Ewald & Wasserman
RESEARCH CONSULTANTS, LLC

OBSERVATIONAL STUDY OF CELL PHONE AND TEXTING USE AMONG CALIFORNIA DRIVERS AND COMPARISON TO 2011 THROUGH 2016 DATA

METHODOLOGICAL AND ANALYSIS REPORT

Conducted on Behalf of

The California Office of Traffic Safety

The Safe Transportation Research and Education Center - University of California, Berkeley

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I. SUMMARY

Overall electronic device use and distracted driving due to electronic devices variable

In total, 7.6% of all drivers observed in this study displayed distracted driving due to electronic device use, compared to 5.4% in 2015; the 2.2% increase is significant (Table 16).

The “holding phone to ear” behavior increased significantly by 0.9% in 2016, the use of headsets/Bluetooth devices increased significantly by 0.5%, and manipulating a hand-held device increased significantly by 1.2% (Table 17).

Distracted driving due to electronic devices by gender, location, and age of driver

There is no significant difference between males and females in the rate of distracted driving, but there is a 2.7% significant increase of female driver electronic device use and a 1.8% significant increase of male driver electronic device use compared to 2015 (Table 18).

The difference in device use among the geographic areas types is significant, with the highest observed electronic device use in urban areas with 9.4% of all observations. Compared to the previous year, the increase of electronic device use while driving was markedly higher in urban areas, with a significant 4.7% increase (Table 19).

There is a significant increase in electronic device use by drivers age 25 to 69 of 2.1% (Table 21).

Distracted driving due to electronic devices by time of observation

The 3.8% increase in electronic device during rush hours in 2016 is significant, as is the 1.9% increase of device use during all other traffic hours (Table 23).

Distracted driving due to electronic devices by age

There is a significantly higher rate of 16-24-year-olds manipulating a hand-held device while driving (6.5%) compared to the other age groups. The age group of 16-24-year-olds significantly more often talked on a hand-held compare to drivers in other age ranges (Table 24).

Distracted driving due to electronic devices by region variable

Holding the phone to the ear was most frequently observed in Southern California (3.8%), compared to Central California (1.9%) and in Northern California (1.4%). The 2.0% increase of holding the phone to the ear in Southern California in 2016 is significant as well (Table 30).

Distracted driving due to electronic devices by presence of children and passengers

There is no significant difference between drivers with or without children in the car with respect to being distracted by electronic device use (Table 31).

There is also no significant difference among drivers with additional passengers in the vehicle and distracted driving behavior. The incidence of this behavior increased significantly in 2016 for drivers who are driving alone (an increase of 1.4%) and those with one additional passenger in the vehicle (an increase by 4.0%, Table 33).

Compensation for Difficulty in Observing Hands-Free Cell Phone Use

Use of hands-free devices is difficult to identify in observational studies because the device may not be visible to the observer. Consequently, "Talking with headset/Bluetooth" is likely to be underestimated at the observed level of 1.9% in 2016. The National Highway Traffic Safety Administration (NHTSA) has

developed a methodology to correct for this difficulty. The correction raises the hands-free usage from 3.3% to 4.8%, and the overall cell phone usage rate from 9.2% to 12.8%. (See Appendix C).

II. INTRODUCTION

This methodological and analysis report outlines the procedures and findings for the sixth annual wave of the "Observational Survey of Cell Phone and Texting Use among California Drivers Study," conducted by Ewald & Wasserman Research Consultants (E&W) on behalf of the California Office of Traffic Safety (OTS) and the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley.

This combined report describes E&W's survey research and data collection procedures implemented for the sixth wave of this longitudinal study, which collected data of a statistically representative sample on drivers' distracted driving behaviors, including cell phone and other electronic device use.

The overall study design included the observation of California vehicle drivers at controlled intersections - such as traffic lights and stop signs - using a data collection protocol similar to the National Occupancy Protection Use Study (NOPUS) methodology published by the National Highway Transportation Safety Administration (NHTSA) on electronic device use by drivers in their Traffic Safety Facts publications, DOT HS 811 372 and DOT HS 811 361. The data collection plan also incorporated sections of the methodological outline of the Seat Belt Survey Regulation for Section 157 Surveys: 23CRF Part 1340, published by NHTSA.

III. METHODS

A. Sample Methodology and Sample Site Selection

The counties and sites included for site visits were the same as in the preceding waves of data collection. The original study sample frame was created in a multi-stage proportional random site selection based on the Daily Vehicle Miles Traveled (DVMT) on California roadways, using DVMT by county as the primary sampling units. The DVMT information was derived from the California Department of Transportation's Highway Performance Monitoring System (HPMS) 2013 California Public Road Data. Tables listing the maintained daily vehicle miles traveled by jurisdictions and by county were summarized to create the overall main sample frame for the site selection.

In the first step of sample preparation, all ineligible jurisdictions (areas not open to the public, with limited access, or no roadways) were removed from the sample frame. The updated list of ineligible jurisdictions can be found in Table 1. All remaining jurisdictions were deemed eligible and included city jurisdictions, highways, and unincorporated land and were broken down by county.

Table 1. List of ineligible jurisdictions

- Army Corps of Engineers
- Bureau of Indian Affairs
- Department of Defense
- Department of Energy
- Golden Gate Bridge
- Indian Tribal Nation
- National Park Service
- Port of Oakland
- San Diego Unified Port District
- U.S. MARINE CORPS
- State Department of Water Resources
- State Forestry Service
- State Park Services
- U.S. Army
- University of California
- U.S. Bureau of Reclamation
- U.S. Fish & Wildlife Service
- U.S. Forest Service
- U.S. Navy

After removing ineligible jurisdictions, all counties in the State of California accounting for less than 1.0% each of the total DVMT in the State were excluded. In this process, ten of California's 58 counties were removed, leaving the sample frame with counties and jurisdictions accounting for 99.2% of the total California DVMT. The ten excluded counties, which accounted for 0.8% of all DVMT in the state, were:

- Amador
- Calaveras
- Plumas
- Mono
- Del Norte
- Modoc
- Trinity
- Mariposa
- Sierra
- Alpine

In the following step, a random selection of counties was included in the sample frame; the proportion determining inclusion was calculated based on the DVMT per county. For the eligible 48 counties and jurisdictions, a sample interval was created based on a target of 17 counties, a number defined by the original NOPUS design, which served as the random value for the first stage of site inclusion. All counties with a DVMT larger than the random value were automatically included in the sample frame due to their size and were excluded from the subsequent random selection list. These five counties included: Los Angeles, Riverside, San Bernardino, San Diego, and Orange counties. They accounted for 53.6% of all DVMT in the State of California.

The remaining 12 sites to be selected were pulled in a proportional randomized design which increased the probability of inclusion in the sample frame for counties with a higher DVMT volume. The final list of counties selected is shown in Table 2.

