## Title

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BRIEF REPORT

# Findings From a Probability-Based Survey of United States Households About Prevention Measures Based on Race, Ethnicity, and Age in Response to Severe Acute Respiratory Syndrome Coronavirus 2

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We investigated individual behaviors taken by white, African American, and Latino United States (US) households in response to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and likelihood of using digital tools for symptom surveillance/reporting. We analyzed cross-sectional week 1 data (April 2020) of the coronavirus disease 2019 (COVID-19) Impact Survey in a large, nationally representative sample of US adults. In general, all groups engaged in the same prevention behaviors, but whites reported being more likely to use digital tools to report/act on symptoms and seek testing, compared with African Americans and Latinos. Individual behaviors may not explain COVID-19 case disparities, and digital tools for tracking should focus on uptake among race/ethnic minorities.

**Keywords.** SARS-CoV-2; COVID-19; prevention; digital health; surveillance; disparities.

There have been 21.7 million reported cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and >776 000 deaths due to coronavirus disease 2019 (COVID-19) worldwide through 17 August 2020. More than one-fourth of cases are in the United States (US), with African Americans and Latinos being disproportionately impacted in case counts and death rates [1–5].

Prevention control messages and efforts, such as sheltering in place and quarantining, may not have been as successful among African Americans and Latinos for numerous reasons, such as needing to work outside of the home, living in large households in close quarters, and including the effects of structural racism (ie, access to health insurance and care, limited health literacy) [6, 7]. Little is known about individual prevention measures that were taken in response to COVID-19 or how people may engage with surveillance/reporting strategies as we enter phase 2 of the pandemic.

We analyzed data collected from 20 to 26 April 2020 in the COVID-19 Impact Survey [8]. Data are from a probability-based panel representative of US households. We tested for differences between non-Latino white, African American, and Latino respondents on prevention control measures, likelihood of using surveillance/reporting strategies, and household size.

## METHODS

The National Opinion Research Center (NORC) at the University of Chicago (www.norc.org) collects weekly responses to health, economic security, and social dynamics questions. All survey data are available at www.covid-impact.org [8]. NORC's probability-based panel is designed to be representative of the US household population. Adults aged ≥18 years representing 50 states and the District of Columbia were randomly sampled from the AmeriSpeak Panel. Surveys were conducted online or by telephone with a NORC interviewer. The sample weights in the dataset were calculated with information from demographic weighting variables acquired from the 2020 Current Population Survey reflecting the US population [9]. This manuscript meets criteria to be self-exempt from the University of California, San Francisco Institutional Review Board.

### Measures

#### *Prevention Control Measures*

Participants responded yes (1) or no (0) to 19 measures taken in response to SARS-CoV-2 (eg, worn a facemask, kept distance of 6 feet).

#### *App- and Internet-Based Reporting and Recommendations and SARS-CoV-2 Testing*

Respondents rated their likelihood of "installing an [mobile] app that (1) asks you questions about your own symptoms and provides recommendations about COVID-19" and (2) "tracks your location and sends push notifications if you might have been exposed to COVID-19," and (3) "using a website to log your symptoms and location and get recommendations about COVID-19." Respondents also rated their likelihood of "testing for COVID-19 infection using a Q-tip to swab your cheek or nose" and "testing you for immunity or resistance to COVID-19 by drawing a small amount of blood." Ordinal response options were as follows: 1 (not likely at all), 2 (not too likely), 3 (moderately likely), 4 (very likely), and 5 (extremely likely).

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### Statistical Analysis

The NORC Field Report contains complete details on the statistical weights, design effect, and margin of sampling of error [10]. The statistical weights we used were computed by NORC and included as an additional variable in the dataset. The weights are the inverse of probability of selection from the sampling frame used to sample housing units for AmeriSpeak.

Both analyses we ran were conducted with Mplus statistical software and used the sampling weights. The first analysis was a multivariable logistic regression model with all 19 prevention control measures regressed on a dummy-coded race/ethnicity variable: non-Latino whites, African Americans, and Latinos, with age (18–29, 30–44, 45–59, and ≥60 years) and sex (female vs male) as covariates. The second analysis was a multivariable ordinal logistic regression model where the app- and internet-based and testing ordinal responses were regressed on race/ethnicity, with age and sex as covariates. Ordinal regression results are interpreted as odds of responding to each outcome level (5 = extremely likely) vs all lower options (1 = not likely at all through 4 = very likely).

