BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-051882
Article Type:	Original research
Date Submitted by the Author:	30-Mar-2021
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Keywords:	COVID-19, Public health < INFECTIOUS DISEASES, EPIDEMIOLOGY

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COVID-19 risk perceptions of social interaction and essential activities and inequity in the United States: Results from a nationally representative survey

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Word count: 2,999

Key words: COVID-19, inequity, risk perceptions

ABSTRACT

Introduction: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has disproportionately affected disadvantaged communities across the United States. Risk perceptions for social interactions and essential activities during the COVID-19 pandemic may vary by sociodemographic factors.

Methods: We conducted a nationally representative online survey of 1,592 adults in the United States to understand risk perceptions related to transmission of COVID-19 for social and essential activities. We assessed relationships for activities using bivariate comparisons and multivariable logistic regression modeling, between responses of safe and unsafe, and participant characteristics. Data were collected and analyzed in 2020.

Results: Among 1,592 participants, risk perceptions of unsafe for 13 activities ranged from 29.2% to 73.5%. Large gatherings, indoor dining, and visits with elderly relatives had the highest proportion of unsafe responses (>58%) while activities outdoor, accessing health care, and going to the grocery store had the lowest (<36%). Older respondents were more likely to view social gatherings and indoor activities as unsafe, but less likely for other activities, such as going to the grocery store and accessing health care. Compared to White/Caucasian respondents, Black/African American and Hispanic/Latino respondents were more likely to view activities such as dining and visiting friends outdoor as unsafe. Generally, men vs. women, Republicans vs. Democrats and independents, and individuals with higher vs. lower income were more likely to view activities as safe.

Conclusion: Evidence-based interventions should be tailored to sociodemographic differences in risk perception, access to information, and health behaviors when implementing efforts to control the COVID-19 pandemic.

Strengths and limitations of this study

- Our study had a large sample size of sufficient size to explore associations by race/ethnicity and other important participant characteristics.
- We provided insights into perceived risks for specific activities during a later stage of the COVID-19 pandemic than previous studies.
- Our findings suggest the importance of socioeconomic differences, health disparities, and structural racism for efforts to control the COVID-19 pandemic.
- Selection bias associated with online surveys is well established; for example, underrepresenting individuals who are older, without internet access, have lower income, and have less formal education.
- Numbers of participants for some participant characteristics, including certain racial and ethnic minorities, were too small to provide sufficient statistical power for our analyses.

INTRODUCTION

As of January 2021, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease (COVID-19), has infected more than 23 million people and contributed to over 390,000 deaths in the United States.[1] The negative health and social consequences of the COVID-19 pandemic – including morbidity and mortality; decreased access to health care; and lost jobs and economic hardships – have not been experienced equally, and instead have impacted certain communities in greater numbers and with increased severity. For example, COVID-19 related diagnoses, hospitalizations, and deaths have disproportionately affected Black communities[2] and those in poverty,[3] demonstrating the impact of structural racism and health disparities in disadvantaged populations.[4]

Numerous COVID-19 pandemic, tracking, mapping, and monitoring tools have emerged, covering a wide array of indicators from testing capacity to daily case counts and deaths to policy interventions.[5, 6] While data collected from these trackers provide critical insights into the COVID-19 pandemic trajectory and public health response measures, they rarely address upstream socio-behavioral aspects, such as risk perceptions, knowledge and access to information, spread of misinformation, and agency and stigma. Yet access to information and health literacy vary by age, gender, and race and other characteristics with important implications for risk perceptions, behaviors, and health outcomes, including COVID-19 infection and mortality.[7]

Few studies have sought to estimate prevalence of risk perceptions related to social interaction or essential activities during the COVID-19 pandemic or explore associations between these

perceptions and sociodemographic factors.[8, 9] Differences in risk perceptions could provide insights into the determinants of risk perception and health knowledge and subsequent behaviors related to the COVID-19 pandemic, while also helping to inform development of targeted communication campaigns and preventive interventions.[10, 11]

The National Pandemic Pulse is a United States-population representative, internet phone/computer survey designed to obtain data on preventive behaviors, risk perceptions, agency and stigma, and misinformation related to the ongoing COVID-19 pandemic across census regions.[12] Our aim is to examine relationships between these issues and sociodemographic factors to understand how systematic racism and inequity impact health and wellbeing in the context of the COVID-19 pandemic. Here we present findings from the first national Pandemic Pulse Survey to understand racial and sociodemographic differences in risk perceptions of social interaction and essential activities during the COVID-19 pandemic.

METHODS

Study population

We conducted a cross-sectional online survey of adults currently living in the U.S. ages 18 and older from September 1st to 7th, 2020. The sample was selected from an online panel to represent the U.S. Census population using pre-specified demographic quotas for age, gender, race, census region, and income. Black/African American and Hispanic/Latino respondents were over-sampled by approximately 385 individuals per group to increase power for analyses comparing risk perceptions by ethnicity/race groups. This sample allowed for detection of a 10% difference in proportions between White, Black, and Hispanic ethnicity/race groups assuming power of

80%, type I error rate of 0.05, and a baseline prevalence of 40%-60%. Dynata – a market research firm (https://www.dynata.com) that maintains a large first-party global data platform, including 62 million panelists with accompanying demographic information – selected a random sample from their database to match the U.S. Census estimates. Dynata sent invitations by email to 16,904 panelists matching the required demographic targets of the survey until each quota was filled. The survey response rate was 10.0% and completion rate among eligible respondents was 95.3%. Survey responses were excluded for the following reasons: age less than 18 (n=47), residence outside United States (n=3), ethnicity/race for which sample quota was already filled (n=171), refusal of consent (n=72), and partial interview (n=77). Security and data quality checks utilized included digital fingerprinting and spot-checking via third-party verification to confirm the identity of the respondents and prevent duplication. Participants received a small compensation for survey completion.

Questionnaire

A team of experts at Johns Hopkins Bloomberg School of Public Health collated COVID-19 questions from existing surveys and created new questions to address existing gaps in the literature. In a module on risk perception, the focus of this analysis, participants were presented with a series of thirteen activities related to social and essential activities and asked to respond to the question: "How safe or unsafe do you think the following activities are in terms of your getting COVID-19 or giving it to someone else?" Allowed responses included extremely safe, somewhat safe, somewhat unsafe, extremely unsafe, unsure, and prefer not to say. For the purpose of this analysis, we collapsed extremely and somewhat categories into perceptions of 'safe' and 'unsafe'.

Statistical analysis

All analyses were adjusted for the study design using survey weights for race by Census region generated using the 2010 U.S. Census estimates. We assessed bivariate relationships between responses of safe, unsafe, and unsure and participant characteristics for each activity presenting percent change (absolute) and assessing significance using Pearson's chi-squared tests. We used multivariable logistic regression models to calculate unadjusted and adjusted odds ratios (OR and aOR) of perceiving each activity as unsafe and associated 95% confidence intervals (CIs). Participant demographic and socioeconomic characteristics included in multivariable models were age, gender, race/ethnicity, education, income, census region, and political affiliation. To assess differences in risk perceptions by age and race, we presented relationships overall and stratified by White/Caucasian, Black/African American, and Hispanic/Latino groups. Multivariable logistic regression models were also extended to include interaction terms for age and race and assessed for significance using Wald tests ($p<0.05$). Statistical analyses were conducted 2020 in Stata 16.1 (StataCorp, College Station, Texas, USA).

Ethical approval

Participants provided electronic consent to participate by responding to a question on the survey. The study received ethical approval from the Institutional Review Board at Johns Hopkins Bloomberg School of Public Health, Baltimore, USA (IRB00012413).

