CHIS Methodology Brief

Innovative Methods to Increase Child Interviews in the California Health Interview Survey

Brian M. Wells, UCLA Center for Health Policy Research

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Summary

The California Health Interview Survey (CHIS) has consistently strived to provide accurate health and health care information about children aged 0-11 in California. However, the growing difficulties with survey data collection have prompted CHIS to consider a methodological redesign for child data collection. In 2019, CHIS replaced its historic telephone mode with a mixed-mode web and telephone design using address-based sampling. In conjunction with the general sampling and data collection redesign, CHIS implemented two new methods to specifically increase the number of child survey completes in 2019: 1) placing the child survey questions before the adult survey and 2) oversampling households with children through predictive modeling. These changes helped CHIS achieve over 3,000 child completes in 2019 — the highest number of child completes since CHIS 2012. The innovative methods used here have promise for many other surveys looking to add or improve child survey data collection.

Introduction

The struggle in recent decades to obtain population-based survey data has had direct impacts on collecting data on children, not just on adults. Often, it is the difficulty of encouraging parents — as they are also at an increased risk of not responding to a survey request — to provide potentially sensitive information about their children to researchers. Parents stand as gatekeepers ever more watchful about what information regarding their child will be collected and how it will be used. Time is valuable, especially to parents after already completing a long survey about themselves.

The California Health Interview Survey (CHIS) has been an important source on the health and health care of children aged 0–11 in California for nearly 20 years. However, the proportion of adults who have agreed to participate and completed the child survey has gradually declined by 40% since CHIS 2001 with just over half of parent's agreeing to complete the child survey in CHIS 2017–2018. This reflects the general trend in survey research, especially in telephone interviewing, which shows increased resistance to survey participation, resulting in lower response rates (e.g., Lavrakas et al., 2017). Meanwhile, the increasing length of the adult interview may also reduce the likelihood of a parent being willing to complete the secondary request to complete the child interview.

This struggle for completed child interviews is not new to CHIS. In 2005, CHIS introduced the "child-first" procedure to obtain child completes from a parent not selected for the adult interview. Under this procedure, if the selected adult was not available, a knowledgeable parent or guardian of the selected child could complete the survey questions about the child, and the interviewer would call back later to complete the adult interview. This change greatly increased the number of child completes with almost half of the children sampled coming from child-first households (California Health Interview Survey, 2007). However, the effectiveness of the child-first procedure has diminished over time with the introduction of a cell phone frame in 2009 which automatically selected that adult, and increasing the ratio of landline to cell

phone numbers sampled from 80/20 to 50/50 in 2015. In CHIS 2017–2018, the child-first procedure represented less than 10% of the eligible child sample (California Health Interview Survey, 2019).

Given these and the other current struggles of telephone interviewing, CHIS decided to investigate a sample and data collection redesign in 2019 to try and reverse, or at least slow, some of these trends with a focus on improving child data collection. CHIS implemented three methodological changes to improve child data collection in 2019: 1) switching to address-based sampling and web data collection; 2) reordering the adult and child surveys with the child survey preceding the adult survey; and 3) oversampling households likely to have children under age 18. The following sections discuss the theoretical and practical justifications for these changes and the impact on child data collection in CHIS 2019.

New sampling frame and mixed-mode collection

Background. Changing behaviors and cultural shifts in telephone ownership and usage have resulted in industry declines in the effectiveness of telephone interview surveys (Lavrakas et al., 2017; Dutwin et al., 2018). Many surveys have searched for alternative sampling frames and modes of data collection to remain relevant and reduce cost increases (Olson et al., 2019). The transition to address-based sampling (ABS) has shown huge potential for improving coverage, response, and cost-effectiveness of both state and national surveys (Harter et al., 2016; Olson et al., 2019). In particular, the United States Postal Service (USPS) Computerized Delivery Sequence (CDS) file arguably has the best frame of households in the United States as it is regularly updated and has very high coverage — as high as 100% in some areas (Harter et al., 2016).

