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Tracking the Effect of the COVID-19 Pandemic on American Households

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Since March 10, 2020, we have been tracking effects of the COVID-19 pandemic on respondents to the nationally representative Understanding America Study (UAS). After an initial survey that covered March 10–31, 2020, we launched tracking surveys every two weeks. Every day, about 500 respondents are invited to take the survey for a total of about 7,000 respondents over a two-week period.

Results are shared in a variety of ways. About 3,000 graphs are updated every night, with the corresponding tab-delimited text files available for download. The underlying micro-data are available for registered researchers after the end of each four-week field period. The paper describes the set-up of the tracking survey, lists the main topics covered and highlights a number or early results. Our ambition is to keep tracking the experiences of U.S. households for as along as the pandemic lasts.

Keywords: COVID-19, Understanding America Study, UAS

1 Introduction

The 2019 Coronavirus Disease (COVID-19) pandemic is a once-in-a-lifetime public health crisis. For social scientists the urgent task is to document its societal and individual effects, while the epidemic is playing out. Several groups have taken up the challenge; see for instance the Societal Experts Action Network (SEAN) COVID-19 Survey Archive, https://covid-19.parc.us.com. Taking advantage of the survey panel infrastructure of the nationally representative Understanding America Study (UAS), our effort makes the unique contribution of having tracked the symptoms, mental health, employment, financial conditions, and other experiences of the households in the United States since March 10, 2020. We briefly describe the survey infrastructure, and how we have set up the tracking survey. We will present some illustrative results and discuss data dissemination. We end with a brief discussion of prospects going forward.

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2 The Understanding America Study

The UAS is a probability-based Internet panel of about 9,000 individuals 18 and older representing the entire non-institutionalized population of the United States (Alattar, Messel, & Rogofsky, 2018). The panel has oversampled about 3,200 California residents, including 1,800 Los Angeles County residents. Respondents are recruited through Address Based Sampling (Harter et al., 2016) and receive a tablet and broadband Internet if needed. After joining the panel, individuals are invited to take, on average, two surveys each month. Invitations to panel members to take surveys are mostly sent by email, and in a minority of cases by postcard. Surveys are answered online. Respondents receive about $20 for every 30 minutes of survey time. Surveys are administered in English and Spanish.

The UAS web-site documents every step of the recruiting process into the panel, as well as response and retention rates: https://uasdata.usc.edu/. The UAS has an estimated recruitment rate of 13 to 15 percent, which is comparable to or slightly higher than those of most other probability-based Internet panels in the United States.[1]

[1]It is not easy comparing these rates with other panels, because of confusion over terminology and flexibility in adding or dropping stages or assigning cases to stages, as well as fairly large within-panel variability across years and surveys and sometimes lack of reporting. Our 13–15% is the weighted cumulative recruitment rate from sampling a household to entering the panel, which combines DiSogra and Callegaro (2016)'s recruitment rate and profile rate. The Ipsos KnowledgePanel has a comparable recruitment rate of about 5% (Fahimi, 2020). We know from our own work in the

Though the low recruitment rates have led to arguments that there is little practical difference between probability and nonprobability or convenience samples (Rivers, 2013), considerable evidence shows that probability-based panels tend to better represent the underlying population in terms of demographic characteristics (Chang & Krosnick, 2009; Yeager et al., 2011) and produce responses of higher quality.[2] Our own work also suggests the UAS is capable of matching data quality with that from high quality traditional surveys, such as the Health and Retirement Study (Angrisani, Finley, & Kapteyn, 2019).

