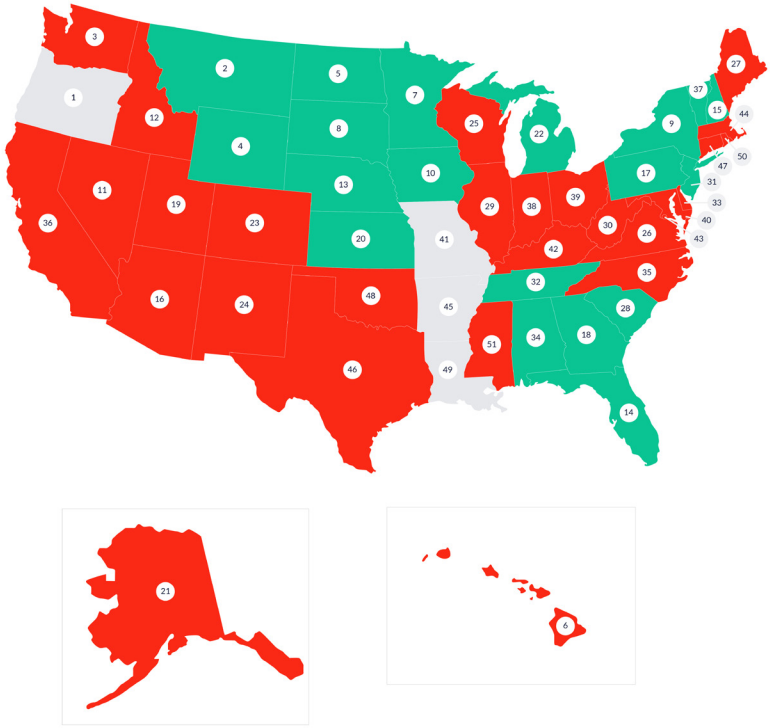
Iowa, which does not have a law prohibiting handheld phone use by drivers, made the biggest improvement in state ranking this year, moving up from the 32nd least distracted state to the 10th least distracted. California, where driver handheld phone use is illegal, saw its rank fall the farthest, from the 7th least distracted state in 2017 to the 36th in 2018.

Whether or not a state has a law prohibiting drivers from using handheld phones appears to have little effect on the amount of driver phone use or the change in driver phone use from 2017 to 2018. Of the sixteen states that ban drivers from using handheld phones, only one (Vermont) saw a reduction in driver phone use, eleven fell in the state-by-state ranking, four improved in ranking, and one stayed the same (Oregon, which was the least distracted state in 2017 and 2018).

Our data science team looked at the relationship between how long people drove each day and how much time they spent using their phones while driving. They calculated the ratio between the average daily driving time and the average amount of time drivers used their phones each day. By comparing duration to duration, i.e. apples to apples, Zendrive came up with the most direct and accurate measurement of driver distraction.