## RESULTS

The sample included 1395 white, 265 African American, and 369 Latino respondents. Table 1 shows the full sample characteristics and descriptive statistics of key variables.

### Nineteen Prevention Control Measures

There were no differences in the reporting of 19 prevention control measures between white and African American respondents (Table 2). Latinos were less likely than whites to report keeping physical distance with people outside of their household (odds ratio [OR], 0.49 [95% confidence interval {CI}, .28–.86]; $P < .04$) (Table 2). Females were consistently engaging in more prevention control measures than males (Table 2), whereas age was not associated with any measure.

### Three App- and Internet-Based COVID-19 Questions

Relative to whites, African Americans and Latinos reported a lower likelihood of installing an app that asks about symptoms (OR, 0.52 [95% CI, .38–.70] and 0.53 [95% CI, .40–.70], respectively; $P < .001$ for both). Relative to 18- to 29-year-old respondents, those ≥60 years of age reported a lower likelihood of installing an app that asks about symptoms (OR, 0.66 [95% CI, .49–.91]; $P < .04$).

Relative to whites, Latinos reported a lower likelihood of installing an app that tracks location and sends push notifications if users were possibly exposed to SARS-CoV-2 (OR, 0.71 [95% CI, .55–.92]; $P < .03$). No differences emerged between African Americans and whites.

African Americans and Latinos reported a lower likelihood of using a website to log symptoms and get recommendations for COVID-19, relative to whites (OR, 0.47 [95% CI, .33–.65] and 0.54 [95% CI, .40–.71], respectively; $P < .001$ for both). Relative to 18- to

**Table 1. Characteristics of Respondents in the United States Household Coronavirus Disease 2019 (COVID-19) Impact Survey, Descriptive Statistics of Individual COVID-19 Prevention Control Measures, and Ratings of the Likelihood of Using Technology-Based Surveillance and Testing for COVID-19**

| Characteristic | Non-Latino White (n = 1395) | African American (n = 265) | Latino (n = 369) |
|---|---|---|---|
| Age category, % | | | |
| 18–29 | 10.3 | 14.2 | 21.4 |
| 30–44 | 27.2 | 32.2 | 38.2 |
| 45–59 | 25.1 | 24.7 | 21.4 |
| ≥60 | 37.4 | 28.8 | 19.0 |
| Sex, % | | | |
| Male | 55.8 | 53.2 | 54.7 |
| Female | 44.2 | 46.2 | 45.3 |
| Household size, % | | | |
| <5 people | 86.7 | 82.4 | 68.0 |
| ≥5 people | 13.3 | 17.6 | 32.0 |
| Household income, % | | | |
| <$30 000 | 19.4 | 42.7 | 40.4 |
| $30 000–$49 999 | 18.6 | 19.8 | 20.0 |
| $50 000–$99 999 | 35.8 | 28.1 | 27.6 |
| ≥$100 000 | 26.2 | 9.4 | 12.0 |
| Education, % | | | |
| No high school | 2.5 | 6.4 | 11.7 |
| High school or equivalent | 17.4 | 18.0 | 25.5 |
| Some college, no degree | 40.2 | 43.8 | 44.4 |
| Associate degree or higher | 39.9 | 31.8 | 18.4 |
| General health, % | | | |
| Excellent | 12.8 | 12.4 | 13.0 |
| Very good | 40.9 | 33.0 | 33.3 |
| Good | 32.9 | 38.2 | 38.2 |
| Fair | 10.8 | 14.2 | 14.1 |
| Poor | 2.7 | 2.2 | 1.4 |
| Average No. of COVID-19 prevention control measures (SD); possible range, 0–19 | 9.5 (3.1) | 9.5 (3.2) | 8.9 (3.3) |
| Mean (SD) rating of using technology-based surveillance and testing for COVID-19 (1 = not likely at all; 5 = extremely likely) | | | |
| • Installing an app on your phone that asks you questions about your own symptoms and provider recommendations about COVID-19 | 3.6 (1.4) | 3.2 (1.4) | 3.1 (1.4) |
| • Installing an app on your phone that tracks your location and sends push notifications if you might have been exposed to COVID-19 | 3.5 (1.4) | 3.4 (1.4) | 3.3 (1.3) |
| • Using a website to log your symptoms and location and get recommendations about COVID-19 | 3.6 (1.3) | 3.2 (1.3) | 3.3 (1.3) |
| • Testing you for COVID-19 infection using a Q-tip to swab your cheek or nose | 2.7 (1.4) | 2.7 (1.4) | 2.7 (1.3) |
| • Testing you for immunity or resistance to COVID-19 by drawing a small amount of blood | 2.5 (1.4) | 2.9 (1.4) | 2.7 (1.4) |

Abbreviations: COVID-19, coronavirus disease 2019; SD, standard deviation.