UAS respondent recruitment has been carried out in batches. The first batch was a simple random sample of addresses provided by ASDE Survey Sampler (http://surveysampler.com/). Subsequent batches were recruited using a two-stage sampling design for drawing addresses from the USPS Delivery Sequence File provided by the Marketing Systems Group (https://www.m-s-g.com/): zip codes are drawn first, and then households are randomly drawn from selected zip codes. The selection of zip codes in the first stage of this procedure follows an adaptive sampling algorithm (R. M. Groves & Heeringa, 2006; Tourangeau, Brick, Lohr, & Li, 2017; Wagner et al., 2012) that was specifically developed for the UAS (Angrisani, Kapteyn, Meijer, & Saw, 2019). This algorithm generates unequal sampling probabilities with the goal of refreshing the panel so that its demographic composition moves closer to that of the U.S. population. Specifically, before sampling an additional batch, the algorithm computes the unweighted distributions of specific demographic characteristics (e.g., sex, age, marital status and education) in the UAS at that point in time. It then assigns to each zip code a nonzero probability of being drawn, which is an increasing function of the degree of "desirability" of the zip code. The degree of desirability is a measure of how much, given its population characteristics, a zip code is expected to move the current distributions of demographics in the UAS toward those of the U.S. population.

Sample weights are constructed in two steps. In the first step, a base weight is created to account for unequal probabilities of sampling UAS members stemming from the aforementioned adaptive sampling scheme. In the second step, final post-stratification weights are generated to correct for differential nonresponse rates and to bring the final survey sample in line with the reference population as far as the distributions of key demographic variables are concerned. These are sex, race/ethnicity, age, education, and geographic location.

3 Set-up of the tracking survey

Since March 10 2020, the UAS has been surveying US residents about their symptoms, mental health, employment, financial conditions and other experiences related to the COVID-19 pandemic. The results of the first survey, which was closed on March 31 2020, are available on our dedicated web-site https://uasdata.usc.edu/covid19.

While the first survey was in the field, we received funding from the Gates Foundation to conduct a tracking survey whereby every respondent would be asked to respond to surveys every fourteen days. On March 29, we fielded a consent survey among the UAS respondents, asking for willingness to participate in bi-weekly surveys related to the COVID-19 pandemic. At the moment of writing approximately 7,000 respondents have agreed to participate out of 9,000 UAS panel members.[3]

The second survey wave was fielded on April 1. Each day about one fourteenth of the sample (about 500 per day) is invited to answer a bi-weekly survey. We use a nested stratified design to randomly assign each respondent to a start day on which he or she is invited to take the survey, and he or she will be invited to participate in following waves every fourteen days. This design aims to balance responses across survey days. The criteria used for balancing survey invitations are Los Angeles County resident, age, sex, and whether working at the time of assignment. In principle, a respondent has a 14-day window to respond to each survey wave (until his or her next wave becomes available). To encourage a prompt response, a respondent receives a $1 bonus for answering on the assigned day. On average 81 percent of respondents respond on their assigned day. The full field cycle for a particular survey is 28 days, with a 14-day period in which respondents are invited on a rolling basis, and another 14-day grace period for the last batch of respondents to complete their survey. This design also implies that waves overlap: while early respondents to wave t are responding to the new survey, late respondents to wave $t-1$ are still answering questions of the previous survey.

In addition to the tracking survey that goes out to the national sample every fourteen days, we are collecting data on residents living in Los Angeles County at a higher frequency. Los Angeles County residents answer once a week, alternating between a long form survey, which is administered to everyone across the United States every two weeks, as described above, and a short-form survey administered only to Los Angeles County residents every other week. This short-form survey is funded by the University of Southern Califor-

American Life Panel, which we founded, that the recruitment rate was on a par or slightly lower than the UAS recruitment rate. From Parker et al. (2018) and Pew Research Center (2019), we estimate that the Pew American Trends Panel has a recruitment rate between 5 and 7%. For NORC's AmeriSpeak panel, it is 5.7%, but an experiment with an in-person follow-up with a subset of initial nonresponders resulted in a much higher weighted recruitment rate (Bilgen et al., 2020).

[2]One issue with convenience or opt-in panels is the presence of "bogus respondents," as noted by Kennedy et al. (2020).