## 2018 STATE RANKINGS (MOST DISTRACTED TO LEAST DISTRACTED)

| | State | 2018 - Average percent of time people spent using their phones while driving each day | 2017 - Average percent of time people spent using their phones while driving each day (Considering trips with at least one phone use) | Change in rank year-over-year | Hand-held phone ban (*current rank state only) |
|---|---|---|---|---|---|
| 51 | Mississippi | 7.97% | 6.85% | -1 | |
| 50 | Rhode Island | 7.74% | 5.58% | -6 | yes |
| 49 | Louisiana | 7.70% | 6.38% | No change | |
| 48 | Oklahoma | 7.14% | 5.64% | -2 | |
| 47 | Connecticut | 7.04% | 5.34% | -10 | yes |
| 46 | Texas | 6.99% | 5.31% | -10 | |
| 45 | Arkansas | 6.94% | 5.75% | +2 | |
| 44 | Massachusetts | 6.92% | 5.49% | -2 | |
| 43 | District of Columbia | 6.91% | 5.38% | -4 | yes |
| 42 | Kentucky | 6.76% | 5.31% | -7 | |
| 41 | Missouri | 6.71% | 5.56% | +2 | |
| 40 | Maryland | 6.58% | 4.96% | -21 | yes |
| 39 | Ohio | 6.58% | 5.15% | -10 | |
| 38 | Indiana | 6.58% | 5.11% | -10 | |
| 37 | Vermont | 6.54% | 7.42% | +14 | yes |
| 36 | California | 6.54% | 4.24% | -29 | yes |
| 35 | North Carolina | 6.53% | 5.19% | -4 | |
| 34 | Alabama | 6.50% | 5.76% | +14 | |
| 33 | Delaware | 6.50% | 4.69% | -20 | yes |
| 32 | Tennessee | 6.49% | 5.40% | +9 | |
| 31 | New Jersey | 6.39% | 5.60% | +14 | yes |
| 30 | West Virgina | 6.39% | 5.11% | -3 | yes |
| 29 | Illinois | 6.37% | 5.10% | -3 | yes |
| 28 | South Carolina | 6.34% | 5.36% | +10 | |
| 27 | Maine | 6.34% | 5.01% | -4 | |
| 26 | Virgina | 6.30% | 5.02% | -2 | |
| 25 | Wisconsin | 6.30% | 4.92% | -7 | |
| 24 | New Mexico | 6.29% | 4.40% | -14 | |
| 23 | Colorado | 6.28% | 4.78% | -8 | |



## 2018 STATE RANKINGS (MOST DISTRACTED TO LEAST DISTRACTED)

| | State | 2018 - Average percent of time people spent using their phones while driving each day | 2017 - Average percent of time people spent using their phones while driving each day (Considering trips with at least one phone use) | Change in rank year-over-year | Hand-held phone ban (*current rank state only) |
|---|---|---|---|---|---|
| 22 | Michigan | 6.27% | 5.09% | +3 | |
| 21 | Alaska | 6.25% | 4.48% | -10 | |
| 20 | Kansas | 6.25% | 5.39% | +20 | |
| 19 | Utah | 6.20% | 4.25% | -11 | |
| 18 | Georgia | 6.19% | 5.31% | +16 | |
| 17 | Pennsylvania | 6.09% | 5.23% | +16 | |
| 16 | Arizona | 6.06% | 4.62% | -4 | |
| 15 | New Hampshire | 6.05% | 4.88% | +1 | yes |
| 14 | Florida | 6.03% | 5.00% | +6 | |
| 13 | Nebraska | 6.03% | 5.18% | +17 | |
| 12 | Idaho | 6.01% | 4.01% | -9 | |
| 11 | Nevada | 5.95% | 4.14% | -5 | yes |
| 10 | Iowa | 5.93% | 5.21% | +22 | |
| 9 | New York | 5.85% | 5.01% | +13 | yes |
| 8 | South Dakota | 5.77% | 4.77% | +6 | |
| 7 | Minnesota | 5.73% | 4.92% | +10 | |
| 6 | Hawaii | 5.71% | 4.07% | -2 | yes |
| 5 | North Dakota | 5.49% | 5.01% | +16 | |
| 4 | Wyoming | 5.47% | 4.30% | +5 | |
| 3 | Washington | 5.44% | 3.96% | -1 | yes |
| 2 | Montana | 5.24% | 4.11% | +3 | |
| 1 | Oregon | 5.24% | 3.69% | No change | yes |

# CITY RANKINGS

At the city-level, do prohibitions on driver handheld phone use work? Zendrive looked at the amount of time drivers spent on their phones during each trip.

Like states, driver phone use increased this year in every city that Zendrive looked at in the study. This year, Zendrive looked at twenty-two cities and metropolitan areas; our 2017 driver phone use analysis looked at fifteen. Chicago's ranking improved the most, moving from the 11th least distracted city in 2017 to the 6th least distracted in 2018. Houston, TX, and Boston, MA fell the most in the rankings. Houston went from the 10th least distracted to the 22nd (and most) distracted city in 2018. Boston fell from the 3rd least distracted in 2017 to the 16th least distracted this year.