**Table 2. Multivariable Logistic Regression With All 19 Coronavirus Disease 2019 Prevention Control Measures as the Dependent Variables, Race and Ethnicity as the Independent Variables, and Adjusted by Age and Sex**

| | Non-Latino White (Referent Group) (n = 1395) | African American (n = 265) | Latino (n = 369) | Male (Referent Group) (n = 908) | Female (n = 1121) |
|---|---|---|---|---|---|
| Prevention Control Measures[a] (0 = no; 1 = yes) | % | % OR (95% CI), *P* Value | % OR (95% CI), *P* Value | % | % OR (95% CI), *P* Value |
| 1. Canceled a doctor appointment | 36.9 | 31.8 0.93 (.66–1.31), .76 | 34.4 1.03 (.73–1.45), .89 | 31.1 | 39.5 0.64 (.51–.81), **.002** |
| 2. Worn a face mask | 80.4 | 83.5 0.94 (.60–1.46), .81 | 77.2 1.03 (.70–1.52), .91 | 79.5 | 80.7 0.76 (.58–1.00), .94 |
| 3. Visited a doctor or hospital | 7.4 | 7.1 0.98 (.55–1.75), .96 | 8.9 1.07 (.61–1.89), .84 | 6.8 | 7.5 0.73 (.49–1.1), .19 |
| 4. Canceled or postponed work activities | 39.6 | 38.2 0.71 (.51–.1.00), .10 | 28.2, .66 (.47–.94), .05 | 34.5 | 39.5 0.75 (.60–.94), **.04** |
| 5. Canceled or postponed school activities | 21.4 | 17.6 0.72 (.48–1.07), .16 | 18.7 1.20 (.76–1.80), .55 | 17 | 23.2 0.54 (.41–.71), **.001** |
| 6. Canceled or postponed dentist or other appointment | 46.6 | 47.9 1.02 (.74-.1.41), .92 | 36.0 0.76 (.55–1.06), .18 | 39 | 49.4 0.60 (.48–.75), **.001** |
| 7. Canceled outside housekeepers or caregivers | 13.5 | 15.0 1.04 (.67–.1.62), .88 | 11.1 0.88 (.56–1.41), .66 | 13.1 | 13.4 0.93 (.68–1.3), .72 |
| 8. Avoided some or all restaurants | 78.5 | 79.8 0.76 (.51–1.14), .26 | 72.1 0.71 (.50–1.03), .13 | 75.3 | 79.1 0.60 (.46–.78), **.001** |
| 9. Worked from home | 42.9 | 55.1 0.89 (.64–1.24), .57 | 34.1 0.84 (.60–1.18), .41 | 43.7 | 39.7 1.24 (1.0–1.6), .11 |
| 10. Studied from home | 19.2 | 18.4 1.11 (.75–1.64), .68 | 14.9 0.86 (.55–1.33), .56 | 17.7 | 18.8 0.66 (.50–.90), **.03** |
| 11. Canceled or postponed pleasure, social, or recreational activities | 81.9 | 81.3 0.82 (.54–1.25), .45 | 70.2 0.71 (.50–1.03), .14 | 75.9 | 82.7 0.52 (.40–.68), **.001** |
| 12. Stockpiled food or water | 35.6 | 35.6 0.80 (.56–1.14), .30 | 40.1 1.31 (.95–1.82), .17 | 35.0 | 37.6 0.74 (.58– .93), **.03** |
| 13. Avoided public or crowded places | 85.3 | 84.3 0.64 (.41–.98), .09 | 82.1 0.69 (.45–1.05), .14 | 81.9 | 86.7 0.59 (.44– .80), **.04** |
| 14. Prayed | 51.0 | 49.4 0.78 (.56–1.07), .20 | 58.0 0.97 (.69–1.36), .87 | 42.4 | 59.9 0.52 (.42–.65), **.001** |
| 15. Avoided contact with high-risk people | 65.1 | 65.9 0.98 (.69–1.39), .91 | 63.4 0.87 (.61–1.22), .49 | 59.6 | 69.1 0.50 (.40–.63), **.001** |
| 16. Washed or sanitized hands | 96.3 | 96.3 0.91 (.33–2.53), .87 | 94.9 0.58 (.28–1.17), .20 | 94.2 | 97.5 0.38 (.22–.67), **.005** |
| 17. Kept 6 feet distance from those outside my household | 92.9 | 94.8 1.04 (.46–2.31), .94 | 89.2 0.49 (.28–.86), **.04** | 91.1 | 93.6 0.58 (.40–.90), **.04** |
| 18. Stayed home because I felt unwell | 9.1 | 10.9 1.66 (1.02–2.69), .09 | 13.0 1.42 (.87–2.34), .24 | 7.2 | 12.4 0.51 (.35–.75), **.004** |
| 19. Wiped packages entering my home | 45.1 | 44.9 0.79 (.57–1.08), .21 | 46.1 1.20 (.87–1.67), .36 | 43.2 | 46.9 0.77 (.62–.96), .05 |