Recently, push-to-web surveys have become quite popular in an effort to improve response rates via the internet (Harter et al., 2016; Dillman, 2017; Olson et al., 2019). This mixed-mode strategy uses an invitation mailed to selected addresses to encourage households to participate in a web survey. Web collection is generally considered the least expensive mode of data collection significantly reducing the cost per complete. The American Community Survey (ACS) adopted this strategy in 2013 and many countries — including the United States, Canada, Australia, and Japan — have used web-push methods for recent censuses (Harter et al., 2016; Dillman, 2017). This method is being tested for a variety of surveys as a potential replacement for random-digit dial (RDD) telephone interviews and/or in-person interviews across the world (Olson et al., 2019).

However, a push-to-web strategy is insufficient by itself for CHIS. CHIS 2015–2016 estimated the internet penetration rate in California to be nearly 84% meaning that a sizable proportion of the population would not be covered by only offering a web response option. Self-administered methods like web have not proven as successful for non-English speakers and significantly underrepresent low English proficient respondents (e.g., McGovern, 2004; Brick et al., 2012; Caporaso et al., 2013; Newsome et al., 2017). In total, coverage, education and literacy

concerns as well as language barriers emphasize the need to continue offering telephone as a data collection mode.

Methods. CHIS conducted two experiments in 2018 to test the effectiveness of an ABS mail push-to-web design with a telephone nonresponse follow-up. The first experiment was a feasibility test in three California counties: Los Angeles, Santa Clara, and Tulare. Following the initial positive results from that test (Wells et al., 2018), a statewide pilot test was conducted in the late 2018 implementing a number of additional experiments and improvements based on the previous lessons learned, including the child survey ordering discussed in the following section (Wells et al., 2019). Given that these additional improvements resulted in higher response and reductions in cost compared to maintaining the 2017–2018 design, CHIS committed to transitioning to the new design for the 2019–2020 cycle.

The final CHIS 2019 ABS sample was generated from the USPS CDS file and utilized a mixed-mode design using a mail push-to-web survey with a telephone nonresponse follow-up. Selected adults were invited to participate in the web survey via mail invitations. After three mailings were sent to the selected address, households that could be matched to a phone number were contacted to complete a computer-assisted telephone interview (CATI). Respondents could also call in to complete the survey via telephone at any time during the survey period.

Regarding the child survey, CHIS 2019 continued to oversample children aged 0–5 at twice the rate of those children aged 6–11. The historic child-first methodology of rostering children with a sufficiently knowledgeable parent when the selected adult respondent was not available was still used in CATI as needed.

CHIS 2019 Results. While CHIS needed to sample almost 2.3 million telephone numbers to achieve the target 40,000 adult interviews in 2017–2018 (roughly a million telephone numbers per year), only about 255,000 addresses needed to be sampled in 2019, about a quarter of the needed sample compared to the previous years. While the adult response rate was below 5% in 2017–2018, CHIS saw an adult response rate of 11.2% in 2019. Nearly 11% of adult completes were done by telephone, with about half of those cases being inbound calls from respondents eager to participate by telephone.

CHIS 2019 identified 3,746 eligible children from the adult sample and obtained 3,009 child completes — higher than any single year since 2012 (see Figure 1). This results in a completion rate of 80.3%, the highest completion rate since 2003 (see Figure 2). The corresponding child response rate[1] was 86.1%. Of all child interviews, only 4.5% completed via telephone compared to the 10.7% for the adult survey suggesting that families with children are more likely to complete the survey on the web.