[3]The consent survey is still in the field and the number of respondents expressing a willingness to participate is still increasing.

nia and was developed to support the L.A. County Department of Public Health's efforts to monitor infection rates and social conditions in L.A. County. We provide the Department of Public Health's Population Health Assessment Unit with our most recent L.A. County data on a weekly basis. The short-form is essentially a subset of the long-form with a few specific Los Angeles County questions added on the topics of information seeking and trust in information sources. The implication is that Los Angeles County residents have only one week to complete their survey, rather than two weeks like the rest of the sample. For the subset of long form and short form survey questions that are identical, data for the full Los Angeles County sample are final after a 14-day period.

At the moment of writing, the field periods of the first two national survey waves in March and April, and the first two Los Angeles County survey waves in April have been closed. The March national survey had a response rate of 81%; the first April national survey (with invitations sent out April 1–14 and responses up to April 28) had a response rate of 97% among respondents who had signed up as participants of the continuous tracking surveys. The response rates for the first two Los Angeles County surveys in April were 96% and 90%, respectively, among respondents who had signed up as participants of the continuous tracking surveys.

4 Domains covered in the surveys

The main topics of the March 2020 survey included:

- Whether or not respondents have been diagnosed with COVID-19;
- Perceived symptoms of COVID-19 (choice from a list of 18);
- Self-reported symptoms (same list);
- Self-reported protective behaviors in last seven days and perceptions of their effectiveness (handwashing, avoid pubic areas, cancel or postpone personal or work activities or air travels, wear mask, stockpile food or water, pray, etc.);
- Mental distress and coping behaviors;
- Perceived discrimination;
- How many friends/acquaintances have been infected;
- Percent chance of getting the virus in the next three months; percent chance of dying if infected;
- Use of and trust in news sources for pandemic related information;
- Likelihood to vaccinate if a vaccine is available and willingness to pay for a vaccine;
- Current work situation and ability to work from home;
- Financial insecurity.

The tracking survey that started on April 1 added information on:

- Behaviors seeking for medical help (seen a doctor, tested, who contacted if positive, where sought care and how);
- Social behaviors and connectedness (gone out, went to store, had friends over or visited friends, walked, stayed home);
- Stigmatization (think people infected were weaker);
- Perceived stress and social support;
- Added items on work conditions and compensation (types of jobs; number of days worked for pay last seven days and associated income; number of days worked from home; sick leave);
- Income and job loss and associated impact (lost job and if found other job, health insurance if lost job, use of unemployment benefit, plan to respond to economic challenges);
- Food insecurity; crime and neighborhood disorder.

For households with school-aged children, additional questions were asked about coping with the added pressure of child care and the burden of home schooling. A special module was added to ask about changes in payment behavior, in particular whether cash is used to pay for purchases.

5 Daily and weekly trackers

A large number of variables are continuously tracked and presented on our website. Specifically, every night around 3am PDT, the new responses from the previous day are downloaded, and Stata programs are run that compute basic descriptives (means, percentages) for a large number of core variables, as well as demographic breakdowns by sex, age, race/ethnicity, education, and income. Results are computed for rolling 7-day windows, so, for example, the results for April 7 use the data from April 1–7 and the results for April 8 use the data from April 2–8. These results are then plotted against time and can be viewed by everyone on the dedicated dashboard: https://covid19pulse.usc.edu/. Moreover, the data points for these graphs can be downloaded as tab-delimited text files. Importantly, since the same respondents are answering every other week, we are able to track changes with much more accuracy than when one would draw new samples every week.

