You killed me at Hello: Examining Factors Behind Mobile Phone Usage When Driving

Team number: 1

Names of team members: Carrie Li, Emily Lopez, Rick Oldham

Date: 4/15/2024

<u>**Overview**</u>

<u>Intended Audience:</u>

California Lawmakers and Traffic Safety Officials

<u>Background:</u>

In 2008, California state laws were enacted, banning the use of personal mobile devices in "handheld" mode while operating motor vehicles (Simitian, 2008, para. 2), but since then, the California Highway Patrol has issued hundreds of thousands of citations for violations of these laws (CHP, 2023, para. 4). A 2023 California Office of Traffic Safety (OTS) Survey identified distracted driving as their primary traffic safety concern and mobile devices remain the biggest distraction (OTS, 2024, para. 1).

The National Highway Traffic Safety Administration (NHTSA) reports that a 12% increase in distraction-affected crashes in 2021 caused a nationwide loss of thousands of friends and family members, accounting for over 8% of fatalities that year (NHTSA, 2023, para. 2).

Even though some states have seen decreases in distracted driving related traffic accidents, it continues to be a problem throughout the country. So much so that the NHTSA launched the "Put the Phone Away or Pay" campaign February 1, 2024 (USDOT, 2024, para. 1) to synchronize state and federal efforts to discourage this risky behavior.

This problem will likely be exacerbated as mobile devices evolve to offer the user more and more functionality and connectivity. Of particular concern is the propagation of this risky behavior to our younger generations.

<u>Existing Literature:</u>

There have been studies conducted at Sandia National Laboratories suggesting previously unknown cognitive effects of cellphone usage (SNL, 2011, para. 4). Studies conducted by the NHTSA and the National Institute of Health (NIH) clearly identify the consequences of mobile device distracted driving (NHTSA, 2024; NIH, 2013). Finally, organizations like the U.S. Department of Transportation and the University of North Carolina Highway Safety Research Center have conducted research on Distracted Driving Countermeasures (Liu et al., 2019; Bevan et al., 2023).

Anticipated Impacts:

Unfortunately, no research has been conducted that answers a very fundamental question: With all that is at stake, why do people continue to use mobile phones while driving? We believe the solution to this problem is related to public perception and attitude. The goal of this project is to uncover the factors that contribute to the public's propensity to violate established laws that prohibit Distracted Driving with Handheld Mobile Devices (DDHD). The results of this study will support state and federal traffic safety officials in their strategy to provide better protections against this menace by providing information necessary to shape the public's attitude towards DDHD. This study will support law enforcement and law making at the state and federal level by providing state and federal authorities an alternative view of factors contributing to the problem.

Research Questions

Main Research Question:

Why do people use mobile phones while driving?

Sub-Questions:

Are attitudes like optimism bias a common motivator for DDHD?

What are the cognitive processes of individuals who continue to use mobile phones while driving despite understanding the associated danger?

Does having a system or tool in place help minimize the risks from using hand-held devices? (e.g. do not disturb features, turning the phone off, carplay, spotify car mode, CMT device / insurance partnership with reward, etc)

How do teens, young adults and older drivers' attitudes differ towards DDHD?

Would people still engage in DDHD if the penalties were similar to drunk driving penalties or if they were monitored via telematics? (e.g. license revocation, greater fine and or jail time)

<u>Definitions</u>

DDHD is a simple acronym coined for the purpose of this study that refers to the act of unlawfully manipulating a handheld mobile communications device while operating a motor vehicle.

Phone Usage is the act of operating a mobile device, typically a smartphone, to send, read, or compose messages while simultaneously driving a vehicle.

However, navigation apps, when used responsibly, can enhance driver safety by providing real-time directions and guidance to help drivers navigate unfamiliar routes. Unlike texting or browsing the internet, which often require continuous visual and cognitive attention, navigation apps typically provide audio instructions, reducing the need for visual interaction with the device. Adding navigation to the discussion of texting and driving introduces a nuanced perspective. While both activities involve interacting with a device while driving, the level of distraction and risk associated with each can differ significantly. Our study is not focused on navigation apps and rather focused on non-navigation device usage.

Attitude is a settled way of thinking or feeling about someone or something and is typically reflected in a person's behavior. In our research design, we will be using attitudinal data—data relating to attitudes.

Optimism Bias is synonymous to the popular belief of invulnerability and the idea that 'it won't happen to me.