RESULTS

Participant characteristics

Complete responses from 1,592 respondents were included in this analysis. Roughly half of respondents were less than 45 years old (52.2%) and female (49.5%) (weighted percentages; Table 1). Participants were 60.0% White/Caucasian, 12.4% Black/African American, and 18.4% Hispanic/Latino. Risk perceptions of unsafe for the 13 activities ranged from 29.6% to 73.5% and unsure from 3.7% to 11.6% (Figure 1). Large gatherings (of 10, 100, and church), indoor dining, and visits with elderly relatives had the highest proportion of unsafe responses (>58%) while activities outdoor (dining, visiting friends), visiting the doctor or dentist, and going to the grocery store had the lowest (<36%).

Table 1: Participant characteristics[~]

Characteristic	n=1,592[*]	Percent[+]
Age (years)		
18-24	187	10.3
25-34	352	21.7
35-44	305	20.2
45-54	245	16.3
55-64	239	14.7
65+	264	16.8
Gender		
Female	800	49.5
Male	786	50.5
Other	1	0.0
Race		
White/Caucasian	685	60.0
Black/African American	410	12.4
Hispanic/Latino	382	18.4
Asian/Pacific Islander	61	5.8
American Indian/Alaska Native	20	0.7
Other	34	2.8
Education		
High school or less	345	20.2
Associate degree	215	13.2
Some college (no degree)	289	17.9
Bachelor's Degree	450	28.9
Graduate Degree	288	19.7

Income		
<$20,000	273	16.3
$20,000-<$40,000	317	19.0
$40,000-<$70,000	416	26.9
$70,000-<$100,000	258	16.8
≥$100,000	315	21.0
Lost job		
No	1008	65.3
Yes	333	19.8
Retired	234	14.9
Census region		
Northeast	312	17.1
Midwest	347	20.8
South	561	38.3
West	372	23.9
Political party		
Republican	429	39.1
Democrat	699	32.2
Independent	371	25.2
Other	52	3.5

*Actual numbers of individuals surveyed

+Overall population percentage adjusted for survey sample design by weighting for race by Census region.

~ Participant responses not listed above include the following "other" and "prefer not to say" categories (number, percentage adjusted for survey sample design): age: n=0; gender: refuse (n=5, 0.3%); race: n=0; education: refuse (n=5, 0.2%), income: refuse (n=13, 0.6%); lost job: refuse (n=17, 0.9%); census: n=0; and political affiliation: refuse (n=41, 2.1%).

Large gatherings and activities in public

Perceptions of unsafe increased by >15% from the lowest to highest age categories (18-24 to 65+) for gathering of 10, gathering of 100, and going to church (all p<0.001), but decreased by a similar amount for going to the grocery store (p=0.015). Males were less likely than women to perceive these activities as unsafe, with significant differences (p<0.05), ranging from -3.3% to

7.4%, except gathering of 10. Perceptions differed by race only for gatherings of 10, highest among Hispanic/Latino (67.5%) and Asian/Pacific Islander respondents (67.1%) (p=0.011). Respondents with higher education were less likely to perceive gathering of 100 as unsafe (p=0.024). Perceptions of unsafe decreased with increasing income (p<0.05), with differences between <$20,000 and ≥$100,000 categories ranging from -3.2% to -10.2%. Democrats and independents were more likely to perceive activities as unsafe for all variables compared to Republicans (p<0.001).

In multivariable models (Figure 2 and Supplementary Table 1) perception of unsafe increased with age for gathering of 10 (aOR=1.24 (95% CI: 1.14, 1.35)), gathering of 100 (aOR=1.38 (95% CI: 1.25, 1.52)), and going to church (aOR=1.18 (95% CI: 1.09, 1.28)) and decreased for going to the grocery store (aOR= 0.89 (95% CI: 0.82, 0.96)). Men were less likely to perceive activities as unsafe. Across income groups, there was a significant decrease in perception of unsafe with increasing income for gathering of 10 (aOR=0.86 (95% CI: 0.77, 0.96)) and going to the grocery store (aOR=0.83 (95% CI: 0.74, 0.92)). Democrats and independents were more likely to report activities as unsafe relative to Republicans.

Indoor and outdoor dining and visits with relatives

Perceptions of unsafe increased between lowest and highest age categories (18-24 to 65+) by >10% for dining indoor (p<0.001) and visiting friends indoor (p=0.001), and decreased, ranging from -3.1% to -10.1%, for visiting elderly relatives (p=0.039), visiting friends outdoor (p=0.001), and dining outdoor (p=0.006). Men compared to women were less likely to perceive activities as unsafe, with significant differences (p<0.05), ranging from -3.3% to -10.3%, except for visiting

friends outdoor. Activities in this category varied by race, with White/Caucasian respondents generally less likely to perceive them as unsafe. Respondents with higher education were less likely to perceive dining outdoor as unsafe (p=0.040). Perceptions of unsafe decreased with increasing income (p<0.05) for most of these activities, ranging from -3.8% to -11.8% (<$20,000 to ≥$100,000 categories), except for visiting friends indoor. Democrats and independents were more likely to report activities as unsafe relative to Republicans (p<0.001).

In multivariable models (Figure 3), risk perception across age groups increased significantly for dining indoor (aOR=1.12 (95% CI: 1.04, 1.21)) and visiting friends indoor (aOR=1.15 (95% CI: 1.07, 1.24)). Men relative to women had lower odds of viewing these activities as unsafe, but this was only significant for visiting friends indoor. There was a significant decreasing trend across income groups for dining indoor (aOR=0.87 (95% CI: 0.78, 0.97)) and dining outdoor (aOR=0.87 (95% CI: 0.78, 0.96)) but not visiting friends in either setting. Compared to White/Caucasian respondents, Black/African American and Hispanic/Latino respondents were more likely to view dining outdoor and visiting friends outdoor as unsafe. Democrats were more likely to view these activities as unsafe relative to Republicans. There was a statistically significant interaction between age and race for visiting an elderly relative (p=0.061) (Supplementary Table 2). The change in odds of perceiving visiting an elderly relative as unsafe for each 10-year increase in age was non-significant among White/Caucasian respondents (aOR=0.99 (95% CI: 0.89, 1.10)) and Hispanic/Latino respondents (aOR=1.11 (95% CI: 0.96, 1.29)) but significant among Black/African American respondents (aOR=1.35 (95% CI: 1.15, 1.58)).

Medical visits and returning to work

Perceptions of unsafe decreased (-16.2% and -6.3%, respectively) between the lowest and highest age categories (18-24 to 65+) for doctor visits ($p<0.001$) and going to the emergency room ($p=0.006$), and increased (4.2%) for returning to work ($p<0.001$). Men were less likely than women to perceive these activities as unsafe, with significant differences ($p<0.05$) ranging from -5.9% to -10.5%. Dentist visits were the only activity for which risk perception significantly differed by race ($p<0.001$). Respondents with lower education were more likely to respond "unsure," with differences ($p<0.05$) between lowest and highest categories (high school or less to graduate degree) ranging from -5.2% to -6.9%. Respondents with higher income were less likely to perceive these activities as unsafe with a range of difference between the lowest and highest categories (<$20,000 to ≥$100,000) of -4.3% and -12.5% ($p<0.05$). Democrats and independents were more likely to report activities as unsafe relative to Republicans ($p<0.001$).

In multivariable models (Supplementary figure 1), a risk perception of unsafe across age groups decreased significantly for going to the doctor (aOR=0.84 (95% CI: 0.78, 0.91)) and emergency room (aOR=0.90 (95% CI: 0.84, 0.97)). Males were less likely to view going to the doctor, emergency room, and returning to work as unsafe. Compared to White/Caucasian respondents, Hispanic/Latino respondents were more likely to view going to the dentist or emergency room as unsafe. Respondents with higher income were less likely to view these activities as unsafe; trends across income groups were statistically significant for going to the doctor (aOR=0.84 (95% CI: 0.75, 0.94)), dentist (aOR=0.87 (95% CI: 0.78, 0.97)), and emergency room (aOR=0.86 (95% CI: 0.78, 0.96)). Democrats and independents were more likely to view activities as unsafe. There was a statistically significant interaction between age and race for

returning to work (p=0.039). The change in odds of perceiving returning to work as unsafe for each 10-year increase in age was smallest for White/Caucasian respondents (aOR=1.13 (95% CI: 1.00, 1.27)) followed by Hispanic/Latino respondents (aOR=1.21 (95% CI: 1.03, 1.42)) and Black/African American respondents (aOR=1.31 (95% CI: 1.12, 1.52)).

