Methodology

2017 National Sports Survey

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for the Washington Post and the University of Massachusetts Lowell

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SUMMARY

The 2017 National Sports Survey obtained telephone interviews with a nationally representative sample of 1,000 adults, age 18 or older, living in the continental United States. Telephone interviews were conducted by landline (344) and cell phone (656, including 398 without a landline phone). The survey was conducted by Princeton Survey Research Associates International (PSRAI). Interviews were done in English and Spanish by Issues & Answers Network, Inc. from August 14 to 21, 2017. Statistical results are weighted to correct known demographic discrepancies. The margin of sampling error for the complete set of weighted data is ± 3.7 percentage points.

Details on the design, execution and analysis of the survey are discussed below.

DESIGN AND DATA COLLECTION PROCEDURES

Sample Design

A combination of landline and cellular random digit dial (RDD) samples was used to represent all adults in the continental United States who have access to either a landline or cellular telephone. Both samples were provided by Survey Sampling International, LLC (SSI) according to PSRAI specifications.

Numbers for the landline sample were drawn with equal probabilities from active blocks (area code + exchange + two-digit block number) that contained one or more residential directory listings. The cellular sample was not list-assisted, but was drawn through a systematic sampling from dedicated wireless 100-blocks and shared service 100-blocks with no directory-listed landline numbers.

Contact Procedures

Interviews were conducted from August 14 to 21, 2017. As many as five attempts were made to contact every sampled telephone number. Sample was released for interviewing in replicates, which are representative subsamples of the larger sample. Using replicates to control the release of sample ensures that complete call procedures are followed for the entire sample. Calls were staggered over times of day and days of the week to maximize the chance of making contact with potential respondents. Each phone number received at least one daytime call when necessary.

For the landline sample, interviewers asked to speak with the youngest adult male or female currently at home based on a random rotation. If no male/female was available, interviewers asked to speak with the youngest adult of the other gender. This systematic respondent selection technique has been shown to produce samples that closely mirror the population in terms of age and gender when combined with cell interviewing. Prior to dialing, the landline sample was scrubbed of non-working numbers. Additionally, the landline sample was also scrubbed of numbers that have been ported to wireless service by comparing the sample file to the most recently available Intermodal Ported Telephone Number Identification Service database.

For the cellular sample, interviews were conducted with the person who answered the phone. Interviewers verified that the person was an adult and in a safe place before administering the survey.

WEIGHTING AND ANALYSIS

Weighting is generally used in survey analysis to compensate for sample designs and patterns of non-response that might bias results. The sample was weighted to match national adult general population parameters. A two-stage weighting procedure was used to weight this dual-frame sample.

The first stage of weighting corrected for different probabilities of selection associated with the number of adults in each household and each respondent's telephone usage patterns.[1] This weighting also adjusts for the overlapping landline and cell sample frames and the relative sizes of each frame and each sample.

[1] i.e., whether respondents have only a landline telephone, only a cell phone, or both kinds of telephone.

This first-stage weight for the i^{th} case can be expressed as:

$$WT_i = \left[\left(\frac{S_{LL}}{F_{LL}} \times \frac{1}{AD_i} \times LL_i\right) + \left(\frac{S_{CP}}{F_{CP}} \times CP_i\right) - \left(\frac{S_{LL}}{F_{LL}} \times \frac{1}{AD_i} \times LL_i \times \frac{S_{CP}}{F_{CP}} \times CP_i\right)\right]^{-1}$$

Where S_{LL} = the size of the landline sample

F_{LL} = the size of the landline sample frame

S_{CP} = the size of the cell sample

F_{CP} = the size of the cell sample frame

AD_i = Number of adults in household i

LL_i=1 if respondent has a landline phone, otherwise LL=0.

CP_i=1 if respondent has a cell phone, otherwise CP=0.

The second stage of weighting balanced sample demographics to population parameters. The sample was balanced by form to match national population parameters for sex, age, education, race, Hispanic origin, region (U.S. Census definitions), population density, and telephone usage. The basic weighting parameters came from the U.S. Census Bureau's 2015 American Community Survey (ACS) data.[2] The population density parameter was derived from Census 2010 data. The telephone usage parameter came from an analysis of the July-December 2016 National Health Interview Survey.[3]

Weighting was accomplished using SPSSINC RAKE, an SPSS extension module that simultaneously balances the distributions of all variables using the GENLOG procedure. Weights were trimmed to prevent individual interviews from having too much influence on the final results. The use of these weights in statistical analysis ensures that the demographic characteristics of the sample closely approximate the demographic characteristics of the national population. Table 1 compares weighted and unweighted sample distributions to population parameters.

[2] ACS analysis was based on all adults excluding those living in institutional group quarters.

[3] Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, July-December, 2016. National Center for Health Statistics. May 2017.