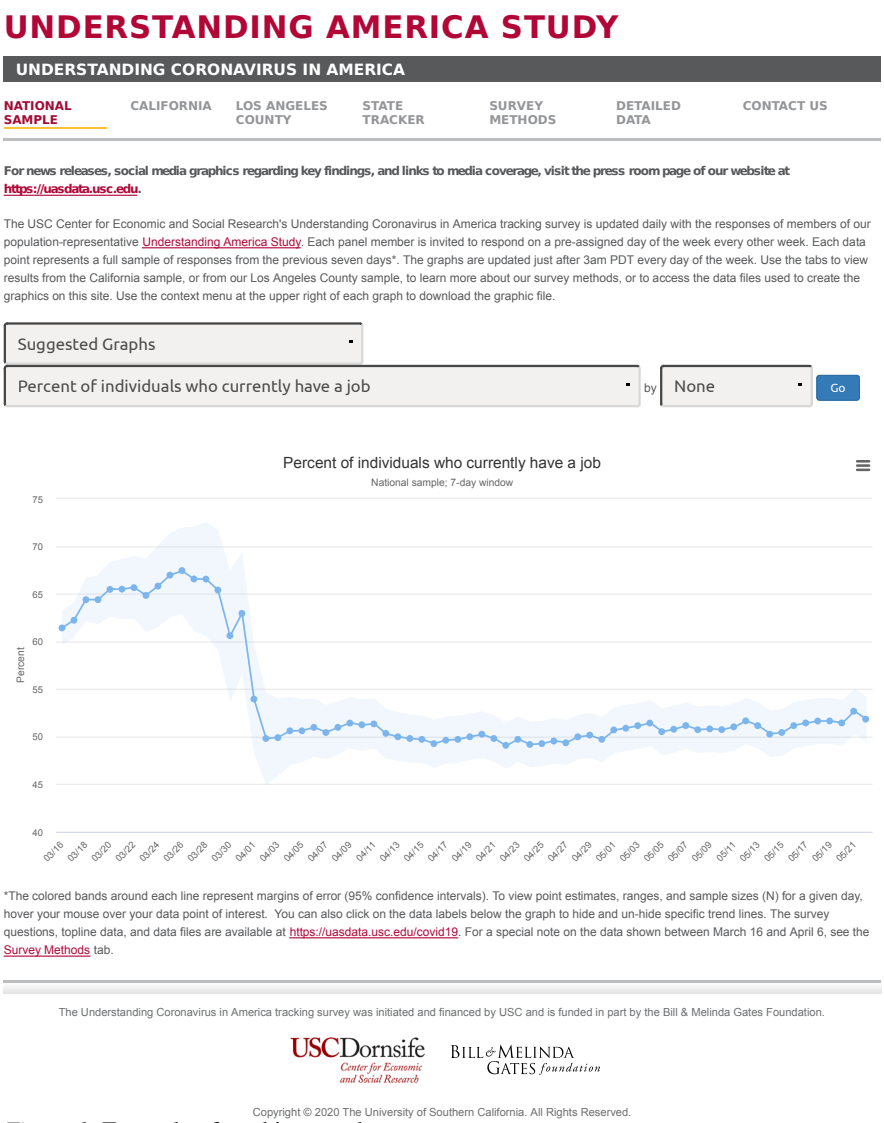

Figure 1. Example of tracking graph

The tracking web-site contains some 3,000 different graphs covering either the entire U.S., the State of California, or Los Angeles County. We also compare a small subset of our results for California against the corresponding results from Civis Analytics (https://www.civisanalytics.com/) for the States of Florida, New York, and Washington.

Figure 1 presents a screen shot of one such graph. It should be noted that the March 2020 survey was based on a different design, in which all UAS panel members were invited to take the survey at the same time, with no random assignment of respondents to specific start days, and hence the responses shown over time simply reflect differences in how quickly UAS respondents take a survey. This has two effects: (1) possibly respondents answering later are different from respondents answering earlier and this may confound the interpretation of changes shown in the graphs over time; (2) the number of respondents answering on a given day is considerably lower on later days, and hence the data points later in the month are based on fewer observations, as can be seen by hovering the mouse over the data points, and is reflected in wider confidence intervals.

6 Illustrative results

Several working papers, blogs, and memos have been written based on the results of the survey. Results based on the micro-data include findings that:

- Both the economic and health risks are highly concen-

trated among lower socio-economic strata (Bennett, Kapteyn, & Saw, 2020).