Census region

Differences between census regions in bivariate comparisons included higher proportions of respondents considering activities as unsafe in the west vs. north (gathering of 10, gathering of 100, grocery store, church, and dentist) and south vs. north (dining indoor). Census region was only predictive of risk perception in multivariable models for three activities (dining indoor: Midwest vs. Northeast: aOR=0.66 (95% CI: 0.44, 0.98); visiting friends indoor: Midwest vs. Northeast: aOR=0.68 (95% CI: 0.46, 1.00); and dining outdoor: South vs. Northeast aOR=1.44 (95% CI: 1.01, 2.06)).

DISCUSSION

We conducted a nationally representative survey of the U.S. population to understand risk perceptions related to transmission of COVID-19 for social interaction and essential activities. Overall, risk perceptions ranged widely, but were higher for activities which have been shown to present increased risk for COVID-19 infection, particularly large gatherings and indoor activities, suggesting effective information dissemination to the public regarding COVID-19 risk factors.[13] Risk perceptions for age and race varied by the type of activity. Men were more likely to view activities as safe compared to women, similar to findings elsewhere.[14] Individuals with higher income in our survey were more likely to view activities as safe, perhaps a result of facing fewer barriers to physical distancing.[15] This could also reflect wealth

differentials in the experience of the pandemic, with increased COVID-19 transmission and case volumes in low-income and minority populations.[16] There were few differences by education. Nearly universally, Democrats and independents were more likely than Republicans to view activities as unsafe, potentially a reflection of the highly polarized U.S. climate in which information about COVID-19 has been influenced by politics.

Previous studies about perceived health and economic risks associated with COVID-19 have shown significant differences in risk perception by age, gender, education, and other sociodemographic factors. A cross-sectional survey of U.S. adults conducted in March 2020 found lower risk perceptions, but higher prevalence of social distancing behaviors, among older adults.[17] Other studies have shown mixed results by age, with some reporting higher risk perceptions for older adults[18] and others lower.[19] Our study showed that older respondents were more likely to view social gatherings with many people and indoor activities as unsafe, yet more likely to view activities such as going to the grocery store, participating in outdoor activities, visiting elderly relatives, and visiting the doctor or emergency room as safe.

Studies have found lower perceived risk of COVID-19 infection and mortality among Black/African American persons.[17] Another study reported higher risk perceptions concerning COVID-19 in Native American/Alaska Native and Asian groups relative to Black/African American persons.[18] Associations between respondent race/ethnicity and risk perceptions in our study varied by activity; for some, such as attending gatherings, visiting grocery stores, and attending church, there were no significant differences between groups. However, Black/African American and, especially, Hispanic/Latino respondents were more likely to view several

activities, such as dining and visiting friends outdoor, as unsafe compared to White/Caucasian respondents. Evidence suggests that Black and Hispanic groups have higher rates of infection and mortality from COVID-19.[20] This raises questions as to how structural racism and socioeconomic and health disparities influence access to information and trust in health services and authorities in the context of the COVID-19 pandemic. Authors of a qualitative study in a rural Latino community suggested that risk perceptions and concerns were linked to stress of loss of employment.[21] Responsibility rests with politicians, health authorities, and community leaders to communicate evidence-based information in a manner that is honest and clear, easily accessible, and culturally appropriate. Respondents in the study of perceptions in the rural Latino community suggested, for example, a personalized approach to deliver information, by utilizing email or text messages from nearby universities, their medical providers, or the local health department.[9, 21]

Perceived risks of COVID-19 morbidity and mortality have not necessarily aligned with actual behaviors.[17] While some studies have shown close correlation between perceived disease severity and preventive behaviors, others have reported discrepancies between perceived disease risk and adherence to prevention behaviors; this suggests that efforts to change risk perceptions alone may be inappropriate and inadequate.[22, 23] Examining how sociodemographic factors influence risk perceptions and behaviors could identify how inequities lead to increased health risks in specific disadvantaged groups. Further, risk perceptions are likely to vary by location, local COVID-19 incidence, and over time as more information becomes available, factors such as ‘pandemic fatigue’ increase in prevalence, and more recent experiences exert a stronger influence on how people view the pandemic. In the U.S., many published studies to date were

conducted during the early phases of the pandemic and focused on perceived risks of infection or mortality and health behaviors, often without detailed information on race/ethnicity.[22, 24] Our findings supplement this body of evidence by providing insights into perceived risks for specific activities, sufficient sample size to explore associations by race/ethnicity, and status of these perceptions during a later stage of the COVID-19 pandemic.

This study had limitations. Selection bias associated with online surveys is well established, for example, underrepresenting individuals who are older, without internet access, have lower income, and have less formal education; this effect is difficult to quantify, in either direction or magnitude, and may limit the generalizability of our results. However, the digital divide in internet access has shrunk over time.[25] Despite our large sample size, samples for strata of important participant characteristics, including certain racial and ethnic minorities, were too small to provide sufficient statistical power for our analyses; still, we had sufficient statistical power to examine racial and ethnic differences between Black/African American, Hispanic/Latino, and White/Caucasian groups, which very few studies have done. Our questionnaire did not collect data on some characteristics that could affect risk perceptions, including presence of underlying health conditions, type of employment, or whether the respondent knew someone who had been infected with COVID-19.

CONCLUSION

Our findings suggest the importance of socioeconomic differences, health disparities, and structural racism for efforts to control the COVID-19 pandemic, including preventive behaviors, care seeking for testing and treatment, and vaccination strategies. Further research should

address how evidence-based interventions and programs can be tailored in consideration of these barriers with a goal of increased health equity in the pandemic response.

Competing interests: SHM reports personal fees from Gilead Sciences, outside the submitted work. SSS reports grants/products from Gilead Sciences and grants/products from Abbott Diagnostics, outside the submitted work.

Funding: This research was supported by a grant from the Johnson & Johnson Foundation (J&J Grant 90089979) and Johns Hopkins University COVID-19 Research Respond Fund.

Acknowledgments: We appreciate the team at Dynata for working closely with us during collection of the data. We would also like to recognize the Johns Hopkins University COVID-19 Research Response Fund for their initial support in getting this project off the ground. Thank you also to Dr. Gregory Kirk for help in developing the initial project plan. Lastly, thank you to the Johnson & Johnson Foundation for supporting this research project.

Data sharing: Data can be made available upon reasonable request.

Patient and Public Involvement: Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

Authors' contribution: SM, SS, DG, SA, and AL created the questionnaire and designed the survey. DG worked with Dynata to collect the data. DE, AZ, and PB conducted the analysis and drafted the manuscript. All authors contributed to the analysis, interpretation of the results, and reviewed and provided inputs to the manuscript.

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Figure title and legends

Figure 1: Participant risk perceptions for each activity

Figure 1: Percentages are the weighted estimates adjusted for race by Census region to match the overall U.S. population. Extremely safe and somewhat safe and extremely unsafe and somewhat unsafe response categories were collapsed into safe and unsafe, respectively.