Table 2. Total 17 counties included in sample frame and number of DVMT (1,000s)

#	COUNTY	DVMT (2013)
1	ALAMEDA	40,128
2	BUTTE	4,598
3	EL DORADO	4,301
4	KERN	21,907
5	MERCED	7,240
6	PLACER	9,800
7	SAN JOAQUIN	17441
8	SAN MATEO	18,677
9	SANTA CLARA	41,604
10	SOLANO	12,207
11	SONOMA	10,881
12	TULARE	9,869
13	LOS ANGELES	215,763
14	ORANGE	73,564
15	SAN BERNARDINO	60,258
16	SAN DIEGO	76,308
17	RIVERSIDE	54,886

In a subsequent step of the proportional random selection, the actual sites within each selected county were determined. The secondary sampling unit consisted of either: city or town jurisdictions, unincorporated land, or State Highway jurisdictions. Using a proportional cell selection method, jurisdictions with higher volumes of DVMT had a higher probability to be included in the sample frame. This procedure resulted in 130 sites in the selected 17 counties (Table 3).

Table 3. List of sites per county

COUNTY	JURISDICTION	Total
ALAMEDA	COUNTY (UNINCORP.)	4
	LIVERMORE	1
	OAKLAND	3
	STATE HIGHWAYS	3
ALAMEDA Total		11
BUTTE	STATE HIGHWAYS	1
BUTTE Total		1
EL DORADO	STATE HIGHWAYS	1
EL DORADO Total		1
KERN	BAKERSFIELD	1
	COUNTY (UNINCORP.)	4
	STATE HIGHWAYS	1
KERN Total		6

COUNTY	JURISDICTION	Total
ORANGE	ANAHEIM	1
	BREA	1
	BUENA PARK	1
	COSTA MESA	1
	COUNTY (UNINCORP.)	1
	GARDEN GROVE	1
	HUNTINGTON BEACH	3
	LA HABRA	1
	SANTA ANA	3
	SEAL BEACH	1
	TUSTIN	1
ORANGE Total		15
MERCED	COUNTY (UNINCORP.)	2
	MERCED	1
	STATE HIGHWAYS	4
MERCED Total		7

Table 3. List of sites per county (continued)

COUNTY	JURISDICTION	Total
LOS ANGELES	ALHAMBRA	1
	ARCADIA	1
	BALDWIN PARK	1
	BEVERLY HILLS	1
	COUNTY (UNINCORP.)	1
	GARDENA	1
	GLENDORA	1
	HAWTHORNE	1
	INDUSTRY	1
	LA CANADA-FLINTRIDGE	1
	LANCASTER	1
	LAWNDALE	1
	LONG BEACH	1
	LOS ANGELES	1
	MONROVIA	1
	PASADENA	1
	POMONA	1
	REDONDO BEACH	1
	SANTA CLARITA	1
	SANTA MARINO	1
	SOUTH GATE	2
	STATE HIGHWAYS	1
	TORRANCE	1
LOS ANGELES Total		24
PLACER	COUNTY (UNINCORP.)	1
	ROSEVILLE	2
	STATE HIGHWAYS	3
PLACER Total		6
RIVERSIDE	BLYTHE	1
	CORONA	1
	COUNTY (UNINCORP.)	1
	INDIAN WELLS	1
	MORENO VALLEY	1
	PALM DESERT	2
	RIVERSIDE	1
	STATE HIGHWAYS	2
	TEMECULA	1
RIVERSIDE Total		11
SAN BERNARDINO	CHINO	3
	COUNTY (UNINCORP.)	1
	FONTANA	1
	HESPERIA	1
	ONTARIO	1
	REDLANDS	1
	STATE HIGHWAYS	1
	VICTORVILLE	2
SAN BERNARDINO Total		11
SAN DIEGO	CARLSBAD	1
	CHULA VISTA	1
	COUNTY (UNINCORP.)	3
	EL CAJON	1
	OCEANSIDE	2
	POWAY	1
	SAN DIEGO	2
	STATE HIGHWAYS	1
SAN DIEGO Total		12
SAN JOAQUIN	STATE HIGHWAYS	4
	STOCKTON	1
SAN JOAQUIN Total		5
SAN MATEO	COUNTY (UNINCORP.)	1
	SAN MATEO	1
	STATE HIGHWAYS	2
SAN MATEO Total		4
SANTA CLARA	COUNTY (UNINCORP.)	3
	CUPERTINO	1
	SAN JOSE	2
	STATE HIGHWAYS	2
SANTA CLARA Total		8
SOLANO	COUNTY (UNINCORP.)	1
	FAIRFIELD	1
	VALLEJO	1
SOLANO Total		3
SONOMA	SANTA ROSA	1
	STATE HIGHWAYS	1
SONOMA Total		2
TULARE	COUNTY (UNINCORP.)	2
	TULARE	1
TULARE Total		3
Grand Total		130

Table 4 shows the final list of selected counties and the number of selected sites within each county.

Table 4. Total number of selected sites within the 17 counties

COUNTY	Total	COUNTY	Total	COUNTY	Total
ALAMEDA	11	ORANGE	15	SAN MATEO	4
BUTTE	1	PLACER	6	SANTA CLARA	8
EL DORADO	1	RIVERSIDE	11	SOLANO	3
KERN	6	SAN BERNARDINO	11	SONOMA	2
LOS ANGELES	24	SAN DIEGO	12	TULARE	3
MERCED	7	SAN JOAQUIN	5		
				Total	130

Of the 130 selected observation sites, 27 were highway sites and 25 were unincorporated land sites, all others were surface streets with controlled intersections. For the highway sites, only controlled exit ramps with either a stop sign or a traffic light were included. For the unincorporated sites, the controlled intersection closest to the geographically determined site was selected.

For the sixth wave of the Observational Study, the same site locations as those in the previous waves were selected. Minor differences to the original data collection locations occurred, mainly due to some exit ramps being reconfigured from a stop sign to a yield sign or construction.

Monitoring of the number of observations between the current and last wave identified any outlying differences in traffic volume. These sites were flagged and the location re-visited at another time to confirm long-term changes in traffic volume and to avoid biases as a result of temporary traffic changes.

B. Observation Locations, Times, and Duration

Field observations were conducted between February 26, 2016, and April 1, 2016, within the same time frame as previous waves. A team of five E&W Field Observers based out of the San Francisco Bay Area, Los Angeles, and San Diego visited all 130 sample frame sites. Observation times ranged from 7:00 a.m. to 5:29 p.m. during non-rainy days during daylight hours and included weekdays as well as weekends. All staff were rigorously trained in the methodology and protocols and assigned defined location sites where they would conduct the 45-minute observation. The field observers were monitored and managed by the E&W Research Coordinator throughout the study period.