- Mental health has deteriorated and is strongly related to expected adverse economic consequences (Kampfen, Kohler, et al., 2020); it appears to be particularly adversely affected among those who actively seek out social media and other news sources (Riehm, Holingue, et al., 2020).

- Initial risk perceptions of SARS-CoV-2 infection and infection fatality are associated with self-reported protective behaviors, especially later (vs. earlier) in March 2020 (Bruine de Bruin & Bennett, 2020).

- Older adults early on recognized their greater case-fatality risk, but perceived a lower risk of getting infected, and felt generally less anxious (Bruine de Bruin, 2020).

- Implementation of and longer time under the state shelter-in-place (SIP) orders is associated with increased adoption of risk reduction behaviors; though longer time under SIP is generally associated with higher mental distress, the mental health starts to improve after one week under the order (Liu & Mattke, 2020).

- Self-reported probabilities of being infected and of facing adverse economic consequences are positively related to local infection rates (Cianco, Kampfen, et al., 2020).

- Experiences of discrimination attributed to the COVID-19 pandemic have risen significantly among Asians and to a lesser extent among non-Hispanic persons (Liu & Finch, 2020).

- The percent of employed adults in the U.S. dropped 20 percent between early March and early April (Figure 1); rates of job loss were greatest among non-Hispanic blacks and Hispanics.

- As of mid-April, a high percentage (87%) of households with school-aged children report that at least one child is engaged in school-provided educational activities and that they are satisfied with the school communications they have received (Press release, April 30: https://uasdata.usc.edu/page/Covid-19+Press).

- As of mid-April, almost 15% of households with a high-school senior report that their student has changed post-graduation plans (Press release, April 30: https://uasdata.usc.edu/page/Covid-19+Press).

7 Data dissemination

At the end of each field period the survey data are made available to the research community for free download at https://uasdata.usc.edu/covid19, subject to signing a Data Use Agreement. The data of the different waves are organized in one easy-to-use longitudinal file. The data can be linked to the wealth of background information available on UAS respondents, so that one can take advantage of many hours-worth of survey time collected every year in the UAS. This is particularly important because many existing survey data provide baseline information on the same group of respondents (e.g., job and financial history, prior mental health, cognitive ability, and experience with discrimination). Among the many datasets that can be linked is the Comprehensive File, which includes detailed information from a number of surveys that are repeated every two years and span a wide range of topics (https://uasdata.usc.edu/page/UAS+Comprehensive+File).

8 Prospects

At this moment there is no way of knowing how the pandemic will play out, and what the consequences will be for individuals and society. We are planning to keep tracking its effects as long as needed to obtain as full a picture of the societal and individual effects as is practically possible. Although we aim to keep core content unchanged, new questions are considered at every wave in response to new developments or as a result of new research ideas. In addition to the continuation of the longitudinal data collection, a powerful addition to the analytic potential of the data consists of the inclusion of contextual data. These data may include local information on infection rates or policy measures taken or relaxed. Other examples include local labor market conditions, healthcare infrastructure, socio- economic and ethnic profiles of zip-codes, etc.

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Commentary

In the paper "Tracking the Effect of the COVID-19 Pandemic on the Lives of American Households," Kapteyn et al. describe how they adapted the Understanding America Study (UAS) to track the effects of the COVID-19 pandemic. This paper is an excellent illustration of the great power and potential of internet panels—especially probability-based panels. When international, national, or local events change quickly, launching a traditional survey is costly and often takes too long to field to fully measure the effect of the event of interest over time, particularly because the sample must be generated from scratch. Through the UAS—a probability-based internet panel with about 9,000 members—Kapteyn et al. describe how they are tracking the COVID-19 pandemic in the United States as a whole and in Los Angeles, CA specifically.

