



## Distracted Driving

Distracted driving—defined as any activity that could divert a person's attention away from the primary task of driving—includes activities such as talking or texting, eating and drinking, talking to people in your vehicle, fiddling with the stereo, entertainment or navigation system, and rubbernecking. Distracted drivers are 23 times more likely to crash than non-distracted drivers<sup>1</sup> and costs taxpayers as much as \$175 billion a year<sup>2</sup>.

When it comes to laws to curb distracted driving, many states have focused on the use of handheld devices while driving. In 2019, Minnesota became the 23<sup>rd</sup> state to pass legislation banning the use of handheld devices while driving. State lawmakers often cite safety statistics—use of handheld devices causes an accident every 24 seconds<sup>3</sup>; novice drivers are 8.3 times more likely to crash while talking on the phone<sup>4</sup>—and the increased numbers of accidents due to “driving while in-texticated” as rationale for these laws. The goal of this assignment is to answer the following research question:

Has there been an increase over time in fatal distracted driving crashes that involved cell phone use by the driver?

To help answer this research question, the National Highway Traffic Safety Administration (NHTSA) has provided the following information:

- **Base Rate:** In 2010, 12% of all fatal crashes attributed to distracted driving involved cell phone use by the driver.
- **Observed Data:** In 2017, 401 of 2,843 fatal crashes attributed to distracted driving involved cell phone use by the driver.<sup>5</sup>

<sup>1</sup> U.S. Department of Transportation (2012). [Driver distraction in commercial vehicle operations](#).

<sup>2</sup> National Highway Traffic Safety Administration. (2010). [The economic and societal impact of motor vehicle crashes](#).

<sup>3</sup> National Safety Council. (2010). [Understanding the distracted brain](#).

<sup>4</sup> Klauer, S. G.; Guo, F.; Simons-Morton, B. G.; Ouimet, M. C.; Lee, S. E.; Dingus, T. A. (2014). [Distracted driving and risk of road crashes among novice and experienced drivers](#). *New England Journal of Medicine*, 370 (1), 54–59.

<sup>5</sup> Data are from <https://www.ii.org/table-archive/23890>



## Explore the Observed Data

1. Do the data provided by the NHTSA suggest that fatal distracted driving crashes involving cell phone use by the driver have increased? Explain.

## Model

To answer the research question, you will set up a TinkerPlots™ sampler that models the variation in the number of fatal distracted driving crashes involving cell phone use by the driver you would expect in samples of 2,843 crashes if the true rate was 12% (the rate in 2010).

2. Set up a TinkerPlots™ sampler that corresponds to the model that is described above. Copy and paste the sampler window into your word-processed document.
3. Write the statistical *hypothesis* that describes the model in your TinkerPlots™ sampler.

## Simulate from the Model

Use TinkerPlots™ to generate the 500 samples of 2,843 fatal distracted driving crashes. Collect the number that involve cell phone use by the driver from each trial of the simulation.

## Evaluate the Observed Results

4. Plot the 500 simulated results. Use TinkerPlots™ to add a reference line in this distribution at the observed result of 401 crashes involving cell phone use by the driver. Copy and paste this plot into your word-processed document.
5. Use formal statistical language to describe the shape of the distribution of simulated results.
6. Compute the mean number of crashes involving cell phone use by the driver expected under the hypothesized model. Explain how this relates to the statistical hypothesis you wrote in Question #3.
7. Describe the variation in the simulated results by describing the range where most of the simulated results can be found. To do this, complete the following sentence by filling in the three missing pieces of information:

*Under the hypothesized model, \_\_\_\_% of the simulated results are between \_\_\_\_ and \_\_\_\_ .*

**Hint:** To determine the percentage of simulated results between your two endpoints, use the TinkerPlots™ divider tool *and* the percent button.



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8. Based on the variation you described in Question #7, how compatible is the observed result of 401 crashes involving cell phone use by the driver 2017 under the hypothesized model? Explain.

**Answer the Research Question**

9. Write a short note to the NHTSA that answers the research question. In your response, use the statistical evidence from your simulation to explain how you came to the conclusion you did.