Figure 2: Adjusted odds ratios of perceiving large gatherings and activities in public as unsafe for all participants

Figure 2: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

Figure 3: Adjusted odds ratios and 95% CIs of perceiving indoor and outdoor dining and visits with friends and relatives as unsafe for all participants

Figure 3: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

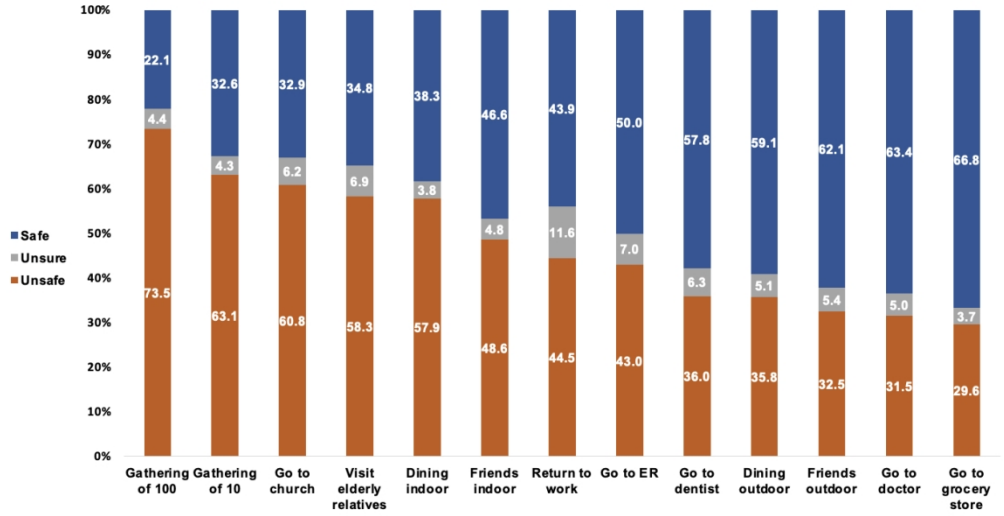

Figure 1: Participant risk perceptions for each activity

Figure 1: Percentages are the weighted estimates adjusted for race by Census region to match the overall U.S. population. Extremely safe and somewhat safe and extremely unsafe and somewhat unsafe response categories were collapsed into safe and unsafe, respectively.

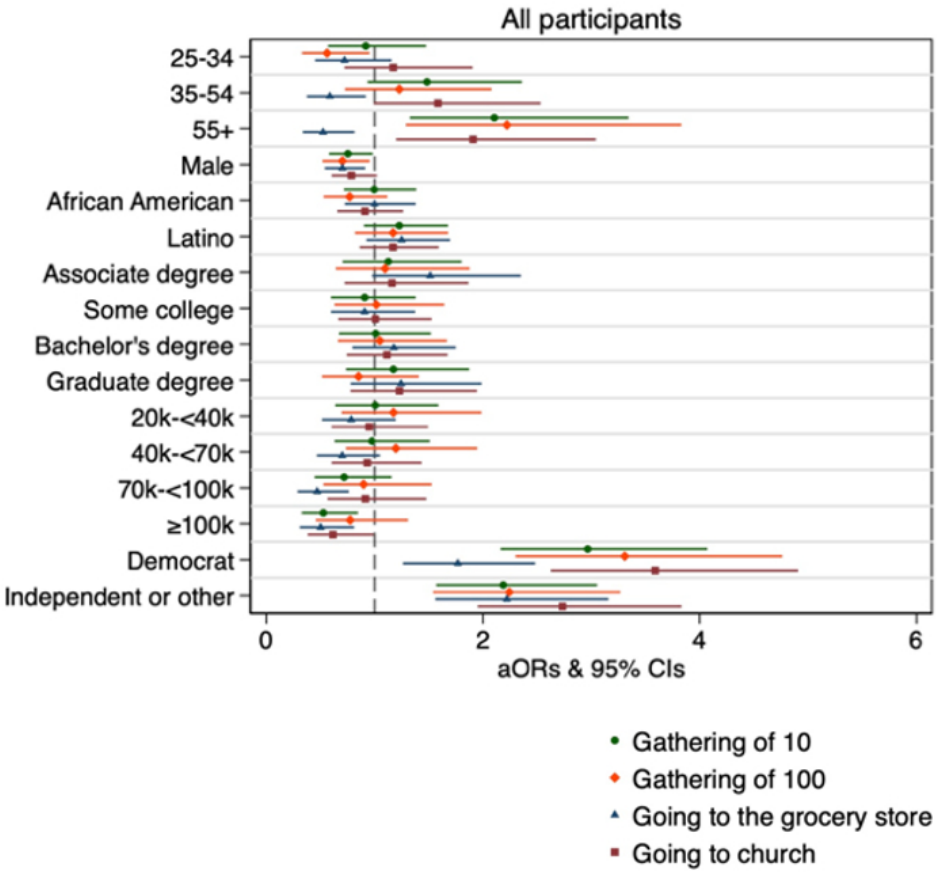

Figure 2: Adjusted odds ratios of perceiving large gatherings and activities in public as unsafe for all participants

Figure 2: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

259x230mm (72 x 72 DPI)

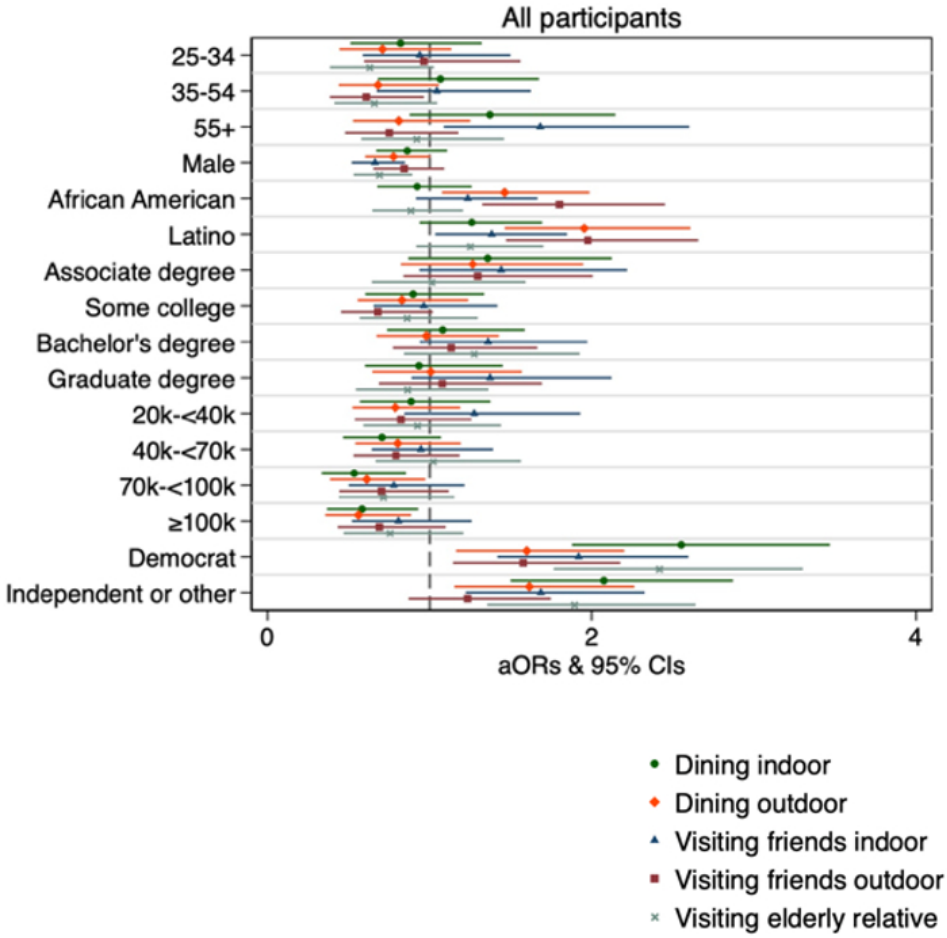

Figure 3: Adjusted odds ratios and 95% CIs of perceiving indoor and outdoor dining and visits with friends and relatives as unsafe for all participants
Figure 3: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

260x248mm (72 x 72 DPI)

Supplementary Table 1: Unadjusted and adjusted Odds Ratios and 95% CIs for Perceiving Activities as Unsafe