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[1] Child response rates are reported as conditional response rates, or response rates conditional on the adult interview.
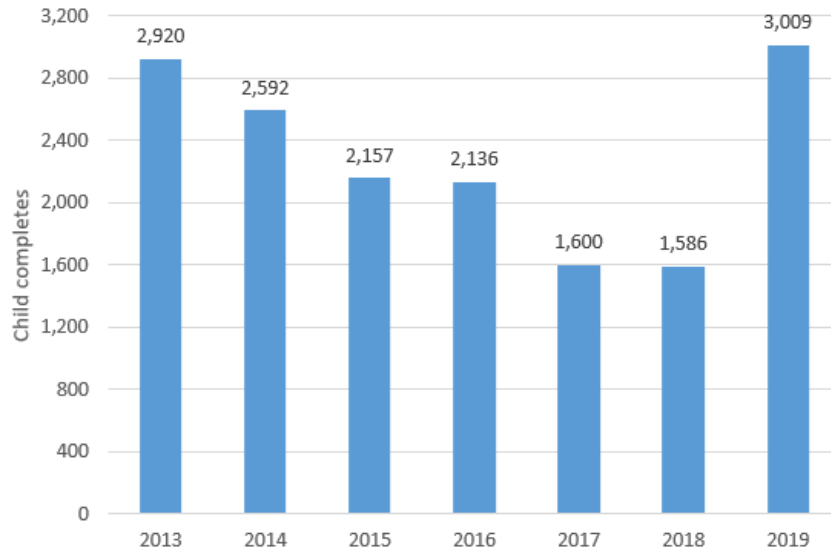
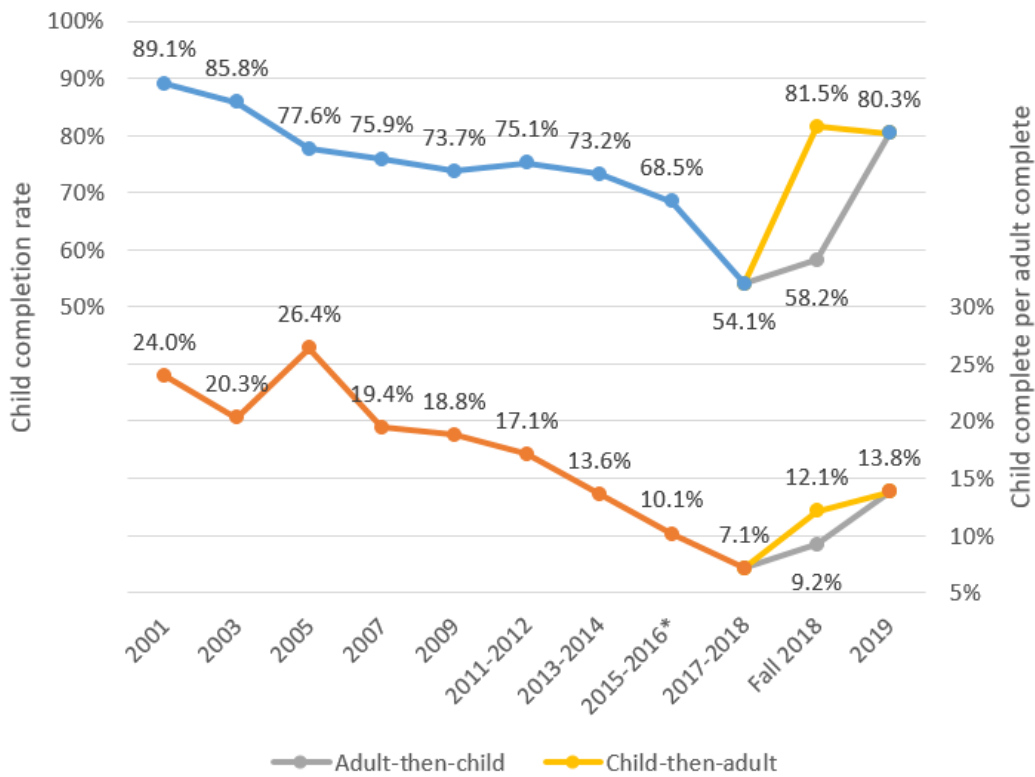**Figure 1.** Annual CHIS child completes from 2013 to 2019.

Figure 2. CHIS cycle child completion rate and rate per adult completes by year from 2001 to 2019. Includes Fall 2018 web experiment results by child ordering condition.
* Revised numbers for CHIS 2015–2016 are provided here based on changes in child rostering implemented in CHIS 2015 which artificially inflated child eligibility and completion rates (Wells, 2018).

Table 1. Unweighted CHIS child survey age distribution

	CHIS 2017–2018	CHIS 2019	ACS 2018
Age 0–5	42.3%	52.5%	49.1%
Age 6–11	57.7%	47.5%	50.8%

Note. American Community Survey (ACS) 2018 1-year data is weighted.

Looking at the unweighted age distribution of completed child surveys, CHIS 2019 had a much larger number of children aged 0–5 (52.5%) compared to 2017-2018 (42.3%). This unweighted proportion of children aged 0–5 is much more in-line with the 2018 ACS 1-year estimates for children aged 0–5 reported at 49.1% (see Table 1).