The Southern California team visited San Bernardino, San Diego, Riverside, Orange, Kern, and Los Angeles counties. The Bay Area team in Northern California was assigned Alameda, Butte, El Dorado, Merced, Placer, San Joaquin, San Mateo, Santa Clara, Solano, Sonoma, and Tulare counties for their data collection routes. For data collection sites that produced no vehicle traffic in the allocated time frame, as well as those that showed a substantial difference to the previous year data, staff re-visited the sites within the time frame defined in the sample frame (weekend/weekday/rush hour and other) to confirm the finding and control for outlying information.

C. Staff Training

Training procedures and pre-testing of observation form

All E&W Field Observer teams were trained in groups beginning with a formal review of the documents and forms, including a detailed review of data collection procedures and observation protocol and a rehearsal of coding categories. This was followed by an on-site visit, a 45-minute round of test observations, and a review of findings. The final version of the observation form can be found in Appendix A; a letter provided to staff to proof legitimacy of the study is shown in Appendix B.

All teams in the Bay Area, Los Angeles, and San Diego areas were trained in the second and third week of February 2016. The training team and Research Coordinator visited several selected sites for observation testing within each locale, practicing all aspects of data collection, including site positioning, identifying the accurate lane to code, and swift and accurate markings in the coding selections on the observation form. All observers were instructed on the coding categories in advance of the data collection, as outlined on the data collection form. During the practical training, the E&W Research Coordinator monitored all staff for accuracy and quality control.

The field observers were provided with materials including observation forms, assigned site location maps and images, a validation letter on UC Berkeley SafeTREC and OTS letterhead for respondents inquiring about the purpose of the observations, safety vests, and guidelines for procedures while in the field. The field observers also received explicit instructions on: a) locating and ensuring the accurate assigned location; b) confirming that the position and orientation of the observation direction was as specified on the detailed map for that location; and c) implementing an exact procedure for time recording, accurate lane selection, and coding accuracy.

D. Study Outcomes

Notes: Data differences between 2015 and 2016 observation waves are only indicated when they constitute large and/or significant differences. Any significant differences between the previous waves since 2011 can be found in their respective reports.

Statistical significance is defined as a two-tailed p value of less than p=0.05, all p values in this report are noted with two decimals. The p values less than 0.00 are noted as p=0.00.

Percentage comparison of values is calculated using the z-ratio and two-tail probabilities between assumed independent proportions.

All 17 counties were included in the sample frame and a total 5,341 observations were made. Vehicle traffic was observed in 127 out of 130 selected sites; three sites did not have any traffic and were re-visited a second time with the same outcome. The number of observations per site ranged from 1 to 173; the average was 41 observations per site, same as the previous year. Table 5 indicates the 17 counties with the numbers of observations per county, along with the number of observations in previous waves.

Table 5. Counties and number of observations per county with comparison to previous waves

COUNTY	# observations 2016	# observations 2015	# observations 2014	# observations 2013	# observations 2012	# observations 2011
Alameda	523	629	478	556	483	567
Butte	31	23	25	28	26	21
El Dorado	94	83	104	80	74	40
Kern	49	116	110	182	134	182
Los Angeles	973	905	1,161	1,272	1,337	1,215
Merced	312	275	245	258	179	291
Orange	605	643	629	782	604	606
Placer	426	428	431	375	343	231
Riverside	175	202	204	203	181	289
San Bernardino	196	235	251	149	404	118
San Diego	511	461	771	824	890	553
San Joaquin	222	162	213	203	101	115
San Mateo	258	352	216	280	235	358
Santa Clara	521	409	488	464	459	418
Solano	140	130	101	101	102	78
Sonoma	50	71	14	41	28	164
Tulare	255	225	252	301	84	167
Total	5,341	5,349	5,693	6,099	5,664	5,413

Time frames of data collection and comparison to previous waves

The observational data was collected between February 26, 2016, and April 1, 2016. Data collection times ranged from 7:00 a.m. to 5:29 p.m., and included weekend days and weekdays, with a higher emphasis on data collection during morning and evening rush hours as described in the NOPUS methodology. About a third of all observations were completed during morning and evening rush hours, defined to be weekdays from 7:00 a.m. to 9:30 a.m. and from 3:30 p.m. to 5:00 p.m.

The percent of observations during the three data collection time frames of rush hour, weekend, and all other times are shown in Table 6, together with the previous waves. Similar to past waves, 36.2% of all observations were collected during rush hour traffic, 21.6% on weekends, and 42.2% at all other times.

Table 6. Time points of data collection with comparison to previous waves

Time frame	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Rush Hour	36.2%	33.8%	33.0%	34.1%	29.7%	30.3%
Weekend	21.6%	20.1%	21.1%	18.7%	22.4%	19.1%
All Other	42.2%	46.2%	45.8%	47.2%	47.9%	50.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Additionally, E&W also collected the exact time frame of the data observation shift for additional segmentation of the 'rush hour' time line as needed. However, for the purpose of this study, analysis adhered to the NOPUS methodology definition.

Data site definitions and comparison to previous waves

Overall, 25.5% of all observations were made at highway exit ramps, which as in previous waves included major California routes and freeways. A total of 72.7% of observations were made at controlled intersections on surface streets (Table 7).

Table 7. Road types of observations with comparison to previous waves

Road type	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
HWY exit ramp	25.5%	23.0%	20.6%	21.2%	26.6%	28.8%
Surface Street	72.7%	77.0%	79.4%	76.7%	72.8%	70.5%
Other	1.8%	0.0%	0.0%	2.1%	0.5%	0.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The area types of observations were coded into three categories: rural, urban, and suburban. The defined area types were confirmed or changed by the interviewer in the field at the time of the observation and the final determination of area types are listed in Table 8. A total of 36.3% of observations were made at suburban sites, 38.1% at urban sites, and 25.6% of observations were made at rural sites (Table 8).

Table 8. Area type of observations with comparison to previous waves

Area type	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Rural	25.6%	27.5%	22.9%	24.4%	21.0%	20.6%
Urban	38.1%	36.5%	43.0%	46.5%	49.6%	45.4%
Suburban	36.3%	36.0%	34.1%	29.1%	29.4%	29.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Demographic characteristics of drivers and comparison to previous waves

The age of vehicle drivers was coded by the data collectors, with a distribution of age ranges comparable to the previous waves. The majority of drivers, 87.3%, were coded as between the ages of 25 and 69, 8.9% were between the ages of 16 and 24, and 3.7% were 70 or older (Table 9).

Table 9. Observed age of drivers with comparison to previous waves

Age of driver	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
16-24	8.9%	7.4%	6.1%	7.6%	7.6%	8.7%
25-69	87.3%	86.4%	88.5%	87.6%	87.2%	88.2%
70 and older	3.7%	6.1%	5.4%	4.8%	5.2%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Similarly, the driver gender as observed by the data collector shows a comparable distribution to the previous waves of data, with 58.2% of male drivers and 41.8% female drivers (Table 10).

Table 10. Observed gender of drivers with comparison to previous waves

Gender of driver	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Female	41.8%	42.4%	42.6%	42.7%	54.0%	41.4%
Male	58.2%	57.6%	57.4%	57.3%	46.0%	58.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The tabulation of gender and age of driver is shown in Table 11.