Characteristic	Gathering of 10 or more		Gathering of 100 or more		Going to grocery store		Going to church	
Age (years)	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
18-24	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25-34	0.84 (0.55, 1.28)	0.91 (0.57, 1.46)	**0.57 (0.36, 0.90)**	**0.56 (0.33, 0.95)**	0.68 (0.44, 1.03)	0.72 (0.44, 1.17)	0.92 (0.60, 1.42)	1.16 (0.71, 1.88)
35-44	0.82 (0.53, 1.27)	1.17 (0.71, 1.92)	0.67 (0.42, 1.08)	0.86 (0.49, 1.50)	**0.55 (0.36, 0.85)**	0.63 (0.38, 1.03)	0.83 (0.53, 1.28)	1.11 (0.67, 1.83)
45-54	1.50 (0.95, 2.37)	**2.01 (1.16, 3.46)**	1.68 (0.97, 2.90)	**2.12 (1.11, 4.02)**	**0.51 (0.32, 0.81)**	**0.54 (0.32, 0.89)**	**1.95 (1.20, 3.18)**	**2.56 (1.47, 4.46)**
55-64	1.43 (0.89, 2.28)	**1.85 (1.11, 3.08)**	1.37 (0.80, 2.35)	1.68 (0.92, 3.07)	**0.53 (0.33, 0.83)**	**0.59 (0.36, 0.97)**	1.34 (0.84, 2.13)	**1.73 (1.03, 2.90)**
65+	**2.20 (1.37, 3.54)**	**2.39 (1.41, 4.06)**	**3.14 (1.72, 5.74)**	**3.08 (1.60, 5.94)**	**0.44 (0.28, 0.69)**	**0.46 (0.27, 0.77)**	**1.89 (1.18, 3.01)**	**2.10 (1.25, 3.52)**
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Male	0.79 (0.62, 1.00)	**0.73 (0.56, 0.96)**	**0.73 (0.56, 0.95)**	**0.68 (0.50, 0.92)**	**0.69 (0.54, 0.88)**	**0.71 (0.55, 0.92)**	**0.74 (0.58, 0.94)**	**0.76 (0.58, 0.99)**
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black/African American	**1.33 (1.00, 1.77)**	1.02 (0.73, 1.42)	1.12 (0.82, 1.52)	0.80 (0.55, 1.16)	1.29 (0.98, 1.71)	0.99 (0.73, 1.36)	1.25 (0.94, 1.65)	0.94 (0.68, 1.31)
Hispanic/Latino	**1.39 (1.05, 1.84)**	1.25 (0.92, 1.71)	**1.39 (1.00, 1.92)**	1.22 (0.85, 1.75)	**1.35 (1.01, 1.79)**	1.24 (0.91, 1.68)	1.32 (0.99, 1.75)	1.20 (0.88, 1.64)
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Associate degree	0.96 (0.63, 1.46)	1.13 (0.70, 1.80)	0.93 (0.58, 1.49)	1.09 (0.63, 1.86)	1.10 (0.73, 1.64)	1.51 (0.98, 2.34)	1.01 (0.67, 1.53)	1.17 (0.73, 1.89)
Some college	0.94 (0.64, 1.38)	0.88 (0.58, 1.34)	1.00 (0.65, 1.56)	0.96 (0.60, 1.56)	0.80 (0.54, 1.18)	0.92 (0.62, 1.39)	1.01 (0.69, 1.49)	0.98 (0.65, 1.48)
Bachelor's Degree	0.85 (0.61, 1.20)	0.96 (0.64, 1.45)	0.89 (0.60, 1.30)	0.97 (0.61, 1.54)	0.76 (0.54, 1.07)	1.21 (0.83, 1.80)	1.02 (0.72, 1.44)	1.05 (0.70, 1.57)
Graduate Degree	0.87 (0.60, 1.28)	1.16 (0.73, 1.86)	0.72 (0.47, 1.09)	0.82 (0.49, 1.36)	0.84 (0.58, 1.23)	1.27 (0.79, 2.03)	0.99 (0.68, 1.45)	1.22 (0.77, 1.93)
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
$20,000-<$40,000	1.16 (0.77, 1.74)	1.00 (0.64, 1.58)	1.32 (0.83, 2.10)	1.18 (0.70, 1.99)	0.82 (0.56, 1.21)	0.79 (0.51, 1.21)	1.06 (0.71, 1.60)	0.94 (0.60, 1.48)
$40,000-<$70,000	1.00 (0.68, 1.47)	0.99 (0.64, 1.54)	1.29 (0.84, 1.98)	1.24 (0.76, 2.03)	0.74 (0.52, 1.06)	0.70 (0.47, 1.06)	1.04 (0.72, 1.51)	0.95 (0.62, 1.47)
$70,000-<$100,000	0.80 (0.53, 1.21)	0.77 (0.48, 1.24)	0.87 (0.56, 1.37)	1.01 (0.59, 1.73)	**0.50 (0.33, 0.77)**	**0.46 (0.28, 0.74)**	1.02 (0.68, 1.54)	1.01 (0.63, 1.63)
≥$100,000	**0.55 (0.38, 0.81)**	**0.57 (0.35, 0.91)**	0.67 (0.44, 1.02)	0.88 (0.51, 1.51)	**0.56 (0.37, 0.83)**	**0.49 (0.30, 0.79)**	0.68 (0.46, 1.00)	0.68 (0.42, 1.09)
Political party								