Adult and Child Survey Ordering

Background. Research has shown that people are more likely to be persuaded to complete a long or difficult task if the task is preceded by a shorter or easier task (Mowen & Cialdini, 1980; Dillman, Smyth, & Christian, 2014). A survey respondent is also more likely to respond if the survey topic is relevant or salient to themselves (Heberlein & Baumgartner, 1978; Groves, Presser, & Dipko, 2004; Dillman, Smyth, & Christian, 2014). Parents in particular are more likely to answer questions about their children than questions on other topics (Groves, Presser, & Dipko, 2004). All of this suggests a shorter child survey preceding a longer adult survey is likely to be more successful than the child survey following the adult survey.

Methods. In the Fall 2018 statewide pilot test of the new ABS push-to-web methodology, CHIS experimentally tested the placement of the child survey at 1) the end of the adult survey (i.e., the standard placement) and 2) following Section A of the adult survey. Section A was chosen because it contains a bulk of demographic data regarding the adult respondent including marital status and provided a logical transition into asking about their spouse/partner and rostering all of the children in the household. Thus for the child-then-adult condition, we moved up the spousal information and child roster from Section G (see Figure 3). Consent to provide information about an eligible child was integrated into the adult consent language to streamline the consent procedure for both adult and child interviews.

Fall Test Results. In the experiment, the child-then-adult condition saw 184 eligible children and resulted in 150 completes which translates to an 81.5% completion rate. This rate is a significant improvement over the adult-then-child condition with a 58.2% completion rate (194 eligible children, 113 total completes). This reordering translated to over 30% more child completes over the standard ordering. This resulted in the child-then-adult condition having an 86.0% response rate over the adult-then-child condition's 64.2% response rate. The adult-then-child condition of the experiment observed a more consistent response rate to CHIS 2017-2018 which saw a 58.3% response rate.
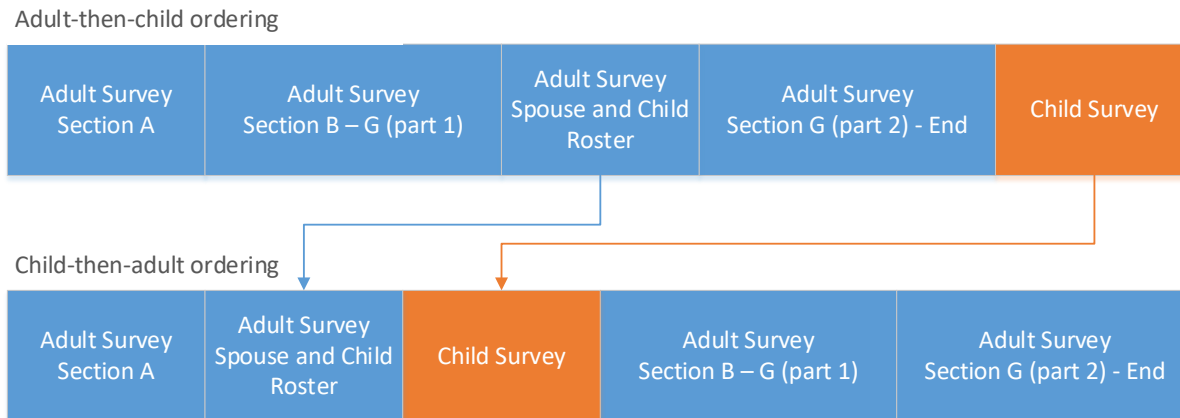
Figure 3. Child and adult survey experimental ordering.

The child-then-adult condition resulted in a ratio of child completes per adult completes of 12.1%, much higher than the 7.1% observed in CHIS 2017–2018 (see Figure 2). However, even the adult-then-child condition resulted in a higher ratio of child completes compared to adult completes at 9.2% (a nearly 30% increase in child completes) showing the overall advantage of the transition to web from CATI.

Examining the impact on adult completes, households assigned to the adult-then-child condition had virtually the same number of completes as the child-then-adult condition (1,231 and 1,236, respectively). Looking at the adult survey breakoffs, there was no significant difference in the number of adult breakoffs for the two conditions. In general, breakoffs that happen earlier during the spouse and child rostering at the end of Section A for the child-then-adult condition occur at a very similar rate when presented later in Section G for the adult-then-child condition. However, the former allows us to record a complete child interview for the household whereas the latter results in no partial or complete child or adult interview. For those child completes without an adult interview, some household-level information may not be available.

In summary, completing the child survey before beginning the adult survey in earnest results in significantly increased child completes with minimal or no impact on adult completes. The child-then-adult ordering was implemented for CHIS 2019.