Table 11. Gender and age crosstabulation

Age by gender	Female	Male	Total
16-24	8.9%	7.4%	100.0%
25-69	87.3%	89.0%	100.0%
70+	3.7%	3.6%	100.0%

Similarly to the other demographic attributes, the ethnicity or race of drivers was determined, to the extent possible, by the observer. The observed frequency of the race/ethnicity distribution is shown below, with the majority of drivers coded as white (49.2%), followed by Hispanic (29.4%) and Asian (14.7%) of drivers (Table 12).

Table 12. Observed ethnicity of with comparison to previous waves

Ethnicity driver	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
White	49.2%	52.4%	57.3%	54.6%	55.9%	57.7%
African-American	5.1%	4.3%	4.0%	4.1%	4.4%	3.3%
Asian	14.7%	12.5%	11.4%	11.1%	10.6%	11.8%
Hispanic/Latino	29.4%	29.1%	25.5%	28.4%	26.1%	25.7%
Other	1.5%	1.8%	1.8%	1.8%	3.1%	1.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The number of passengers counted per vehicle ranged from one (only the driver) to six or more passengers total (the driver plus five and more). Overall, 66.1% of drivers drove alone, while 26.0% had one additional passenger in the car.

Table 13. Observed number of passengers in vehicle with comparison to previous waves

# passengers	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
1	66.1%	73.0%	68.2%	68.6%	71.8%	67.9%
2	26.0%	22.0%	25.5%	24.2%	21.1%	25.8%
3	5.5%	3.5%	4.6%	5.3%	5.0%	4.6%
4	1.9%	1.2%	1.4%	1.4%	1.8%	1.5
5	0.4%	0.3%	0.2%	0.4%	0.2%	0.2%
6 +	0.1%	0.0%	0.1%	0.0%	0.0%	0.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Of all drivers with at least one passenger, 7.7% had a child under the presumed age of eight in the vehicle, comparable to previous years (Table 14).

Table 14. Presence of children under age eight in vehicle with comparison to previous waves

# children < 8 in car	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Yes, kid < 8 in car	7.7%	5.5%	6.3%	7.0%	7.0%	5.3%
No	92.3%	94.5%	93.7%	93.0%	93.0%	94.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The vehicle types observed are shown in Table 15, with 53.2% of all vehicles coded as passenger cars, 30.7% as vans or SUVs, and 16.1 % as pickup trucks, comparable to previous waves.

Table 15. Vehicle type with comparison to previous waves

Vehicle type	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Passenger Car	53.2%	54.7%	53.7%	52.9%	51.3%	51.5%
Van or SUV	30.7%	28.6%	31.2%	29.2%	32.1%	29.8%
Pickup Truck	16.1%	16.6%	15.2%	17.9%	16.6%	18.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

IV. RESULTS

A. Statewide Results on Distracted Driving Due to Electronic Device Use

Note: Due to rounding, some of the table percentages do not add up to a full 100%.

Overall electronic device use and distracted driving due to electronic devices variable

The variable "distracted driving due to electronic devices (DD)" was created based on three behaviors observed by field staff and included:

1. holding a phone to the ear,
2. manipulating a hand-held electronic device while driving, and
3. talking on a hand-held device.

The calculated percentage of driver behavior and electronic device use in all observed locations in California is shown in Table 16. Talking on a phone using a headset or Bluetooth device was NOT included in the variable created for the purpose of this evaluation. Any observed instance of the three behaviors was coded as "distracted driving due to electronic device use" in a separate variable (labelled DD). The data collection on these three driver behaviors included every instance observed and was noted as an exclusive occurrence on the observation form. The DD variable created reflects the number of unique vehicles in which the behavior was observed; the number of unique observations of distracted behavior is higher.

In total, 7.6% of all drivers observed in this study displayed distracted driving due to electronic device use, compared to 5.4% in 2015. The increase of 2.2% is significant (p=0.00). At a 95% confidence level, the true percentage of the increase between both observation years lies between 6.8% and 8.3%.

Table 16. Distracted driving due to electronic devices variable with comparison to previous waves

DD by device	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Yes	7.6%	5.4%	3.8%	4.6%	6.4%	4.2%	+2.2%
No	92.4%	94.6%	96.2%	95.4%	93.6%	95.8%	-2.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--

The percentages of the individual distracted driving behaviors compared with the previous waves are shown in Table 17. This includes the use of a headset or Bluetooth device which is not part of the calculated DD variable.

The "holding phone to ear" behavior increased by 0.9% in 2016 (p=0.00), the use of headsets/Bluetooth devices increased significantly by 0.5% (p=0.03), and manipulating a hand-held increased by 1.2% (significant at p=0.00).

Table 17. Frequencies of device use behaviors with comparison to previous waves

DD behavior * not part of the distracted driving variable	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Phone to Ear	2.6%	1.7%	1.1%	1.6%	2.4%	2.1%	+0.9%
Talking w/headset or Bluetooth*	1.9%	1.4%	0.9%	1.8%	2.0%	1.5%	+0.5%
Manipulating hand-held	4.5%	3.3%	2.2%	2.5%	3.3%	1.7%	+1.2%
Talking on hand-held	0.9%	1.0%	0.7%	0.7%	0.9%	0.6%	-0.1%

Distracted driving due to electronic devices by gender, location, and age of driver

The cross-tabulation of gender and distracted driving due to electronic device use is shown in Table 18. There is no significant difference between males and females in the rate of distracted driving. The increase of 2.7% of female driver electronic device use in 2016 is significant (p=0.00), as is the increase of 1.8% among male drivers (p=0.01).

Table 18. Distracted driving due to electronic devices by gender with comparison to previous waves

DD by Gender	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Female	8.2%	5.5%	4.2%	4.8%	6.3%	4.3%	+2.7%
Male	7.1%	5.3%	3.6%	4.4%	6.6%	4.1%	+1.8%
Total	7.6%	5.4%	3.8%	4.6%	6.4%	4.2%	--

The area types of the observations cross-tabulated by the distracted driving variable are shown in Table 19. The difference in electronic device use among the areas is significant (p=0.00) with the highest observed electronic device use in urban areas (9.4%) and the lowest in rural areas (4.4%). Compared to the previous year, the increase of electronic device use while driving was most markedly higher in urban areas, with a significant 4.7% increase (p=0.00).

Table 19. Distracted driving due to electronic devices by area type with comparison to previous waves

DD by Area type	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Rural	4.4%	3.7%	2.5%	4.0%	5.8%	3.6%	+0.7%
Urban	9.4%	4.7%	4.0%	4.3%	6.9%	4.1%	+4.7%
Suburban	7.8%	7.3%	4.6%	5.6%	6.0%	4.7%	+0.5%

The relationship between the area type and the use of Bluetooth or a headset shows slight increases urban and suburban areas, which are weakly significant (p=0.01, Table 20).