Constructing a probability-based panel requires multiple lengthy and costly recruitment steps (Scherpenzeel & Toepoel, 2912). When a life-altering event such as the COVID-19 pandemic occurs, both time and money are often limiting factors in beginning a tracking survey. Meanwhile, existing panels are being used for other purposes and may not be able to transition to measure a fast-breaking event. Therefore, the UAS's demonstrated agility to gain consent from its panel members and begin tracking the COVID-19 pandemic before its full health and economic impacts were known is admirable and impressive.

One general concern about internet panels, whether probability- or nonprobability-based, is the low recruitment and participation rate among panel members (see, for example, Hays, Liu, & Kapteyn, 2015)[4]—the UAS has a recruitment rate of 13 to 15 percent. Online panel surveys also are known to suffer from a saliency effect whereby only panel members interested in the topic take the survey (R. Groves, Presser, & Dipko, 2004). However, the COVID-19 pandemic is so ubiquitous in the social discourse that the saliency of the topic ensures that nearly all of the panel is interested in taking a survey on the topic mitigating any saliency effect and yielding a nearly 100% response rate. At least 78% of the full panel (7,000+ of 9,000 panel members) has agreed to participate in the tracking survey, and the biweekly response rate has been 97% in the initial waves. This high response gives the results added credibility because the panel weights do not need much further adjustment to correct for nonresponse bias. One point of interest to observe over time will be the level of attrition in the panel response. The authors indicate the tracking survey will continue as long as the pandemic persists, which could easily be well into 2021. Although COVID-19 will likely remain at the forefront of the national discussion, no one knows whether the panel interest in the tracking survey will remain as high: will panel members continue to be willing to complete a biweekly survey for a year? Furthermore, the authors note how the second wave added additional questions to the survey, but the average administration time of the survey is not provided. As the study moves forward with future waves, the effect of new modules on attrition will need to be monitored. Efforts to mitigate any attrition will be critical to the study's continued success.

Another topic not directly discussed in the paper is the external validity of survey estimates to assess potential estimate bias. The survey topics, as outlined in the paper, cover key health and financial topics about the impact of COVID-19 on individuals' lives, but, it is not clear whether the wording of any of the questions is identical or nearly identical to other surveys measuring the COVID-19 pandemic. Because of the limitation with the total recruitment and response rates in probability-based internet panels like the UAS (DiSogra & Callegaro, 2016), it is important to determine whether the survey results are consistent with other studies measuring the same phenomena. The inclusion of a few identically worded questions will allow the authors to do this.

Regardless of the external validity of the survey items used in the UAS, the study does have internal validity by tracking the same measures over time. As indicated in the paper, the UAS produces over 3,000 tracking figures nightly and presents rolling 7-day average estimates. These figures will accurately present the magnitude of changes in the population as they are happening. One potential concern with producing 3,000 figures is that some will not be statistically reliable. Kapteyn et al. do not indicate whether any figures are ever suppressed or if any reliability guidance—beyond presenting the confidence bands—are provided. Given the large interest in COVID-19 from a variety of audiences, the authors may want to provide a helpful flag or greater direction for users to understand when an estimate should be interpreted with caution.

Another benefit of the UAS panel is that the COVID-19 tracking survey can be linked to prior UAS surveys. This link can potentially provide rich contextual data on how Americans felt prior to the pandemic. However, prior studies will not likely involve all 7,000 COVID-19 tracking participants. Therefore, data for some linked survey items will be missing. Methods will need to be developed to either impute the missing values or re-weight the data to exclude those who did not participate in the linked survey.

Finally, one aspect of the UAS COVID-19 tracking survey that is not discussed but could be a powerful analytic tool is the potential to measure change at the individual level. The

[4]References are listed among the references of the main article.

UAS provides rolling cross-sectional estimates. By collecting information from the same set of respondents biweekly and maintaining a low attrition rate, the UAS can measure both population-level changes (as it is now) and individual-level changes. The infrastructure for a longitudinal analysis of individual-level changes may not be built into the existing UAS analysis tool. Therefore, a periodic individual longitudinal report that could be published on the UAS website would be a valuable benefit.

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