CHIS 2019 Results. As was mentioned above, the completion rate of 80.3% was consistent with the Fall experiment results of 81.5%. The ratio of child completes to adult completes is up to 13.8% compared to 7.1% in CHIS 2017–2018, nearly double the rate (see Figure 2).

Predictive modeling

Background. A recent advantage in survey sampling is the use of Big Data and machine learning approaches to build predictive models of household attributes. By using ABS samples appended with auxiliary data (e.g., voting files, commercial consumer information, Census Planning

Database) and then combining that with actual self-reported data from a large survey, models can predict self-reported survey outcomes which can be used to effectively target specific groups, like households with children.

Dutwin (2018) documented the feasibility and promise of such an approach in identifying Jewish households using consumer data appended to ABS samples. While not a perfect prediction (e.g., predicting cases as Jewish that are not in fact Jewish and vice versa), the methods showed improvements in identifying Jewish households over just a random telephone sample. The quality of the appended auxiliary data has large implications for the efficiency and efficacy of the predictions.

Methods. For CHIS 2019, CHIS 2017-2018 data were used to build the predictive models and were evaluated using the 2018 Fall web experiment. While a total of six predictive models were used, the most relevant model for this report was for households that have children under the age of 19. CHIS sampled households flagged with this characteristic at 2.5 times the regular rate.

CHIS 2019 Results. Of the total CHIS sample mailed, 17.5% was flagged as part of the household with child model. Of the 44,530 households mailed identified by that model, 4,012 completed the adult survey for a completion rate of 9.0%, slightly higher than the overall rate of 8.7%. Of those 4,012 adult completes, 27.1% did have an eligible child or teen compared to the remainder of the sample which had a rate of 16.8% (see Figure 4). This translates into a 61% increase in the ratio of eligible children by adult for these cases.
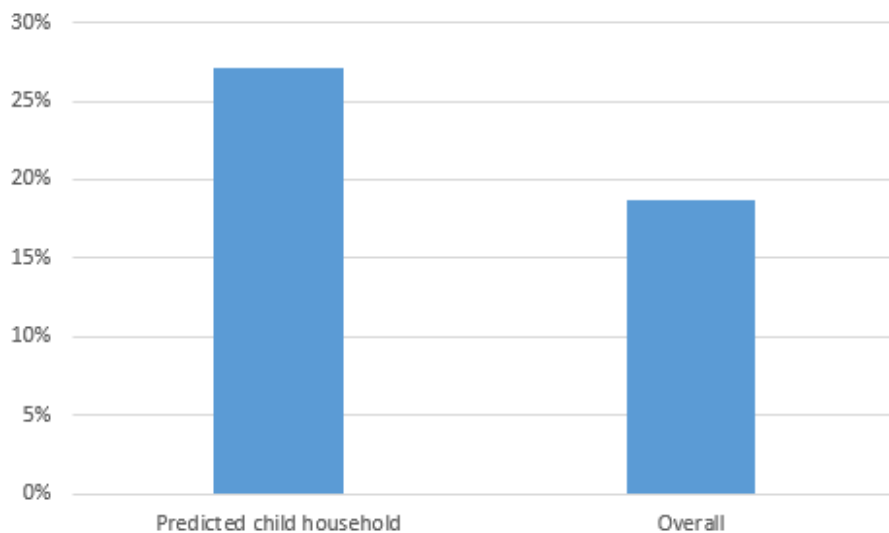

Figure 4. Percent of households with children present comparing the predictive modeling group and the overall CHIS 2019 sample.

Discussion

CHIS 2019 introduced a number of new methodological changes that significantly improved data collection especially for children. The push-to-web methodology helped improve response rates generally and better represented households with younger children age 0–5. In conjunction with reordering the child and adult surveys and introducing predictive modeling for sampling households with children, CHIS was able to increase the number of child completes by nearly 100% compared to CHIS 2017–2018. We also expect CHIS 2020 to exceed 2019's final sample size. This dramatic increase in sample size provides more data to researchers and can produce more stable estimates for racial/ethnic subgroups and sub-state regions.