Table 20. Area type by talking on headset or Bluetooth with comparison to previous waves

Bluetooth/ headset by area	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Rural	0.9%	0.9%	0.8%	2.4%	3.1%	0.9%	0.0%
Urban	2.3%	1.6%	0.8%	1.2%	1.4%	1.1%	+0.7%
Suburban	2.2%	1.5%	1.2%	2.3%	2.4%	2.5%	+0.7%

Distracted driving due to electronic device use by age group is shown in Table 21, with a significant (p=0.00) difference between age groups of drivers. Younger drivers displayed the most electronic device use (10.1% of 16-24-year-olds, compared to 7.6% of 25-69-year-old drivers). There is also a significant increase of 2.1% in electric device use by drivers age 25 to 69 (p=0.00).

Table 21. Distracted driving due to electronic devices by age with comparison to previous waves

DD by age	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
16-24	10.1%	7.0%	8.3%	5.6%	11.4%	5.3%	+3.1%
25-69	7.6%	5.5%	3.8%	4.7%	6.2%	4.2%	+2.1%
70 and older	1.5%	1.8%	0.3%	0.3%	3.4%	1.8%	-0.3%%

Distracted driving due to electronic device use by gender for the 16-24-year-old drivers showed no significant difference between males and females. The increase in electric device use of 16-24-year-olds between 2016 and 2015 is not significant (Table 22).

Table 22. Distracted driving due to electronic devices by gender for 16-24 year-olds with comparison to previous waves

DD 16-24 year-old by gender	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Female	9.4%	6.1%	8.5%	7.1%	12.3%	4.3%	+3.3%
Male	10.8%	7.9%	8.2%	3.8%	10.4%	4.4%	+2.9%

Distracted driving due to electronic devices by time of observation

Distracted driving due to electronic device use by time of observation shows significant differences between rush hour, weekend, and all other times of data collections, with rush hour observations showing the highest incidence with 9.1% (p=0.00). The 3.8% increase in electronic device use during rush hour in 2016 is significant p=0.00) and the 1.9% increase of electronic device use during all other traffic hours is significant (p=0.01, Table 23).

Table 23. Distracted driving due to electronic devices by time of observation with comparison to previous waves

DD by time	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
rush hour	9.1%	5.3%	3.5%	4.7%	7.0%	3.5%	+3.8%
weekend	4.4%	4.1%	3.3%	4.5%	6.0%	3.1%	+0.3%
all other	7.9%	6.0%	4.4%	4.6%	6.3%	5.0%	+1.9%

Distracted driving due to electronic devices by geography and age

The breakdown of driver age by individual distracted driving behavior due to electronic device use is shown in Table 24, along with the comparison to previous waves. In some instances, the total percentages of the individually observed behaviors add up to a higher percentage compared to Table 21 due to double-counting observed drivers who displayed more than one distracted behavior.

Table 24. Age by distracted driving behavior with comparison to previous waves

Age	Phone to ear 2016	Phone to ear 2015	Phone to ear 2014	Phone to ear 2013	Phone to ear 2012	Phone to ear 2011
16-24	2.5% (12)	3.5% (14)	0.3% (1)	1.1% (5)	4.7%	3.2%
25-69	2.7% (125)	1.5% (71)	1.3% (63)	1.7% (91)	2.2%	2.0%
70 and older	0.5% (1)	1.2% (4)	0.0% (0)	0.0% (0)	1.4%	0.6%
Total	2.6% (138)	1.7% (89)	1.1% (64)	1.6% (96)	2.4%	2.1%
Age	**Headset/ Bluetooth 2016**	**Headset/ Bluetooth 2015**	**Headset/ Bluetooth 2014**	**Headset/ Bluetooth 2013**	**Headset/ Bluetooth 2012**	**Headset/ Bluetooth 2011**
16-24	1.7% (8)	1.8% (7)	0.9% (3)	0.6% (3)	2.3%	2.3%
25-69	2.0% (92)	1.4% (63)	1.0% (50)	1.9% (104)	2.1%	1.5%
70 and older	1.0% (2)	1.2% (4)	0.0% (0)	0.7% (2)	1.0%	0.6%
Total	1.9% (102)	1.4% (74)	0.9% (53)	1.8% (109)	2.0%	1.5%
Age	**Manipulating hand-held 2016**	**Manipulating hand-held 2015**	**Manipulating hand-held 2014**	**Manipulating hand-held 2013**	**Manipulating hand-held 2012**	**Manipulating hand-held 2011**
16-24	6.5% (31)	3.5% (14)	7.2% (25)	4.1% (19)	6.3%	1.9%
25-69	4.4% (207)	3.5% (161)	2.0% (100)	2.5% (134)	3.1%	1.7%
70 and older	1.0% (2)	0.6% (2)	0.3% (1)	0.3% (1)	1.0%	1.2%
Total	4.5% (240)	3.3% (177)	2.2% (126)	2.5% (154)	3.3%	1.7%
Age	**Talking on hand-held 2016**	**Talking on hand-held 2015**	**Talking on hand-held 2014**	**Talking on hand-held 2013**	**Talking on hand-held 2012**	**Talking on hand-held 2011**
16-24	2.1% (10)	0.5% (2)	0.9% (3)	0.6% (3)	0.5%	0.2%
25-69	0.8% (38)	1.1% (50)	0.8% (38)	0.7% (37)	0.9%	0.7%
70 and older	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1.0%	0.6%
Total	0.9% (48)	1.0% (52)	0.7% (41)	0.7% (40)	0.9%	0.6%

Table 25 shows the observed distracted driving behaviors by select counties. While there are significant differences among counties, the number of observations is very small. The behavior of holding a phone to the ear while driving was significantly different amongst all the counties (p=0.00), ranging from 5.5% of all observations in Orange county, to 0.0% in Butte county (not shown).

The manipulation of a hand-held device while driving was also significantly different among all counties and ranged from 12.6% in Butte County (not shown) and 10.0% of all observations in Sonoma County, to 0.0% in San Bernardino county (p=0.00).

The use of a headset or Bluetooth device was highest in San Mateo County, with 5.4%, while no headset or Bluetooth usage was observed in several other counties. Those differences are significant at p=0.00 (with the actual number of observations being very small).

Talking on a hand-held device did not show significant differences among the selected counties.