Cambridge Mobile Telecom (CMT) is an intellectual property and technology that are embedded in popular mobile applications, triggering big improvements in driving behavior and changing the global insurance market. CMT's technology is often used by insurance companies to offer personalized insurance premiums based on individual driving behavior. By promoting safer driving practices, they aim to reduce the frequency and severity of accidents, leading to lower insurance costs for safer drivers.

Telematics is a term that combines the words telecommunications and informatics to describe the use of communications and IT to transmit, store and receive information from devices to remote objects over a

network. In the context of DDHD, data collected from user devices could be used to pinpoint DDHD activity.

Study Design

Our research will utilize a quantitative design, employing an observational study that utilizes the survey method. This approach will allow us to collect attitudinal data targeting three distinct groups within the broader driving population: Pre-licensed Minors, Licensed Teens and Young Adults, and Licensed Adults.

Many studies show the significant differences in distracted driving incidents between teen drivers, young adults drivers, and older adult drivers (NHTSA, 2022, page 3), so we will look at each of these groups independently to understand their behavior and motivations behind driving while using cellular devices.

We will stratify our survey subjects into three groups based only on their driving age. Group 1 will be Pre-licensed Minors ages 15.5 to 17.5. Group 2 will be an aggregation of Licensed Teens and Young Adults ages 16 to 25. Group 3 will be older Licensed Adults over the age of 25. Additional information on group characteristics is covered below.

This is a longitudinal study consisting of a one-time survey for emergent drivers that will be conducted during the Driver Education phase for Pre-Licensed Minors. This one-time survey will be conducted via an online platform, and a physical copy of the survey will also be available. Periodic collection from the remaining groups will be conducted on various occasions. For drivers with no imminent license expiration, a continuous voluntary survey will be made available. For driver's renewing their operator's license, a mandatory survey will be conducted at renewal. All drivers past the pre-licensed stage will have the option to take the survey in-person at local DMVs, or online via products like Qualtrics or Survey Monkey.

These surveys are an opportunity to simultaneously collect data from drivers and influence their behavior. All survey activity will be in partnership with and guided by the governing body of state traffic safety. An additional component of the study design includes a mechanism for checking the overall validity of the responses.

Pre-licensed Minors:
This group comprises teens between the ages of 15.5 and 17.5 years of age. Children within this age range are required to complete 30 hours of driver education training in preparation for a learners permit

(CA DMV, 2024, para. 2). This group will receive a one-time survey when the driver first collects their permit. This survey will gauge emergent driver attitudes towards current policies and in particular DDHD.

<u>Licensed Teens and Young Adults:</u>

These are drivers who hold a regular, unrestricted license and are between age 16 and 25. Drivers in this group have been enjoying their new freedoms and have had time to develop good and bad habits. We will gain new insights on their behavior and bad habits through indirect survey questions. Surveys for this group will be conducted in two phases, voluntary and mandatory. The mandatory survey will be distributed each time a driver wishes to renew their license, and the voluntary survey will be for drivers with license expirations well beyond the temporal scope of this study. Voluntary participants will receive an incentive of getting 10% off their registration renewal.

<u>Licensed Adults:</u>

These are drivers who hold a regular, unrestricted license and are age 25 or older, since individuals can receive lower insurance premiums starting at age 25. Surveys for this group will be conducted in two phases, voluntary and mandatory. The mandatory survey will be distributed each time a driver wishes to renew their license, and the voluntary survey will be for drivers with license expirations well beyond the temporal scope of this study. Voluntary participants will receive an incentive of getting 10% off their registration renewal.

<u>Timeline</u>

The total duration of our study will be 9 months and will be divided into three phases: data collection, data analysis, and deliverable development.

Since we will obtain data from both our one-time and continual surveys, we will only use the data collected within the first 6 months to conduct our analysis and create our deliverable. We will use data from all subjects within this timeframe. All data collected afterwards will be securely stored for future research projects and analyses that are outside the scope of this study.

We will conduct data analysis using our survey results over the course of 2 months. In our analysis, we will use hypothesis testing and explanatory statistical methods.

We will develop our deliverable over the course of 1 month. The deliverable will be a report with background information, our analysis, data visualizations, key findings, and preliminary suggestions for applications of our results.