Republican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**3.13 (2.35, 4.18)**	**2.88 (2.10, 3.96)**	**3.16 (2.29, 4.34)**	**3.18 (2.20, 4.59)**	**1.92 (1.42, 2.60)**	**1.80 (1.22, 2.64)**	**3.28 (2.48, 4.34)**	**3.47 (2.53, 4.77)**
Independent or other	**2.12 (1.55, 2.90)**	**2.12 (1.52, 2.96)**	**2.14 (1.53, 3.01)**	**2.15 (1.47, 3.15)**	**2.34 (1.68, 3.25)**	**2.25 (1.53, 3.31)**	**2.30 (1.69, 3.12)**	**2.62 (1.87, 3.69)**
Characteristic								
Age (years)	**Dining indoor**		**Dining outdoor**		**Visiting friends indoor**		**Visiting friends outdoor**	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
18-24	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25-34	0.78 (0.51, 1.19)	0.82 (0.51, 1.31)	**0.64 (0.42, 0.97)**	0.71 (0.44, 1.13)	1.09 (0.72, 1.65)	0.93 (0.59, 1.49)	0.92 (0.60, 1.41)	0.97 (0.60, 1.57)
35-44	0.76 (0.49, 1.18)	0.94 (0.58, 1.54)	**0.50 (0.32, 0.77)**	0.70 (0.43, 1.14)	0.99 (0.65, 1.51)	0.93 (0.58, 1.50)	**0.54 (0.34, 0.83)**	0.68 (0.41, 1.12)
45-54	1.21 (0.78, 1.89)	1.23 (0.74, 2.05)	**0.49 (0.31, 0.78)**	0.66 (0.40, 1.09)	1.39 (0.91, 2.14)	1.19 (0.73, 1.96)	**0.46 (0.29, 0.75)**	**0.54 (0.32, 0.91)**
55-64	1.28 (0.81, 2.02)	1.35 (0.82, 2.21)	0.72 (0.47, 1.12)	0.86 (0.53, 1.39)	**1.87 (1.20, 2.92)**	**1.80 (1.14, 2.83)**	0.66 (0.42, 1.05)	0.74 (0.45, 1.22)
65+	1.47 (0.93, 2.32)	1.39 (0.84, 2.29)	0.67 (0.44, 1.05)	0.77 (0.47, 1.24)	**1.93 (1.25, 2.98)**	1.58 (0.99, 2.53)	0.67 (0.43, 1.05)	0.76 (0.46, 1.25)
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Male	**0.78 (0.62, 0.98)**	0.85 (0.66, 1.09)	**0.73 (0.58, 0.92)**	0.78 (0.60, 1.01)	**0.63 (0.51, 0.79)**	**0.65 (0.51, 0.84)**	0.83 (0.66, 1.05)	0.85 (0.66, 1.10)
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black/African American	1.27 (0.97, 1.66)	0.93 (0.68, 1.28)	**1.84 (1.40, 2.42)**	**1.46 (1.07, 1.98)**	**1.42 (1.09, 1.85)**	1.24 (0.93, 1.68)	**2.23 (1.69, 2.93)**	**1.79 (1.31, 2.44)**
Hispanic/Latino	**1.41 (1.07, 1.86)**	1.27 (0.94, 1.71)	**2.08 (1.58, 2.73)**	**1.94 (1.45, 2.60)**	**1.46 (1.12, 1.91)**	**1.39 (1.04, 1.85)**	**2.12 (1.60, 2.80)**	**1.97 (1.47, 2.65)**
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Associate degree	0.98 (0.65, 1.46)	1.36 (0.87, 2.13)	0.97 (0.65, 1.43)	1.26 (0.82, 1.94)	1.12 (0.76, 1.66)	1.44 (0.93, 2.22)	0.94 (0.63, 1.41)	1.30 (0.84, 2.00)
Some college	0.79 (0.54, 1.14)	0.89 (0.60, 1.33)	0.80 (0.55, 1.16)	0.84 (0.56, 1.25)	0.87 (0.61, 1.25)	0.96 (0.65, 1.42)	**0.65 (0.44, 0.95)**	0.68 (0.45, 1.02)
Bachelor's Degree	0.79 (0.57, 1.09)	1.06 (0.72, 1.56)	0.75 (0.54, 1.05)	0.99 (0.68, 1.44)	1.04 (0.76, 1.43)	1.35 (0.93, 1.96)	0.85 (0.61, 1.19)	1.14 (0.78, 1.68)
Graduate Degree	0.73 (0.51, 1.06)	0.94 (0.60, 1.46)	0.69 (0.47, 1.00)	1.02 (0.65, 1.59)	1.06 (0.74, 1.52)	1.39 (0.90, 2.15)	0.76 (0.53, 1.10)	1.07 (0.68, 1.69)
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
$20,000-<$40,000	1.06 (0.71, 1.57)	0.89 (0.57, 1.37)	0.84 (0.57, 1.23)	0.79 (0.52, 1.19)	**1.51 (1.03, 2.20)**	1.28 (0.85, 1.94)	0.99 (0.67, 1.46)	0.82 (0.54, 1.26)
$40,000-<$70,000	0.81 (0.56, 1.18)	0.71 (0.47, 1.08)	0.77 (0.54, 1.10)	0.80 (0.54, 1.19)	1.02 (0.71, 1.46)	0.96 (0.65, 1.43)	0.80 (0.55, 1.15)	0.79 (0.53, 1.18)

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$70,000-<$100,000	**0.62 (0.42, 0.93)**	**0.56 (0.35, 0.89)**	**0.66 (0.45, 0.98)**	**0.61 (0.38, 0.97)**	0.95 (0.64, 1.39)	0.81 (0.53, 1.23)	0.86 (0.58, 1.29)	0.68 (0.43, 1.09)
≥$100,000	**0.60 (0.41, 0.88)**	**0.60 (0.38, 0.97)**	**0.51 (0.34, 0.75)**	**0.56 (0.35, 0.88)**	0.94 (0.65, 1.36)	0.83 (0.57, 1.23)	0.71 (0.48, 1.06)	0.67 (0.42, 1.08)
Political party								
Republican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**2.56 (1.94, 3.38)**	**2.52 (1.85, 3.43)**	**1.95 (1.47, 2.58)**	**1.61 (1.17, 2.22)**	**2.13 (1.62, 2.81)**	**1.91 (1.41, 2.57)**	**1.87 (1.40, 2.48)**	**1.59 (1.15, 2.20)**
Independent or other	**1.87 (1.38, 2.53)**	**2.04 (1.48, 2.83)**	**1.65 (1.21, 2.26)**	**1.62 (1.16, 2.28)**	**1.66 (1.23, 2.25)**	**1.66 (1.20, 2.30)**	1.29 (0.94, 1.78)	1.25 (0.88, 1.77)

Characteristic								
Age (years)	**Going to doctor**		**Going to dentist**		**Going to ER**			
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**		
18-24	Ref	Ref	Ref	Ref	Ref	Ref		
25-34	0.78 (0.51, 1.19)	0.75 (0.46, 1.20)	**0.63 (0.41, 0.97)**	0.75 (0.47, 1.21)	0.91 (0.59, 1.40)	0.76 (0.48, 1.21)		
35-44	0.71 (0.45, 1.10)	0.69 (0.42, 1.13)	0.77 (0.50, 1.20)	1.01 (0.62, 1.65)	0.91 (0.58, 1.40)	0.84 (0.52, 1.36)		
45-54	0.71 (0.46, 1.12)	0.69 (0.42, 1.15)	0.73 (0.47, 1.14)	0.86 (0.52, 1.44)	1.00 (0.64, 1.55)	0.86 (0.53, 1.41)		
55-64	**0.60 (0.38, 0.95)**	**0.59 (0.36, 0.97)**	0.81 (0.52, 1.27)	0.91 (0.55, 1.49)	0.89 (0.57, 1.40)	0.74 (0.46, 1.20)		
65+	**0.40 (0.25, 0.65)**	**0.32 (0.19, 0.54)**	0.66 (0.42, 1.03)	0.72 (0.44, 1.18)	**0.63 (0.40, 0.98)**	**0.48 (0.29, 0.80)**		
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref		
Male	**0.68 (0.54, 0.86)**	**0.74 (0.57, 0.96)**	**0.75 (0.60, 0.95)**	0.83 (0.64, 1.07)	**0.61 (0.48, 0.76)**	**0.62 (0.48, 0.80)**		
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref		
Black/African American	**1.42 (1.08, 1.87)**	1.25 (0.91, 1.72)	**1.50 (1.14, 1.97)**	1.25 (0.91, 1.70)	1.09 (0.83, 1.42)	0.95 (0.71, 1.28)		
Hispanic/Latino	1.24 (0.94, 1.64)	1.19 (0.88, 1.61)	**1.63 (1.23, 2.15)**	**1.63 (1.22, 2.18)**	**1.42 (1.09, 1.86)**	**1.34 (1.01, 1.80)**		
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref		
Associate degree	1.01 (0.67, 1.52)	1.38 (0.89, 2.15)	1.13 (0.76, 1.68)	1.42 (0.92, 2.18)	1.16 (0.78, 1.72)	**1.55 (1.01, 2.38)**		
Some college	0.78 (0.53, 1.15)	1.07 (0.71, 1.63)	0.93 (0.64, 1.35)	0.97 (0.65, 1.45)	0.96 (0.66, 1.39)	1.16 (0.78, 1.72)		
Bachelor's Degree	0.74 (0.52, 1.04)	1.10 (0.74, 1.65)	0.74 (0.53, 1.04)	0.94 (0.64, 1.39)	0.92 (0.67, 1.28)	1.28 (0.87, 1.88)		
Graduate Degree	0.94 (0.65, 1.37)	1.54 (0.97, 2.46)	0.77 (0.53, 1.12)	1.10 (0.70, 1.72)	0.90 (0.63, 1.30)	1.35 (0.87, 2.10)		
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref		