Whether or not there's a state or local law against driver use of handheld phones appears to have little effect on the amount of driver phone use at the city level. Of the nine cities and metropolitan areas that Zendrive studied this year and last with driver phone use bans, three fell in the city-by-city rankings, four improved in ranking, and two stayed the same (Burlington, VT, and Seattle, WA, which was the least distracted city in 2017 and 2018).

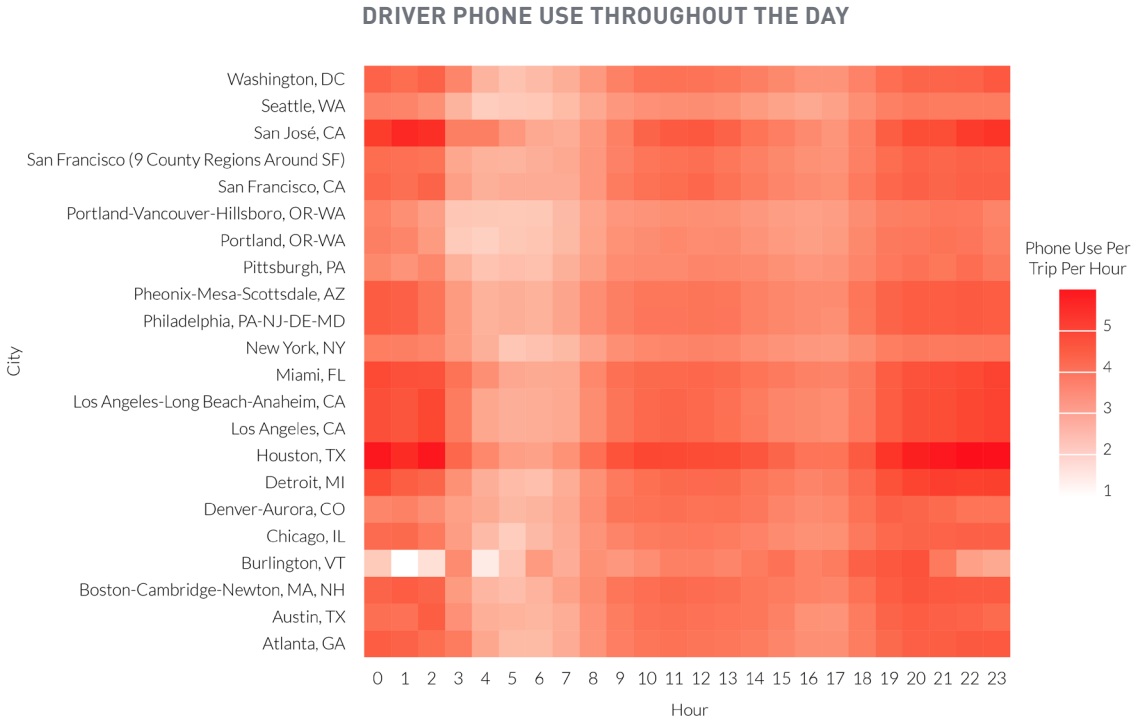
## 2018 CITY RANKINGS (MOST DISTRACTED TO LEAST DISTRACTED)

