

OVERSAMPLING YOUNG ADULTS ON CELL PHONES

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Background

Young adults are often a key research group in public health and public safety surveys. Many research organizations, such as the National Highway Traffic Safety Administration, conduct surveys with oversamples of this age cohort to ensure sufficient data to analyze driving behaviors and attitudes. In a recent national survey, nearly 40% of the cell phone interviews were with respondents under age 35; the same survey yielded young adults less than 10% of the time on landlines. It is clear that cell phones are an efficient method for increasing the sample size for young adults. We conducted a cost-benefit analysis to determine the best sampling design when young adults are a subpopulation of interest. Optimal allocations that account for landline and cell cost differentials are not optimal for reaching this population because the costs will favor the landline sample, resulting in an underrepresentation of young adults. We compare costs and benefits for three dual-frame designs:

- 1) based on the overall optimal allocation;
- 2) based on a screening oversample of young adults; and
- 3) one with a higher allocation to cell phones.

All designs are based on a fixed cost and compared on the overall sample size, the sample size of young adults, and the resulting design effects.

Survey Objectives

Collect national survey data before and after the Summer and Winter National Alcohol-Impaired Driving Crackdown enforcement and advertising campaigns to identify any corresponding changes in:

- Awareness of enforcement activity
- Exposure to enforcement messages
- Perceived risk of an alcohol-impaired driver being stopped by law enforcement

Since younger drivers are known to be at higher risk of drinking and driving, but typically exhibit higher rates of nonresponse to surveys, NHTSA wishes to increase their representation in the survey sample.

Survey Methodology

Random Digit Dial (RDD) telephone survey utilizing a complex three-frame design:

- Landline sample: 750 interviews per wave, all eligible adults
- Cell phone sample: 450 interviews per wave, all eligible adults
- Young driver oversample: 250 interviews per wave, all on cell phone, ages 18–34 only

National probability sample split proportionally to population across the four census regions. Two waves, Summer Crackdown and Winter Crackdown Campaigns, with each campaign having a pre-survey and a post-survey wave, for a total of approximately 2900 interviews per campaign, 5800 per year.

Participation criteria:

- Age 18 and older
- Drives a motor vehicle at least a few times a year
- Has had at least one alcoholic drink in the past 12 months
- If more than one eligible person is in the household, then interview the youngest eligible male driver
- If no eligible male drivers are in the household, then interview the youngest eligible female driver

For Further Information

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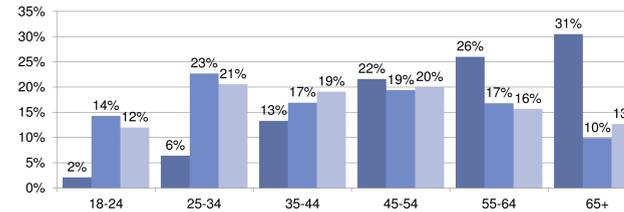
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Landline and Cell Phone Distributions

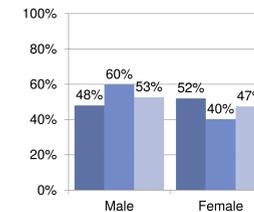
- The cell phone sample produced respondents who are younger on average than the landline sample (cell mean age of 43 vs. landline mean age of 56).
- The age distribution for the cell sample is very similar to that of the population.
- 60% of the cell respondents were male, higher than the population of drinkers (53%).
- The cell phone sample was far more successful in reaching Hispanics.
- Both the landline and the cell phone sample overrepresented college graduates.