Table 25. Selected counties by distracted driving behavior – with comparison to previous waves

County	Phone to ear 2016	Phone to ear 2015	Phone to ear 2014	Phone to ear 2013	Phone to ear 2012	Phone to ear 2011
Alameda	0.4%	1.4%	0.4%	2.9%	1.0%	1.1%
Los Angeles	3.8%	2.0%	1.1%	1.5%	2.5%	2.1%
Orange	5.5%	0.8%	0.5%	0.5%	1.0%	1.3%
Placer	1.9%	1.9%	2.6%	4.5%	3.2%	2.2%
Riverside	3.4%	6.4%	1.5%	2.0%	2.8%	4.5%
San Bernardino	4.1%	1.3%	1.6%	0.0%	4.0%	2.5%
San Diego	2.2%	1.3%	0.9%	0.5%	2.2%	1.1%
San Mateo	1.2%	0.6%	0.0%	1.1%	3.8%	2.0%
Santa Clara	1.2%	1.2%	0.6%	1.3%	1.1%	0.5%
Sonoma	4.0%	2.8%	0.0%	2.4%	0.0%	0.6%
County	**Headset/ Bluetooth 2016**	**Headset/ Bluetooth 2015**	**Headset/ Bluetooth 2014**	**Headset/ Bluetooth 2013**	**Headset/ Bluetooth 2012**	**Headset/ Bluetooth 2011**
Alameda	3.4%	1.3%	1.9%	2.0%	2.7%	1.2%
Los Angeles	1.5%	1.2%	0.4%	1.2%	1.0%	0.7%
Orange	2.1%	3.1%	1.6%	1.5%	2.0%	1.8%
Placer	2.8%	1.2%	2.1%	2.7%	1.7%	1.7%
Riverside	2.3%	0.5%	1.0%	3.0%	0.6%	2.8%
San Bernardino	0.0%	0.4%	0.0%	0.0%	0.5%	3.4%
San Diego	1.4%	0.4%	0.4%	0.7%	1.5%	0.2%
San Mateo	5.4%	3.1%	1.9%	1.1%	3.8%	6.4%
Santa Clara	0.6%	1.7%	0.4%	4.7%	1.7%	1.0%
Sonoma	4.0%	1.4%	0.0%	0.0%	3.6%	0.6%
County	**Manip. hand-held 2016**	**Manip. hand-held 2015**	**Manip. hand-held 2013**	**Manip. hand-held 2013**	**Manip. hand-held 2012**	**Manip. hand-held 2011**
Alameda	6.5%	5.7%	2.1%	3.1%	3.9%	2.5%
Los Angeles	3.9%	2.3%	2.8%	2.5%	3.4%	2.2%
Orange	4.6%	3.1%	2.5%	3.2%	2.6%	0.3%
Placer	9.4%	4.4%	4.6%	3.2%	2.9%	0.4%
Riverside	2.9%	2.5%	3.9%	1.0%	0.0%	3.5%
San Bernardino	0.0%	0.4%	0.4%	4.0%	3.5%	5.9%
San Diego	1.0%	1.3%	1.4%	2.8%	4.8%	1.4%
San Mateo	9.7%	4.5%	0.9%	2.5%	3.8%	2.8%
Santa Clara	3.5%	3.7%	2.0%	2.4%	2.4%	0.0%
Sonoma	10.0%	9.9%	7.1%	12.2%	3.6%	1.8%
County	**Talking hand-held 2016**	**Talking hand-held 2015**	**Talking hand-held 2014**	**alking on hand-held 2013**	**Talking on hand-held 2012**	**Talking on hand-held 2011**
Alameda	0.2%	1.6%	0.4%	1.1%	0.0%	0.5%
Los Angeles	0.7%	0.3%	0.4%	0.7%	0.7%	0.7%
Orange	1.3%	0.6%	0.6%	0.3%	1.3%	1.5%
Placer	0.7%	2.3%	2.1%	1.1%	0.9%	0.4%
Riverside	0.6%	1.5%	1.5%	1.0%	0.0%	0.7%
San Bernardino	1.5%	1.3%	0.4%	0.0%	0.0%	0.8%
San Diego	1.0%	0.9%	0.6%	0.7%	0.8%	0.5%
San Mateo	1.2%	1.1%	0.9%	0.0%	0.4%	0.0%
Santa Clara	0.2%	0.5%	0.8%	0.9%	0.9%	0.2%
Sonoma	2.0%	5.6%	0.0%	4.9%	0.0%	0.6%

B. Countywide and Regional Results on Distracted Driving

Overall electronic device use and distracted driving due to electronic devices variable by county

The rate of distracted driving due to electronic device use by county is shown in Table 26. Of all distracted driving due to electronic device use, the highest percentage, 14.0%, was observed in Sonoma County, the lowest rate was observed in San Joaquin, with 2.7%. The percentage of the distracted driving behavior among counties is significantly different (p=0.00). However, the number of total observations in some counties is very small.

Table 26. Distracted driving due to electronic devices by county with comparison to previous waves

DD by county	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Sonoma	14.0%	12.7%	7.1%	14.0%	3.6%	1.8%
Butte	12.9%	4.3%	8.0%	3.6%	15.4%	0.0%
San Mateo	11.6%	5.4%	1.4%	3.6%	8.1%	4.7%
Placer	11.3%	6.5%	7.9%	8.3%	6.1%	3.0%
Orange	11.2%	4.5%	3.7%	4.0%	5.0%	3.0%
Tulare	9.8%	6.2%	3.6%	5.3%	7.1%	4.8%
Los Angeles	8.3%	4.6%	4.2%	4.7%	6.6%	5.0%
Alameda	7.1%	7.5%	2.9%	6.3%	5.0%	3.2%
Solano	6.4%	6.9%	3.0%	4.0%	10.8%	7.7%
Riverside	6.3%	9.4%	6.9%	3.9%	2.8%	8.3%
Kern	6.1%	6.0%	2.7%	5.5%	3.0%	6.0%
San Bernardino	5.6%	3.0%	2.4%	4.0%	7.4%	9.3%
Merced	4.8%	2.9%	2.9%	1.9%	8.4%	5.8%
Santa Clara	4.8%	5.4%	3.5%	4.1%	4.4%	0.7%
San Diego	4.1%	3.5%	3.0%	4.0%	7.9%	3.1%
El Dorado	3.2%	3.6%	1.0%	2.5%	6.8%	2.5%
San Joaquin	2.7%	4.9%	4.7%	1.5%	10.9%	4.3%

Distracted driving due to electronic devices by region variable

Similar to the previous waves of the study, three regions were delineated by county into “Northern California,” “Central California,” and “Southern California”, as shown in Table 27.

Table 27. Counties by region

Northern California	Central California	Southern California
Butte	Tulare	Los Angeles
Alameda	Kern	Riverside
Santa Clara	Merced	San Bernardino
El Dorado		Orange
San Joaquin		San Diego
San Mateo		
Santa Clara		
Solano		
Sonoma		

Out of all observations, 42.7% were completed in the Northern California region, 5.8% in Central California, and 47.0% in Southern California; the observation ratio is comparable to previous waves (see Table 28) without significant differences.

Table 28. Number of observations by region with comparison to previous waves

Region	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
North	42.7%	42.8%	36.4%	34.9%	32.7%	36.8%
Central	5.8%	11.5%	10.7%	12.1%	7.0%	11.8%
South	47.0%	45.7%	53.0%	53.0%	60.3%	51.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The region variable by the observation of holding the phone to the ear comparison is shown in Table 29 and it's occurrence is significantly higher in Southern California (3.8%, p=0.00, compared to 1.9% in Central California, and 1.4% in Northern California). The increase of 2.0% of holding the phone to the ear in Southern California in 2016 is significant at p=0.00.