| | City | 2018 - Average percent of time people spent using their phones while driving | 2017 - Average percent of time people spent using their phones while driving per trip | Change in rank year-over-year | City/State has hand-held phone ban |
|---|---|---|---|---|---|
| 22 | Houston, TX | 7.84% | 5.15% | -13 | |
| 21 | Miami, FL | 7.08% | 5.27% | -8 | |
| 20 | Detroit, MI | 7.02% | N/A | N/A | |
| 19 | San Jose, CA | 7.00% | N/A | N/A | yes |
| 18 | Los Angeles (County), CA | 6.94% | N/A | N/A | yes |
| 17 | Los Angeles--Long Beach--Anaheim, CA | 6.91% | 5.94% | -2 | yes |
| 16 | Boston-Cambridge-Newton, MA-NH (MSA) | 6.89% | 3.90% | -13 | |
| 15 | San Francisco, CA | 6.74% | 4.18% | -10 | yes |
| 14 | Denver--Aurora, CO | 6.70% | 5.09% | -5 | |
| 13 | Philadelphia, PA--NJ--DE--MD | 6.69% | 5.25% | -1 | |
| 12 | Austin, TX | 6.69% | 5.89% | +2 | yes |
| 11 | Phoenix-Mesa-Scottsdale, AZ (MSA) | 6.66% | N/A | N/A | |
| 10 | Atlanta, GA | 6.64% | 4.05% | -6 | |
| 9 | San Francisco (MSA 9 county regions around SF) | 6.58% | N/A | N/A | yes |
| 8 | Washington, DC | 6.51% | 3.79% | -6 | yes |
| 7 | Burlington, VT | 6.51% | 4.39% | No change | yes |
| 6 | Chicago, IL | 6.47% | 5.21% | +5 | yes |
| 5 | Pittsburgh, PA | 6.15% | N/A | N/A | |
| 4 | New York, NY | 6.06% | 4.61% | +4 | yes |
| 3 | Portland, OR--WA | 5.95% | N/A | N/A | yes |
| 2 | Portland-Vancouver-Hillsboro, OR-WA (MSA) | 5.81% | 4.35% | +4 | yes |
| 1 | Seattle, WA | 5.70% | 3.59% | No change | yes |

# CITY RANKINGS

At the local level, our data science team looked at the relationship between the length of the average trip and how much time people spent using their phones while driving. They calculated the ratio between the average daily trip time and the average amount of time drivers used their phones per trip.

Driver phone use trends vary on an hour-by-hour basis in major U.S. cities. In the chart below, the darker the red box, the more phone use that hour. Cities like Miami and Houston stand out because of consistently heavily phone use 24-hours a day.



# CONCLUSION

We know traffic deaths are preventable. From local Vision Zero policies to the national Road to Zero coalition, communities have set time-bound goals to eliminate traffic deaths and serious injuries. Thirty-five mayors across the country, including Austin, Denver, Durham, Los Angeles, New York, Seattle, and Washington, D.C., have committed to years by which their cities will have no one killed in traffic. The Road to Zero coalition is a joint effort between the National Safety Council and the U.S. Department of Transportation, working to end all roadway fatalities by 2050.

To all of these determined leaders, solving the driver phone use problem remains a tough nut to crack. Until we know more about when, where, and why people use their phones behind the wheel, we won't be able to effectively reduce this risky behavior and make substantial progress towards achieving Vision Zero.

The findings from this study point to new strategies that could make a measurable difference in reducing driver phone use and related crashes, injuries, and deaths:

- Because most driver phone use happens at the very start of a trip, one simple and very effective thing drivers can do to improve safety for everyone is finish that call, send that text, set your music and map before putting the car into drive;

- Most driver phone use happens during daylight hours, so campaigns to prevent this risky behavior should focus on this time of day;

- While less than 4-minutes of driver phone use per hour doesn't seem like a long time, it is deadly, so interventions to need to focus on expressing the extremely high risk of using your phone for a seamingly short period of time behind the wheel.

Until Zendrive's analysis, officials hardly knew what time of day driver phone use is most common or when during a trip most drivers use their phones. Details like this are critical to developing interventions that will stop drivers from using their phones and creating dangerous conditions for themselves and other people.

Managing any controllable problem requires continual assessment, goal setting and interim targets to help reach the goal. When it comes to solving the problem of traffic deaths and serious injuries, the goal is zero, and data is essential. Data on traffic deaths, serious injuries, and the behaviors that most frequently contribute to them are the building blocks to managing, and ending, this crisis.

# ABOUT ZENDRIVE

Zendrive is a mission-driven company, working to improve road safety with data and analytics. Our smartphone-based system measures and analyzes driver behavior. Zendrive focuses on the behaviors most likely to contribute to collisions: speeding, driver phone use, aggressive acceleration, and hard braking. We have the largest and fastest growing dataset of driving and driver behavior, having measured and analyzed 100-billion miles of data in the past two years.