Using the Fall experiment data as a reference, we can breakdown the advantages of each methodological change on child data collection. Regarding the ratio of child completes to adult completes, we estimate the switch to web data collection increased the ratio of child completes by 29% relative to our baseline expectation, the child-then-adult ordering increased the ratio by 41% relative to the baseline, and the predictive modeling added 23.1% (see Figure 5).

Web surveys interested in obtaining information about a selected adult as well as a selected child should consider placing the child survey before the adult survey. This ordering may also
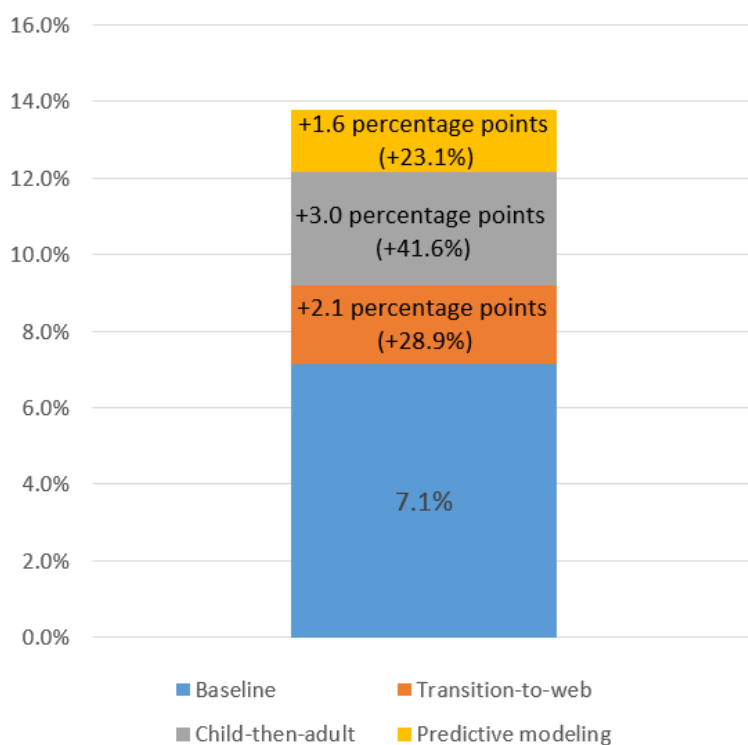

Figure 5. Breakdown of revised data collection methods improvements on the ratio of child completes to adult completes. Presents the percentage point increase and the percent increase relative to the baseline ratio.

work in telephone and in-person contexts as well. The relative gains may be dependent on the length of the child survey. While the CHIS child web survey takes between 10 and 15 minutes, a longer survey may not be as effective at retaining parents for the adult survey.

Predictive modeling with auxiliary data for sampling particular attributes is still a burgeoning area in survey research. These methods are also dependent on the quality of the auxiliary data sources. While we sampled households likely to have children at 150% the normal rate, this did not translate directly to child completes given only a 60% improvement in the rate of households with children for that portion of the sample. However, this new application of data science has broad applications for survey research. Predictive modeling can be applied to a variety of demographic or other outcomes and may be particularly useful for oversampling racial/ethnic subgroups.

Dissemination

Results from the CHIS ABS experiments were presented at professional conferences and academic seminars in both 2019 and 2020:

- 2019 American Association for Public Opinion Research (AAPOR) Conference in Toronto, Canada
    - Hughes, Wells, Park, & Dutwin (2019a)
    - Hughes, Wells, Park, & Sherr (2019)
    - Park et al. (2019)
    - Wells, Hughes, Park, & Best (2019)
    - Wells, Hughes, Park, Langdale, & Ryan-Ibarra (2019a)
- 2019 European Survey Research Association (ESRA) Conference in Zagreb, Croatia
    - Hughes, Wells, Park, & Dutwin (2019b)
    - Wells, Hughes, Park, Langdale, & Ryan-Ibarra (2019b)
- Joint Program in Survey Methodology / Michigan Program in Survey Methodology (JPSM/MPSM) Seminar Series at the University of Michigan, January 29, 2020
    - Wells (2020)

CHIS intends to share results from CHIS 2019 at future professional conferences including the 2021 AAPOR Conference scheduled to be held in Los Angeles in May 2021.

Results from both ABS web experiments were also made publicly available on the UCLA Center for Health Policy Research website following delivery to their respective funding agencies. Center researchers are currently working on submitting various results from these experiments to academic journals in the coming months.

Disclaimer

Suggested Citation

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