Validation:

A partnership with Cambridge Mobile Telecom (CMT) will allow the study to validate user responses by measuring DDHD behavior against CMT data. Since the surveys are meant to measure driver attitudes, an analysis of the CMT data which includes real time metrics on driver mobile usage activity while driving presents an opportunity to compare a general measure of driver activity to the general attitude of the population.

Data

We will use data from three categories: background data, driver data and validation data.

Background Data

This will consist of historic traffic safety data from the State of California Office of Traffic Safety and will serve as a reference in our analysis. We will leverage the relationship with state traffic safety officials to gain access to this data.

Driver Data

The driver data will consist of responses from the various surveys derived from Likert Scaled questions designed to measure the following topics aligned with our main and sub-questions:

- Optimism Bias
- Recklessness
- Risk aversion
- Integrity
- Attitude towards DDHD
- Mobile Phone Usage

- Response to consequences
- Driving hours

This longitudinal study will use surveys to continuously collect driver data via. The survey for Pre-Licensed Minors will be conducted during the Driver Education phase via an online platform, and a physical copy of the survey will also be available. The mandatory survey for Licensed Teens and Young Adults and Licensed Adults will be distributed at renewal of their operator's license. A voluntary survey will also be continuously available for these two groups with the incentive of getting 10% off their registration renewal. Products like Qualtrics or Survey Monkey will be used for our online surveys.

We will use the collected data to measure the driving public's attitude towards DDHD and their likelihood to engage in DDHD.

Validation Data

The data provided by CMT will be used to gauge the validity of our survey responses and will include statistics on the following:

CMT Statistics Analysis	Metrics
Smartphone ownership	Amount of smartphone ownership over the years (count)
Percentage of trips with screen interaction	Calculate the total time spent interacting with screens while driving across all trips
Screen Interaction time	Divide the number of trips with any screen interaction (such as texting, browsing, or using apps) by the total number of trips taken
Percentage of trips with phone motion	Determine the proportion of trips during which the phone is in motion (e.g., moving around within the vehicle)
Phone motion time	Calculate the total duration of phone motion during all trips
Percentage of trips with handheld calls	Determine the percentage of trips during which drivers make or receive handheld phone calls
Handheld call time	Calculate the total duration of handheld phone calls across all trips (minutes)
Phone motion vs speed	Analyze the relationship between phone motion events and vehicle speed

Sample

Sampling frames are composed of the three driver groups outlined above.

Note: There is an overlapping age because ages 16 - 17.5 can be pre-licensed or has already maintained a license.

Group 1: Pre-licensed minors/young adults ages 15.5 to 17.5

Group 2: Licensed Young adults ages 16 to 25

Group 3: Experienced Drivers 25 and older

Inclusion:

Members of the population that fall within one of the 3 groups

Own/use a mobile device

Exclusion:

Drivers that don't own mobile devices ? Unicorns!

Licensed drivers that don't own/operate

Unlicensed individuals

Since the threat of serious injury or death exists for drivers and pedestrians alike, we feel it is prudent to target the entire driving population; therefore our sampling frame consists of drivers who visit their local California DMV. When necessary, samples that represent different demographics can be filtered for analysis. The results of these analyses will inform the solution.

Users who are currently enrolled in the CMT program through insurance will also be included in our sampling frame for validation purposes. CMT has been involved in numerous partnerships with insurance companies globally, and their technology has been adopted by millions of users participating in usage-based insurance (UBI) programs.

Hypotheses

H_0 There is no discernable reason why people use mobile phones while driving.

H_{alt} There are distinct reasons why people use mobile phones while driving.

Variables

X = Reasons

Y = Decision to DDHD

The X Variables extracted from each survey will be inferred from user survey responses and represent how drivers justify mobile phone usage while driving during non-emergency situations.

Statistical Methods

Explanatory – We aim to use inferential statistics to state perceived facts about our population that explain why the phenomenon is occurring.

Potential Risks

The primary risk is under collection, a secondary risk is ethical concerns related to data collection from children. An additional risk is that the results of the study will be inconclusive.

Deliverables

The deliverable will be a report to California lawmakers and traffic safety officials and will include background information, our analysis, data visualizations, key findings, and preliminary suggestions for applications of our results.

References

California Department of Motor Vehicles. (n.d.). Driver Training Schools [Webpage]. Retrieved from https://www.dmv.ca.gov/portal/driver-education-and-safety/driver-training-schools/#:~:text=It%20must%20consist%20of%20either,same%20requirements%20as%20classroom%20instruction.