Table 29. Holding phone to ear by region with comparison to previous waves

Talking on hand-held by region	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
North	1.4%	1.5%	1.1%	2.3%	2.5%	1.5%	-0.1%%
Central	1.9%	1.6%	1.8%	2.2%	2.0%	4.1%	+0.3%%
South	3.8%	1.8%	1.0%	1.0%	2.3%	2.0%	+2.0%%

The region variable and the observation of drivers talking on a headset or Bluetooth device show no significant differences. The number of observations overall is too small to calculate significant differences between the current and last year of observations.

Table 30. Talking on headset/Bluetooth by region with comparison to previous waves

Talking on headset by region	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
North	2.3%	1.7%	1.4%	2.9%	2.3%	2.0%	+0.6%
Central	1.9%	0.2%	0.7%	1.2%	7.8%	1.9%	+1.7%
South	1.6%	1.4%	0.7%	1.2%	1.2%	1.2%	+0.2%

Distracted driving due to electronic devices by presence of children and passenger and vehicle characteristics

The percentage of distracted driving by presence of children under eight years of age in the car, together with the previous waves of data is shown in Table 31. Of all drivers with a child under eight years of age in the car, 9.0% were observed using an electronic device, compared to 7.1% of all drivers who did not have a child in the car. There is no significant difference between drivers with or without children in the car with respect to being distracted by electronic device use.

The overall increase of the distracted driving by electronic device use in 2016 is significant for drivers with and without children under eight years of age in the car (p=0.00).

Table 31. Distracted driving due to electronic devices and the presence of children under age eight in car with comparison to previous waves

DD by kids under 8 in car	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Yes, kid <8 in car	9.0%	2.4%	2.8%	2.8%	6.9%	1.7%	+6.6%
No	7.1%	3.3%	2.5%	2.4%	6.4%	4.3%	+3.8%

There is no significant difference of the distracted driving variable by vehicle type (Table 32).

Table 32. Distracted driving due to electronic devices by vehicle type with comparison to previous waves

DD by vehicle type	2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent
Passenger Car	6.9%	5.4%	4.0%	4.3%	6.5%	3.8%
Van or SUV	8.7%	4.8%	3.5%	5.0%	6.3%	4.6%
Pickup Truck	7.7%	6.3%	3.9%	4.9%	6.4%	4.5%

There is also no significant difference among drivers with additional passengers in the vehicle and the distracted driving behavior. The incidence of this behavior increased significantly (p=0.00) in 2016 for drivers who were driving alone (an increase of 1.4%) and those with one additional passenger in the vehicle (driver + one passenger, an increase by 4.0%). The number of observations of distracted driving by electronic device use and three or more passengers in the car are too small to calculate any significances.

Table 33. Distracted driving due to electronic devices by number of passengers in car with comparison to previous waves

DD by # of passengers		2016 Percent	2015 Percent	2014 Percent	2013 Percent	2012 Percent	2011 Percent	Difference 2016-2015
Passengers	1	7.6%	6.2%	4.4%	5.6%	6.7%	5.1%	+1.4%
	2	7.4%	3.4%	2.9%	2.4%	5.8%	2.1%	+4.0%
	3	7.2%	2.2%	1.1%	2.8%	6.7%	3.2%	+5.0%
	4	11.8%	1.5%	2.4%	2.4%	2.9%	1.3%	+10.3%
	5	5.3%	0.0%	0.0%	0.0%	7.7%	0.0%	+5.3%
	6+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--

Distracted driving due to electronic devices combined with observation categories

Tables 34, 35, 36, and 37 show the combined observation categories by the distracted driving due to electronic device use variable.

Table 34. Combined table of distracted driving by electronic devices by time, road, and area type

	Yes		No		Total	
Time	**#**	**%**	**#**	**%**	**#**	**%**
Rush Hour	175	9.1%	1,756	90.9%	1,931	100.0%
Weekend	51	4.4%	1,105	95.6%	1,156	100.0%
All Other	178	7.9%	2,076	92.1%	2,254	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Road Type	**#**	**%**	**#**	**%**	**#**	**%**
HWY exit ramp	73	5.4%	1,290	94.6%	1,363	100.0%
Surface Street	331	8.3%	3,647	91.7%	3,978	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Area Type	**#**	**%**	**#**	**%**	**#**	**%**
Rural	60	4.4%	1,309	1,369	95.6%	100.0%
Urban	192	9.4%	1,841	2,033	90.6%	100.0%
Suburban	152	7.8%	1,787	1,939	92.2%	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**

Table 35. Combined table of cell phone use and driving by electronic devices by demographic variables

	Yes		No		Total	
Age	**#**	**%**	**#**	**%**	**#**	**%**
16-24	48	10.1%	428	89.9%	476	100.0%
25-69	353	7.6%	4,312	92.4%	4,665	100.0%
70+	3	1.5%	197	98.5	200	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Gender	**#**	**%**	**#**	**%**	**#**	**%**
Female	220	7.1%	2,888	92.9%	3,108	100.0%
Male	184	8.2%	2,049	91.8%	2,233	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Ethnicity	**#**	**%**	**#**	**%**	**#**	**%**
White	157	6.0%	2,471	94.0%	2,628	100.0%
African American	24	8.7%	251	91.3%	275	100.0%
Asian	59	7.5%	727	92.5%	786	100.0%
Hispanic/Latino	159	10.1%	1,412	89.9%	1,571	100.0%
Other	5	6.2%	76	93.8%	81	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**

Table 36. Combined table of cell phone use and driving by electronic devices by vehicle type and occupancy

	Yes		No		Total	
No. of Passengers	**#**	**%**	**#**	**%**	**#**	**%**
1	267	7.6%	3,265	92.4%	3,532	100.0%
2	103	7.4%	1,286	92.6%	1,389	100.0%
3	21	7.2%	272	92.8%	293	100.0%
4	12	11.8%	90	88.2%	102	100.0%
5	1	5.3%	18	94.7%	19	100.0%
6+	0	0.0%	6	100.0%	6	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Presence of Children < 8	**#**	**%**	**#**	**%**	**#**	**%**
Yes	37	9.0%	372	91.0%	409	100.0%
No	367	7.4%	4,565	92.6%	4,931	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Vehicle Type	**#**	**%**	**#**	**%**	**#**	**%**
Passenger Car	195	6.9%	2,648	93.1%	2,843	100.0%
Van or SUV	143	8.7%	1,496	91.3%	1,639	100.0%
Pickup Truck	66	7.7%	793	92,4%	859	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**

Table 37. Combined table of cell phone use and driving by electronic devices by geographic