Table 1: Sample Demographics

	Parameter	Unweighted	Weighted
Gender			
Male	48.3%	56.5%	49.8%
Female	51.7%	43.5%	50.2%
Age			
18-24	12.7%	9.0%	12.3%
25-34	17.6%	12.2%	17.0%
35-44	16.6%	18.5%	16.8%
45-54	17.5%	15.2%	17.2%
55-64	16.6%	17.0%	16.9%
65+	19.0%	28.1%	19.8%
Education			
HS Graduate or Less	40.3%	27.3%	39.5%
Some College/Assoc. Degree	31.3%	29.2%	31.0%
College Graduate	28.4%	43.5%	29.5%
Race/Ethnicity			
White/not Hispanic	64.8%	75.6%	66.0%
Black/not Hispanic	11.8%	9.6%	11.5%
Hispanic	15.5%	9.3%	14.7%
Other/not Hispanic	7.9%	5.5%	7.8%
Region			
Northeast	18.1%	17.7%	18.2%
Midwest	21.2%	20.5%	21.3%
South	37.7%	38.1%	37.5%
West	23.0%	23.7%	23.1%
County Pop. Density			
1 - Lowest	19.9%	20.3%	20.1%
2	20.0%	21.5%	20.0%
3	20.1%	20.8%	20.4%
4	20.0%	19.1%	19.8%
5 - Highest	20.0%	18.3%	19.8%
Household Phone Use			
LLO	5.3%	4.6%	5.0%
Dual	41.2%	55.6%	42.3%
CPO	53.5%	39.8%	52.7%

Effects of Sample Design on Statistical Inference

Post-data collection statistical adjustments require analysis procedures that reflect departures from simple random sampling. PSRAI calculates the effects of these design features so that an appropriate adjustment can be incorporated into tests of statistical significance when using these data. The so-called "design effect" or deff represents the loss in statistical efficiency that results from unequal weights. The total sample design effect for this survey is 1.39.

PSRAI calculates the composite design effect for a sample of size *n*, with each case having a weight, w_i as:

$$deff = \frac{n\sum_{i=1}^{n} w_i^2}{\left(\sum_{i=1}^{n} w_i\right)^2} \qquad \textit{formula 1}$$

In a wide range of situations, the adjusted *standard error* of a statistic should be calculated by multiplying the usual formula by the square root of the design effect ($\sqrt{deff}$). Thus, the formula for computing the 95% confidence interval around a percentage is:

$$\hat{p} \pm \left(\sqrt{deff} \times 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right) \qquad \textit{formula 2}$$

where $\hat{p}$ is the sample estimate and *n* is the unweighted number of sample cases in the group being considered.

The survey's *margin of error* is the largest 95% confidence interval for any estimated proportion based on the total sample -- the one around 50%. For example, the margin of error for the entire sample is ±3.7 percentage points. This means that in 95 out every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 3.7 percentage points away from their true values in the population. The margin of error for estimates based on form 1 sports fans[4] (N=410) is ±5.8 percentage points. For results based on form 2 sports fans (N=403), the margin of error is ±5.7 percentage points. It is important to remember that sampling fluctuations are only one possible source of error in a survey estimate. Other sources, such as respondent selection bias,

[4] Sports fans are respondents who described themselves as an avid, regular or casual sports fan.

questionnaire wording and reporting inaccuracy, may contribute additional error of greater or lesser magnitude.

RESPONSE RATE

Table 2 reports the disposition of all sampled telephone numbers ever dialed from the original telephone number samples. The response rate estimates the fraction of all eligible sample that was ultimately interviewed. Response rates are computed according to American Association for Public Opinion Research standards.[5] Thus the response rate for the landline samples was 2 percent. The response rate for the cellular samples was 4 percent.

[5] American Association for Public Opinion Research. 2016. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 9th edition. AAPOR.

Table 2. Sample Disposition

Landline	Cell	
1,175	375	Non-residential/Business (4.500)
2,859	0	Ported numbers identified before dialing (4.420)
1	0	Cell in landline frame (4.420)
4,035	375	OF = Out of Frame
3,406	11,208	Not working (4.300)
50,369	0	Screened landline disconnects removed prior to dialing
800	194	Computer/fax/modem (4.200)
54,575	11,402	NWC = Not working/computer
4,627	3,323	NA/Busy all attempts (3.120, 3.130)
49,948	8,079	$UHUO_{NC}$ = Non-contact, unknown if household/unknown other
5,213	10,771	Voice mail (3.140)
0	0	Other non-contact (deaf/disabled/deceased) (3.211)
5,213	10,771	UO_{NC} = Non-contact, unknown eligibility
2,695	4,586	Refusals (3.211)
568	1,462	Callbacks (INCLUDE Spanish CBs) (3.211)
3,263	6,048	UO_R = Refusal, unknown if eligible
111	330	O = Other (language) (3.211)
0	316	Child's cell phone (4.700)
19	0	Other ineligible (4.700)
19	316	SO = Screen out
22	44	R = Refusal, known eligible (breakoffs and qualified CBs) (2.100)
344	656	I = Completed interviews (1.0)
117,530	38,021	T = Total numbers sampled
13.3%	60.7%	$e1 = (I+R+SO+O+UO_R+UO_{NC})/(I+R+SO+O+UO_R+UO_{NC}+OF+NWC)$ - Est. frame eligibility of non-contacts
95.1%	68.9%	e2 = (I+R)/(I+R+SO) - Est. screening eligibility of unscreened contacts
24.1%	32.1%	$CON = [I + R + (e2*[O + UO_R])]/[I + R + (e2*[O + UO_R + UO_{NC}]) + (e1*e2*UHUO_{NC})]$
9.6%	12.9%	$COOP = I/[I + R + (e2*[O + UO_R])]$
2.3%	**4.1%**	**$AAPOR\ RR3=I/[I+R+[e2*(UO_R+UO_{NC}+O)]+[e1*e2*UHUO_{NC}]] = CON*COOP$**