$20,000-<$40,000	0.71 (0.49, 1.04)	**0.62 (0.41, 0.94)**	0.79 (0.54, 1.16)	0.70 (0.46, 1.06)	0.84 (0.58, 1.23)	0.70 (0.46, 1.06)
$40,000-<$70,000	0.72 (0.50, 1.04)	**0.63 (0.42, 0.96)**	0.72 (0.50, 1.04)	0.68 (0.46, 1.02)	0.86 (0.60, 1.23)	0.72 (0.47, 1.09)
$70,000-<$100,000	**0.59 (0.40, 0.88)**	**0.52 (0.32, 0.84)**	**0.63 (0.43, 0.94)**	**0.62 (0.39, 0.97)**	**0.66 (0.44, 0.98)**	**0.57 (0.35, 0.93)**
≥$100,000	**0.51 (0.34, 0.75)**	**0.44 (0.27, 0.72)**	**0.54 (0.37, 0.79)**	**0.53 (0.33, 0.84)**	**0.58 (0.40, 0.85)**	**0.51 (0.32, 0.81)**
Political party						
Republican	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**1.43 (1.07, 1.93)**	1.31 (0.94, 1.81)	**1.79 (1.34, 2.40)**	**1.64 (1.20, 2.25)**	**1.72 (1.31, 2.27)**	**1.47 (1.08, 2.00)**
Independent or other	**1.38 (1.00, 1.92)**	1.39 (0.98, 1.96)	**1.74 (1.26, 2.39)**	**1.76 (1.26, 2.47)**	**1.61 (1.18, 2.19)**	**1.58 (1.14, 2.20)**

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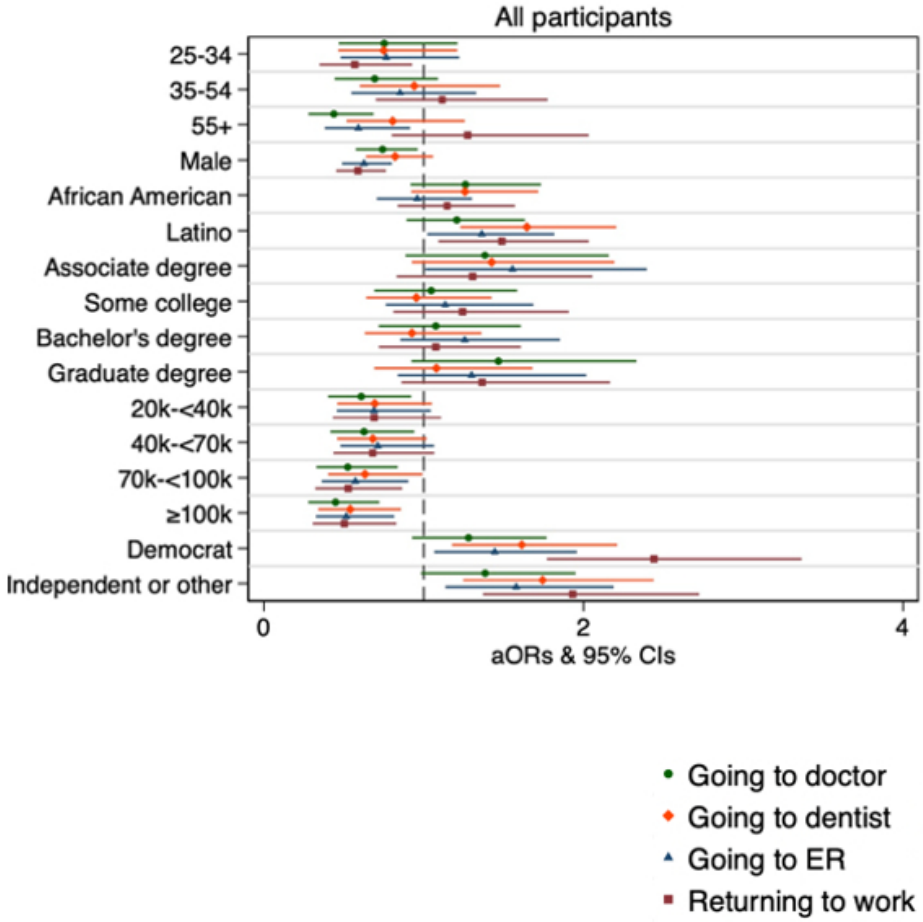
Supplementary Table 2: Unadjusted and Adjusted Odds Ratios and 95% CIs for Perceiving Visiting Elderly Relatives and Returning to Work as Unsafe with Interaction Term for Age and Race

	Unadjusted odds ratios (95% CIs) of Perceiving an Activity as Unsafe	
Age (years)	**Visiting elderly relatives**	**Returning to work**
18-24	Ref	Ref
25-34	0.62 (0.40, 0.96)	0.62 (0.40, 0.95)
35-44	0.53 (0.34, 0.83)	0.79 (0.51, 1.23)
45-54	0.66 (0.41, 1.05)	1.04 (0.65, 1.68)
55-64	0.79 (0.49, 1.27)	0.92 (0.58, 1.47)
65+	0.97 (0.61, 1.55)	1.53 (0.95, 2.45)
Gender		
Female	Ref	Ref
Male	0.65 (0.52, 0.83)	0.60 (0.47, 0.76)
Race		
White/Caucasian	Ref	Ref
Black/African American	1.24 (0.94, 1.64)	1.51 (1.15, 1.98)
Hispanic/Latino	1.49 (1.12, 1.98)	1.57 (1.18, 2.08)
Education		
High school or less	Ref	Ref
Associate degree	0.77 (0.51, 1.16)	1.04 (0.69, 1.57)
Some college (no degree)	0.74 (0.51, 1.08)	1.09 (0.74, 1.60)
Bachelor's Degree	0.97 (0.68, 1.37)	0.81 (0.57, 1.14)
Graduate Degree	0.63 (0.43, 0.92)	0.97 (0.66, 1.41)
Income		
<$20,000	Ref	Ref
$20,000-<$40,000	1.08 (0.72, 1.62)	0.75 (0.50, 1.14)
$40,000-<$70,000	1.10 (0.76, 1.60)	0.69 (0.47, 1.01)
$70,000-<$100,000	0.84 (0.56, 1.26)	0.59 (0.39, 0.89)
≥$100,000	0.71 (0.48, 1.04)	0.53 (0.36, 0.80)
Political party		
Republican	Ref	Ref
Democrat	2.43 (1.84, 3.21)	2.99 (2.25, 3.97)
Independent or other	1.72 (1.26, 2.33)	2.06 (1.50, 2.82)

Characteristic	Adjusted odds ratios (95% CIs) of Perceiving an Activity as Unsafe	
Age (years)	**Visiting elderly relatives**	**Returning to work**
18-24 White/Caucasian	Ref	Ref
25-34 White/Caucasian	**0.36 (0.15, 0.83)**	**0.31 (0.15, 0.67)**
35-44 White/Caucasian	**0.34 (0.14, 0.78)**	0.55 (0.26, 1.17)
45-54 White/Caucasian	**0.36 (0.15, 0.85)**	0.85 (0.40, 1.81)
55-64 White/Caucasian	**0.41 (0.17, 0.97)**	0.47 (0.21, 1.06)
65+ White/Caucasian	0.46 (0.19, 1.08)	0.89 (0.41, 1.94)
Race		
18-24 Black/African American	**0.22 (0.08, 0.57)**	**0.34 (0.15, 0.81)**
18-24 Hispanic/Latino	0.56 (0.19, 1.59)	0.72 (0.28, 1.84)
Age x Race interactions		
25-34#Black/African American	**4.33 (1.40, 13.41)**	**4.95 (1.72, 14.24)**
25-34#Hispanic/Latino	1.68 (0.50, 5.68)	2.22 (0.71, 6.95)
35-44#Black/African American	3.03 (0.95, 9.68)	2.79 (0.94, 8.26)
35-44#Hispanic/Latino	2.92 (0.83, 10.27)	2.50 (0.77, 8.07)
45-54#Black/African American	**5.56 (1.59, 19.48)**	**3.87 (1.18, 12.71)**
45-54#Hispanic/Latino	2.24 (0.60, 8.42)	1.32 (0.40, 4.40)
55-64#Black/African American	**10.66 (2.91, 39.00)**	**9.24 (2.75, 31.04)**
55-64#Hispanic/Latino	3.37 (0.93, 12.22)	2.96 (0.89, 9.85)
65+#Black/African American	**6.48 (1.89, 22.21)**	3.12 (0.98, 9.92)
65+#Hispanic/Latino	2.60 (0.72, 9.40)	3.60 (0.99, 13.02)
Gender		
Female	Ref	Ref
Male	**0.69 (0.53, 0.90)**	**0.57 (0.44, 0.75)**
Education		
High school or less	Ref	Ref
Associate degree	1.06 (0.67, 1.68)	1.38 (0.87, 2.19)
Some college (no degree)	0.90 (0.59, 1.38)	1.27 (0.82, 1.99)
Bachelor's Degree	1.35 (0.89, 2.05)	1.10 (0.73, 1.66)
Graduate Degree	0.92 (0.58, 1.47)	1.43 (0.89, 2.30)
Income		
<$20,000	Ref	Ref
$20,000-<$40,000	0.88 (0.56, 1.37)	0.67 (0.42, 1.08)
$40,000-<$70,000	0.97 (0.63, 1.49)	0.66 (0.42, 1.05)
$70,000-<$100,000	0.67 (0.41, 1.09)	**0.54 (0.33, 0.90)**
≥$100,000	0.72 (0.44, 1.16)	**0.52 (0.31, 0.87)**
Political party		
Democrat	Ref	Ref
Republican	**2.40 (1.74, 3.31)**	**2.36 (1.70, 3.28)**
Independent or other	**1.96 (1.40, 2.76)**	**1.94 (1.36, 2.76)**