# FURTHER RESEARCH

More research to compare Zendrive's driver phone use data to traffic collision, injury, and fatality data would help develop and prioritize interventions to stop people from user their phones behind the wheel. By mapping these data and analyzing their time and date stamps, researchers could better understand where and when driver phone use contributes to crashes and casualties. This would help law enforcement and other public officials implement public awareness and enforcement campaigns to target the most common and dangerous types of driver phone use. It could also help traffic engineers design streets to discourage driver phone use.

Driver phone use at night lasts longer, and it would shed more light on this risky behavior by investigating if these longer nighttime instances of phone use are more likely to result in collisions and if those collisions are more frequent and/or severe than daytime phone use-related crashes.

Because Zendrive's data is measured and analyzed in real-time, it can also be used to evaluate the efficacy of anti-distracted driving initiatives. If a police department conducts an enforcement operation to target driver handheld phone use, they could use Zendrive data to measure the operation's before and after impact on the driving public. This would add more detail to the data on the number of driver phone use tickets a police department writes and the number of distracted driving crashes, injuries, and fatalities they record. The real-time nature of Zendrive's data also allows law enforcement and other stakeholders to assess their work immediately, instead of having to wait months or longer for other data to be compiled.

# METHODOLOGY

## DATA OVERVIEW

Total Zendrive driver behavior data set: 100-billion miles
Total number of Zendrive users: 13-million drivers
Time period for study: December 2017, January 2018, February 2018 (89 days)
Driver behavior data set for study: 7.1-billion miles
Total number of users in study: 4.5-million drivers

Drawing from Zendrive's 100-billion miles of anonymized driver behavior data, we looked at the frequency and duration of phone use behind the wheel. Since last year's study, which looked at December 2016, January 2017, and February 2017, our dataset has grown from 10-billion to 100-billion miles of driver behavior data.

**The average trip in the study was 13.5-miles and lasted for 20-minutes. This is consistent with research by the AAA Foundation for Traffic Safety, which found that, on average, Americans make two driving trips per day, covering 29-miles and 46-minutes.[12]**

The millions of people who use Zendrive are a mix of commercial customers and individual consumers. They all operate standard passenger vehicles -- e.g. sedans, station wagons, minivans, SUVs, etc., not tractor trailers or other large industrial vehicles. Zendrive technology detects vehicle trips and safety related driving events using smartphone sensors. The safety events that Zendrive focuses on include speeding, aggressive acceleration, hard braking, collisions and phone use.

Phone use while driving is detected when the driver handles the phone for a certain period of time for various purposes such as talking, texting, or navigating. For privacy purposes, reported numbers do not differentiate between different purposes or apps; the data consider all sorts of engagement with smartphones as a driving distraction. The dataset used for this study is mostly derived from individual drivers driving passenger cars, though some commercial drivers such as transportation network company drivers, are included. The dataset does not include any type of heavy vehicle. Road network characteristics and traffic conditions were not included in the analysis. Zendrive's algorithms are able to differentiate between drivers and passengers. Our system discards phone use (and other risky behavior data) collected from passengers' phones.

[12] https://newsroom.aaa.com/2015/04/new-study-reveals-much-motorists-drive

## METHODOLOGY (CON'T)

### U.S. STATE RANKING METHODOLOGY

- All 50 states and the District of Columbia were ranked by how many drivers spent the highest proportion of their daily driving trips using their phones

- Zendrive calculated the phone use ratio for states by dividing the average of users' daily aggregated phone use (in minutes) by the average of users' daily aggregated trip duration (also in minutes) -- i.e. the average amount of time drivers use their phones everyday divided by the average time they drive everyday

### U.S. CITY RANKING METHODOLOGY

- Zendrive selected a sample set of cities to analyze from the best and the worst states

- Zendrive calculated the phone use ratio for cities by dividing the average time per trip that users use their phones (in minutes) by the average duration of each trip (in minutes) -- i.e.  the average amount of time drivers use their phones on each trip divided by the average time of each trip