California Highway Patrol. (n.d.). CHP Focused on Tackling Distracted Driving Epidemic [Webpage]. Retrieved from https://www.chp.ca.gov/PressReleases/Pages/CHP-FOCUSED-ON-TACKLING-DISTRACTED-DRIVING-EPIDEMIC.aspx

California Office of Traffic Safety. (n.d.). Distracted Driving. Retrieved from https://www.ots.ca.gov/grants/distracted-driving/#:~:text=Distracted%20driving%20is%20anything%20that,increase%20of%2027.3%25%20from%202020.

California State Legislature. (2008, August 18). SB 28 Senate Bill - Bill Analysis [Webpage]. Retrieved from http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0001-0050/sb_28_cfa_20080818_165734_sen_comm.html

Insurance Institute for Highway Safety. (n.d.). [Title of the article]. Retrieved from https://www.iihs.org/topics/bibliography/ref/2179

National Center for Biotechnology Information. (n.d.). [Title of the article]. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4435680/

National Conference of State Legislatures. (n.d.). Distracted Driving Laws: Cellphone Use [Webpage]. Retrieved from https://www.ncsl.org/transportation/distracted-driving-cellphone-use.

National Distracted Driving Coalition. (n.d.). How Technology Can Help Reduce Driver Distraction [PDF document]. Retrieved from https://usnddc.org/wp-content/uploads/2023/03/NDDC-How-Technology-can-Help-Reduce-Driver-Distraction-11.pdf

National Highway Traffic Safety Administration. (2023). Countermeasures That Work, 11th Edition: A Highway Safety Countermeasures Guide for State Highway Safety Offices [PDF document]. Retrieved from https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-12/countermeasures-that-work-11th-2023-tag.pdf

National Highway Traffic Safety Administration. (n.d.). [Title of the publication]. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559

National Highway Traffic Safety Administration. (n.d.). NHTSA Reminds Drivers to Avoid Distractions, Launches Distracted Driving Campaign [Webpage]. Retrieved from https://www.nhtsa.gov/press-releases/nhtsa-reminds-drivers-avoid-distractions-launches-distracted-driving-campaign

Pedruzzi, R. (2009). [Title of the paper]. Retrieved from
https://researchonline.jcu.edu.au/15183/1/Pedruzzi-ACRS-paper-17-Nov-09.pdf

ScienceDirect. (n.d.). [Title of the article]. Retrieved from
https://www.sciencedirect.com/science/article/abs/pii/S0965856418313272

Traffic Safety Marketing. (n.d.). Put the Phone Away or Pay [Webpage]. Retrieved from
https://www.trafficsafetymarketing.gov/safety-topics/distracted-driving/put-phone-away-or-pay

Teen Driver Education. (n.d.). California Driver's Education FAQs [Webpage]. Retrieved from
https://www.teendrivereducation.com/california/faq/#:~:text=If%20you%20are%20between%20the,get
%20a%20California%20learners%20permit.

U.S. Department of Energy. (n.d.). [Title of the document]. Retrieved from
https://www.osti.gov/servlets/purl/1111753

Statements of Contribution

- Carrie Li: In the group project we decided an approach where we worked individually and then came together to join our findings. Our team met at least 1 - 2x a week and worked on a shared google document, and communicated timely on Slack. A citation I contributed is the study done by Cambridge Mobile Telematics on The State of Distracted Driving in 2023 & the Future of Road Safety. In our group, we worked well on communicating and combining common ideas to create this research. I believe we were all very passionate about this subject which made the group communication enjoyable. If I were to do this again I would keep it the same.
- Emily Lopez: My literature review focused on how tech and advocate groups have worked together to reduce distracted driving and interventions' effectiveness. I contributed literature from the Insurance Institute for Highway Safety. I also contributed to the anticipated impacts, sub-questions, study design, and data sections. We each created a version of the Unit 13 research design and combined our ideas. We all contributed thoughtful perspectives on the topic. I'd like to learn more about related statistical methods.
- Richard Oldham: My individual contributions to the project include the initial vision for the project, information gathering, writing, and editing. I added citations for the Overview section. Our group was pretty much formed the first time we shared a breakout room. We worked very well together in terms of time, organization, and work ethic. We divided the labor well and everyone did their part. If I had to do it again, I wouldn't change anything.