Values in bold indicate statistical significance at alpha less than .05.

Abbreviations: CI, confidence interval; OR, odds ratio.

[a]Age was not associated with any coronavirus disease 2019 prevention control measure and thus is not shown here.

29-year-old respondents, those ≥60 years of age reported a lower likelihood of using a website to log symptoms and get recommendations for COVID-19 (OR, 0.52 [95% CI, .38–.72]; $P < .002$).

#### SARS-CoV-2 Testing

Relative to whites, Latinos reported a lower likelihood of getting tested for SARS-CoV-2 using a Q-tip cheek or nose swab (OR, 0.69 [95% CI, .53–.87]; $P < .02$). No differences emerged between African Americans and whites. Relative to 18- to 29-year-old respondents, those aged 45–59 and ≥60 years reported a lower likelihood of getting tested for SARS-CoV-2 (OR, 0.65 [95% CI, .46–.91] and 0.50 [95% CI, .36–.70], respectively; $P < .04$ for both). Last, no differences emerged across race and ethnicity regarding getting tested for immunity. Relative to 18- to 29-year-old respondents, those aged 45–59 and ≥60 years reported a lower likelihood of getting tested for immunity (OR, 0.64 [95% CI, .46–.90] and 0.52 [95% CI, .38–.71; $P < .03$ for both).

## DISCUSSION

In a probability-based household survey, non-Latino white, African American, and Latino respondents engaged in nearly identical patterns and frequencies of individual prevention measures taken in response to SARS-CoV-2. Only 1 difference emerged between Latinos and whites, which was keeping social distance. Thus, individual behavior may not be driving in the spread of SARS-CoV-2 in racial and ethnic minority communities. These data show that there is a consistent difference in behaviors by sex but not by age. Male respondents' odds for engaging prevention control measures were consistently lower compared with female respondents, which may partially explain higher COVID-19 cases in males vs females [11].

There was a general low endorsement of technology-based reporting strategies, but consistent differences between groups. First, Latinos and African Americans reported being less likely to use these strategies compared to whites. For SARS-CoV-2 testing, Latinos reported being less likely to test compared with whites. These differences may be in part due to immigration status and wanting to avoid involvement in the health system, medical racism, and unwillingness to contribute to an effort with indirect benefit (ie, helping public health monitoring). Furthermore, younger respondents reported a higher likelihood of using technology-based strategies and testing compared with older respondents.

There are several implications from these findings. First, between March and May 2020, unemployment climbed from 6.7% to 16.8% among African Americans and from 6.0% to 17.6% among Latinos [12]. This could have led to greater crowding within homes if person were unable to work, but also does not exclude the possibility of working informally, all of which could have increased exposure to SARS-CoV-2. And as evidenced by an analysis of the Medical Expenditures Panel Survey, African Americans and Latinos were more likely than whites to be "essential workers" (ie, food sector) or to work in health settings [13], further adding to the risk of exposure. In our data, while Latinos reported greater likelihood for not keeping social distance, relative to whites (the only difference between the 2 groups), it is likely that they did not have the opportunity to keep social distance (eg, dimensions of work environment), rather than a notion that they disregarded this prevention control measure. While characteristics such as age and comorbidities (eg, diabetes) were identified as predispositions to severe COVID-19 complications and death [6], the magnitude of disparities cannot be explained by individual behavior, as we have shown, or individual risk factors noted as predispositions [13]. It is likely that other social and structural drivers of health disparities, such as racism, may better explain the disproportionate impact of COVID-19. Second, technology-based strategies will be less effective if they do not account for medical mistrust, lack of familiarity with technology, and privacy concerns [14]. Digital tracking of a pandemic affecting racial and ethnic minorities will likely miss these key populations unless critical acceptability and outreach are established. Last, if exposed and/or diagnosed, quarantining may be difficult for individuals in households with people who cannot work from home, that are multigenerational, or that experience overcrowding [15]. In our sample, 32% of Latinos, compared to 13.3% of whites, lived with 5 or more people. Thus, density is a considerable risk factor for SARS-CoV-2 exposure to address among populations who live in crowded settings.