- Landline
- Cell
- General Population (drinkers)

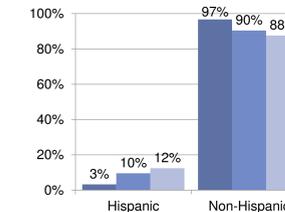
Age Group



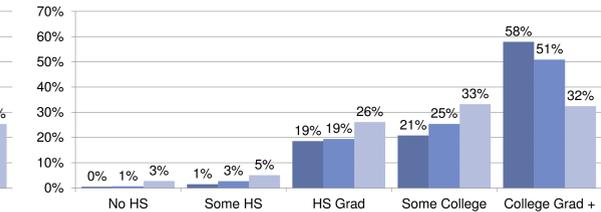
Gender



Hispanic Ethnicity



Education



Sample Design Distributions

	37.5% Cell	37.5% Cell w/OS	58.5% Cell
Sample Size	7786	5892	7310
Gender			
Male	52%	53%	54%
Female	48%	47%	46%
Educational Attainment			
Less than High School	2.9%	3.0%	3.2%
High School Grad	17.7%	18.4%	17.8%
Some college	23.2%	23.9%	23.9%
College Grad	56.3%	54.7%	55.0%
Race/Ethnicity			
Hispanic	6.2%	7.5%	7.5%
Non-Hispanic White	83.1%	80.6%	80.9%
Non-Hispanic Black	5.2%	5.7%	5.4%
Non-Hispanic Other	5.5%	6.3%	6.2%

- All three designs produce very similar distributions by gender and educational attainment.
- The designs with higher cell phone allocations result in about 3% more minority respondents.

Different Designs – Same Cost

The cost to conduct a cell phone interview relative to a landline interview was \$1.34:\$1.00. Based on this information, we estimated the achievable sample size for three designs constrained to the same cost:

- 1) 37.5% cell, 62.5% landline n=7786
- 2) 37.5% cell, 62.5% landline with oversample of 18-34 n=5892
- 3) 58.5% cell, 41.5% landline n=7310

- Compared to the 37.5 cell w/OS design, the 37.5 cell and 58.5 cell designs have much larger sample sizes.
- The 37.5 cell w/OS design produces the highest number of 18-34, but the 58.5% cell design results in nearly as many - 1932 vs. 1846. Screening allowed for 86 additional 18-34 year old completes, but 1,418 less completes overall.

Using these sample sizes and the demographic distributions from the cell and landline sample, we estimated the sample size by subgroups. The oversampling design is based on actual results. The other two designs are based on expected values.

Sample Size and Design Effects

	Sample size			Design effects			Effective sample size		
	37.5% cell	37.5% cell w/OS	58.5% cell	37.5% cell	37.5% cell w/OS	58.5% cell	37.5% cell	37.5% cell w/OS	58.5% cell
18-24	520	688	677	1.20	1.23	1.20	435	558	566
25-34	976	1244	1169	1.34	1.26	1.34	730	986	874
35-44	1139	722	1125	1.32	1.31	1.32	865	549	855
45-54	1620	1026	1487	1.32	1.32	1.32	1225	777	1124
55-64	1759	1108	1508	1.23	1.22	1.23	1433	907	1228
65+	1773	1104	1345	1.27	1.27	1.27	1398	871	1060
Total	7786	5892	7310	1.54	1.40	1.39	5067	4214	5268

- While the 37.5% cell w/OS design increases the 18-34 year olds compared to the other two designs, it is considerable lower in the other age categories, particularly the 35-44.
- The 37.5% cell design suffers from a large design effect overall. This is due to an age distribution that is skewed toward older respondents (see figure). The increased design effect results in an effective sample size that is lower than the 58.5% cell design.

Conclusions

- Increasing the cell phone sample size achieves a slightly smaller sample size of 18-34 year olds, but there are benefits to the overall sample size when increasing the cell phone sample size and not conducting an oversample
- Oversampling young adults on cell phones will yield a larger sample size of 18-34 year olds. However, in our survey, this design underrepresented ages 35-44. This is the result of under-sampling cell in the base survey and screening out ages 35+ in the oversample. Designs that oversample young adults should be careful about representing ages 35-44.
- DON'T SHORT CELL! – Most sample designs under-sample cell phone due to the higher cost. However, the benefits of reaching young adults via cell outweigh the cost savings. In our comparison, the overall sample size was larger if we under-sampled cell, but the effective sample size was smaller. Under-sampling cell skews the age distribution toward older respondents and results in larger weighting adjustments.