	Yes		No		Total	
County	**#**	**%**	**#**	**%**	**#**	**%**
Alameda	37	7.1%	486	92.9%	523	100.0%
Butte	4	12.9%	27	87.1%	31	100.0%
El Dorado	3	3.2%	91	96.8%	94	100.0%
Kern	3	6.1%	46	93.9%	49	100.0%
Los Angeles	81	8.3%	892	91.7%	973	100.0%
Merced	15	4.8%	297	95.2%	312	100.0%
Orange	68	11.2%	537	88.8%	605	100.0%
Placer	48	11.3%	378	88.7%	426	100.0%
Riverside	11	6.3%	164	93.7%	175	100.0%
San Bernardino	11	5.6%	185	94.4%	196	100.0%
San Diego	21	4.1%	490	95.9%	511	100.0%
San Joaquin	6	2.7%	216	97.3%	222	100.0%
San Mateo	30	11.6%	228	88.4%	258	100.0%
Santa Clara	25	4.8%	496	95.2%	521	100.0%
Solano	9	6.4%	131	93.6%	140	100.0%
Sonoma	7	14.0%	43	86.0%	50	100.0%
Tulare	25	9.8%	230	90.2%	255	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**
Region	**#**	**%**	**#**	**%**	**#**	**%**
North	194	7.7%	2,326	92.3%	2,520	100.0%
Central	15	4.8%	297	95.2%	312	100.0%
South	195	7.8%	2,314	92.2%	2,509	100.0%
Total	**404**	**7.6%**	**4,937**	**92.4%**	**5,341**	**100.0%**

Notes on Limitations

As outlined in the Driver Electronic Device Use Protocol published by NHTSA (DOT HS 811 361), the methodology has two noteworthy limitations. First, the observation protocol only observes drivers during daylight hours. Second, it only observes them at controlled intersections, and not while moving. It is therefore plausible that the actual observed numbers on distracted driving might be either higher or lower than observed.

Appendix A– Observation Form

ID of Location: _____ Time Type: _____ Alternate 1: _____ Road: 1=HWY Exit Ramp 2=Surface Street 3=Other

Data Collected by: _____ Weather condition: _____ Start Time: _____ End Time: _____

Data Collected on: _____ Area Type: 1=Rural 2=Urban 3=Suburb Notes: _____

	DRIVER/VEHICLE CHARACTERISTICS						DRIVER BEHAVIOR			
Event #	Age A=16-24 B=25-69 C=70 and older	Gender M=Male F=Female	Ethnicity W=White AA=African American A=Asian H=Hispanic O=Other	Vehicle type 1=Passenger car 2=Van or SUV 3=Pickup truck	Passengers Number in car (If 1 - SKP next question)	Kids under age 8 Y=Yes N=No	Holding Phone to Ear with Hand √	Talking on Headset OR Bluetooth √	Manipulating Hand-Held Device √	Talking on Handheld Device √
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Appendix B – Letter

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SAFE TRANSPORTATION
RESEARCH AND EDUCATION CENTER
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BERKELEY, CA 94720-7374
Phone: (510) 642-0566 Fax: (510) 643-9922

February 2016

To Whom It May Concern:

The purpose of this letter is to tell you about a public safety survey being conducted by the University of California, Berkeley Safe Transportation Research and Education Center (SafeTREC) and the California Office of Traffic Safety (OTS). The purpose of the study is to observe cell phone use while driving throughout the State of California. The results of the study will provide the State with ideas for making the roads of California safer.

We are working with Ewald and Wasserman Research Consultants, a survey research firm. The trained interviewers, who are conducting the observations, will stand at intersections with either stop signs or traffic signals for approximately 45 minutes, and will not interact with drivers. Additionally, they will not interfere with any businesses, residents, etc. in the area.

If you have any questions about the research study, please call Jill Cooper at (510) 643-4259.

Thank you in advance for your understanding.

Sincerely,

DAVID R. RAGLAND, PH.D.
Professor, UC Berkeley School of Public Health

RHONDA L. CRAFT
Director, California Office of Traffic Safety

Appendix C

Distracted Driving in California: Overview of Results from the 2016 Observational Study of Cell Phone Use

The distracted driving variable was created from the observation of three behaviors:

1. Holding a phone to the ear
2. Talking on a hand held device (i.e., talking while holding the phone away from ear)
3. Manipulating a hand held electronic device while driving

The fourth variable observed is NOT included in the distracted driving behavior variable:

4. Talking on a phone using a headset or Bluetooth device

In Table C1 below, are the summarized frequencies and percentages of distracted behaviors in 2013 through 2016.

Table C1. Frequency of device user behaviors in 2014 through 2016

	2016		2015		2014	
DD behavior	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
1. Phone to Ear	138	2.6%	89	1.7%	64	1.1%
2. Talking on hand-held	48	0.9%	52	1.0%	41	0.7%
3. Manipulating hand-held	240	4.5%	177	3.3%	126	2.2%
Total distracted driving by electronic device	**426**	**8.0%**	**318**	**5.9%**	**231**	**4.1%**
4. Talking with headset/Bluetooth	102	1.9%	74	1.4%	53	0.9%

Talking with headset/Bluetooth may be underestimated since it is difficult to observe. This can be corrected by using the California Traffic Safety Survey, which can be used to estimate the ratio between drivers who talk with a hands-free device and drivers who talk with a hand-held device. Table C2 shows the data from the 2014 through 2016 California Traffic Safety Survey.

Table C2. Reported cellphone use from California Traffic Safety Survey

Survey questions	2016	2015	2014
How often in the past 30 days have you talked on a hands-free cell phone?[1]	64.7%	59.8%	61.0%
How often in the past 30 days have you talked on a hand-held cell phone while driving?	46.9%	48.5%	44.6%
Ratio	1.239	1.239	1.261

[1] Percentages are for drivers who reported any frequency of use (regularly/sometimes/rarely).

By applying the ratio of the total of talking on hand-held devices ("Holding phone to ear" and "Talking on hand -held") we can estimate the percent of drivers who talk using a headset/Bluetooth device.

Table C3. Estimation of driver headset use

DD behavior	2016		2015		2014	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total talking hand-held (1+2)	186	3.5%	141	2.6%	105	1.8%
Ratio (multiplier)[2]		*1.381*		*1.202*		*1.370*
4. Talking with headset/Bluetooth		4.8%		3.3%		2.5%

[2]From the California Traffic Safety Survey

Therefore, the estimated overall cellphone use while driving in California is shown in Table C4.

Table C4. Cellphone use rates

DD behavior	2016	2015	2014
1. Phone to Ear	2.6%	1.7%	1.1%
2. Talking on hand-held	0.9%	1.0%	0.7%
3. Manipulating hand-held	4.5%	3.3%	2.2%
4. *Talking with headset/Bluetooth*[3]	4.8%	3.3%	2.5%
Total cellphone use	12.8%	9.2%	6.6%

[3] Estimated according to the California Traffic Safety Survey