Study limitations include the survey questions not being previously validated and not applicable to all persons (eg, people who are unable to work from home could not opt out of the question whether they did or not). Between 20 and 26 April 2020, there were differences between states and cities in SARS-CoV-2 mandates; therefore, some variations in prevention control measures may have depended on region. Despite these limitations, we believe that documenting individual behaviors is critical to plan for strategies that effectively mitigate current and future problems. We also believe that our findings show that disparities in COVID-19 may not be explained by individual behavior. As new surveillance tools and testing strategies become available, we must ensure equal acceptability and access among all racial/ethnic groups. Our data can help in planning for dealing with the current pandemic, future outbreaks of SARS-CoV-2, and potential future pandemics.

### Notes

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***Potential conflicts of interest.*** All authors: No reported conflicts of interest.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

### References

1. Yancy CW. COVID-19 and African Americans. JAMA **2020**; 323:1891–2.
2. Owen WF, Carmona R, Pomeroy C. Failing another national stress test on health disparities. JAMA **2020**; 323:1905–6.
3. Wadhera RK, Wadhera P, Gaba P, et al. Variation in COVID-19 hospitalizations and deaths across New York City boroughs. JAMA **2020**; 323:2192–5.
4. Ross J, Diaz CM, Starrels JL. The disproportionate burden of COVID-19 for immigrants in the Bronx, New York. [manuscript published online ahead of print 8 May 2020]. JAMA Intern Med **2020**. doi:10.1001/jamainternmed.2020.2131.

5. Garg S, Kim L, Whitaker M, et al. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019-COVID-NET, 14 states, March 1–30, 2020. MMWR Morbid Mortal Wkly Rep **2020**; 69:458–64.
6. Hooper MW, Nápoles AN, Pérez-Stable E. COVID-19 and racial/ethnic disparities. JAMA **2020**; 323:2466–7.
7. Bailey ZD, Krieger N, Agénor M, Graves J, Linos N, Bassett MT. Structural racism and health inequities in the USA: evidence and interventions. Lancet **2017**; 389:8–14.
8. Wozniak A, Willey J, Benz J, Hart N. COVID impact survey: version 2.2 [dataset]. Chicago, IL: National Opinion Research Center, **2020**.
9. United States Census Bureau. Current Population Survey data tables. 2019. www.census.gov/programs-surveys/cps.html. Accessed 15 August 2020.
10. National Opinion Research Center. COVID impact survey—week 1. The data foundation field report (April 30, 2020). https://www.norc.org/Research/Projects/Pages/covid-impact-survey.aspx. Accessed 15 August 2020.
11. Ortolan A, Lorenzin M, Felicetti M, Doria A, Ramonda R. Does gender influence clinical expression and disease outcomes in COVID-19? A systematic review and meta-analysis [manuscript published online ahead of print 12 August 2020]. Int J Infect Dis **2020**. doi:10.1016/j.ijid.2020.07.076.
12. Bureau of Labor Statistics. The employment situation—June 2020. News release. **2020**. https://www.bls.gov/news.release/pdf/empsit.pdf. Accessed 2 July 2020.
13. Selden TM, Berdahl TA. COVID-19 and race/ethnic disparities in health risk, employment, and household composition. Health Affairs **2020**; 39:1–6.
14. Mitchell UA, Chebli PG, Ruggiero L, Muramatsu N. The digital divide in health-related technology use: the significance of race/ethnicity. Gerontologist **2018**; 59:6–14.
15. Fry R. The number of people in the average U.S. household is going up for the first time in over 160 years. **2019**. https://www.pewresearch.org/fact-tank/2019/10/01/the-number-of-people-in-the-average-u-s-household-is-going-up-for-the-first-time-in-over-160-years/. Accessed 2 July 2020.