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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7
Bias	9	Describe any efforts to address potential sources of bias	5-6
Study size	10	Explain how the study size was arrived at	5-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	7
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	5-7
		(*e*) Describe any sensitivity analyses	7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8-9
		(b) Give reasons for non-participation at each stage	8-9
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10-13

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-13
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-13
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

COVID-19 risk perceptions of social interaction and essential activities and inequity in the United States: Results from a nationally representative survey

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-051882.R1
Article Type:	Original research
Date Submitted by the Author:	22-Nov-2021
Complete List of Authors:	Erchick, Daniel; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Zapf, Alexander ; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Baral, Prativa; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Edwards, Jeffrey; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Mehta, Shruti; Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology Solomon, Sunil; Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology; Johns Hopkins University School of Medicine, Department of Medicine, Division of Infectious Diseases Gibson, Dustin; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Agarwal, Smisha; Johns Hopkins University Bloomberg School of Public Health, Department of International Health Labrique, AB; Johns Hopkins Bloomberg School of Public Health, Department of International Health; Johns Hopkins University Bloomberg School of Public Health, Johns Hopkins University Global mHealth Initiative
Primary Subject Heading:	Public health
Secondary Subject Heading:	Epidemiology
Keywords:	COVID-19, Public health < INFECTIOUS DISEASES, EPIDEMIOLOGY

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COVID-19 risk perceptions of social interaction and essential activities and inequity in the United States: Results from a nationally representative survey

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Word count: 2,999

Key words: COVID-19, inequity, risk perceptions

ABSTRACT

Introduction: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has disproportionately affected disadvantaged communities across the United States. Risk perceptions for social interactions and essential activities during the COVID-19 pandemic may vary by sociodemographic factors.

Methods: We conducted a nationally representative online survey of 1,592 adults in the United States to understand risk perceptions related to transmission of COVID-19 for social (e.g., visiting friends) and essential activities (e.g., medical visits or returning to work). We assessed relationships for activities using bivariate comparisons and multivariable logistic regression modeling, between responses of safe and unsafe, and participant characteristics. Data were collected and analyzed in 2020.

Results: Among 1,592 participants, risk perceptions of unsafe for 13 activities ranged from 29.2% to 73.5%. Large gatherings, indoor dining, and visits with elderly relatives had the highest proportion of unsafe responses (>58%) while activities outdoor, accessing health care, and going to the grocery store had the lowest (<36%). Older respondents were more likely to view social gatherings and indoor activities as unsafe, but less likely for other activities, such as going to the grocery store and accessing health care. Compared to White/Caucasian respondents, Black/African American and Hispanic/Latino respondents were more likely to view activities such as dining and visiting friends outdoor as unsafe. Generally, men vs. women, Republicans vs. Democrats and independents, and individuals with higher vs. lower income were more likely to view activities as safe.

Conclusion: Evidence-based interventions should be tailored to sociodemographic differences in risk perception, access to information, and health behaviors when implementing efforts to control the COVID-19 pandemic.

Strengths and limitations of this study

- Our study had a large sample size of sufficient size to explore associations by race/ethnicity and other important participant characteristics.
- We provided insights into perceived risks for specific activities during a later stage of the COVID-19 pandemic than previous studies.
- Our findings suggest the importance of socioeconomic differences, health disparities, and structural racism for efforts to control the COVID-19 pandemic.
- Selection bias associated with online surveys is well established; for example, underrepresenting individuals who are older, without internet access, have lower income, and have less formal education.
- Numbers of participants for some participant characteristics, including certain racial and ethnic minorities, were too small to provide sufficient statistical power for our analyses.

INTRODUCTION

As of November 2021, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease (COVID-19), has infected more than 47 million people and contributed to over 767,000 deaths in the United States.[1] The negative health and social consequences of the COVID-19 pandemic – including morbidity and mortality; decreased access to health care; and lost jobs and economic hardships – have not been experienced equally, and instead have impacted certain communities in greater numbers and with increased severity. For example, COVID-19 related diagnoses, hospitalizations, and deaths have disproportionately affected Black communities[2] and those in poverty,[3] demonstrating the impact of structural racism and health disparities in disadvantaged populations.[4]

Numerous COVID-19 pandemic, tracking, mapping, and monitoring tools have emerged, covering a wide array of indicators from testing capacity to daily case counts and deaths to policy interventions.[5, 6] While data collected from these trackers provide critical insights into the COVID-19 pandemic trajectory and public health response measures, they rarely address upstream socio-behavioral aspects, such as risk perceptions, knowledge and access to information, spread of misinformation, and agency and stigma. Yet access to information and health literacy vary by age, gender, and race and other characteristics with important implications for risk perceptions, behaviors, and health outcomes, including COVID-19 infection and mortality.[7]

Few studies have sought to estimate prevalence of risk perceptions related to social interaction or essential activities during the COVID-19 pandemic or explore associations between these

perceptions and sociodemographic factors, including by age, race, income, or education.[8, 9] Differences in risk perceptions could provide insights into the determinants of risk perception and health knowledge and subsequent behaviors related to the COVID-19 pandemic, while also helping to inform development of targeted communication campaigns and preventive interventions.[10, 11]

The National Pandemic Pulse is a United States-population representative, internet phone/computer survey designed to obtain data on preventive behaviors, risk perceptions, agency and stigma, and misinformation related to the ongoing COVID-19 pandemic across census regions.[12] Our aim is to examine relationships between these issues and sociodemographic factors, especially age, race, income, and education, to understand how systematic racism and inequity impact health and wellbeing in the context of the COVID-19 pandemic. Here we present findings from the first national Pandemic Pulse Survey to understand racial and sociodemographic differences in risk perceptions of social interaction and essential activities during the COVID-19 pandemic.

METHODS

Study population

We conducted a cross-sectional online survey of adults currently living in the U.S. ages 18 and older from September 1st to 7th, 2020. The sample was selected from an online panel to represent the U.S. Census population using pre-specified demographic quotas for age, gender, race, census region, and income. Black/African American and Hispanic/Latino respondents were over-sampled by approximately 385 individuals per group to increase power for analyses comparing

risk perceptions by ethnicity/race groups. This sample allowed for detection of a 10% difference in proportions between White, Black, and Hispanic ethnicity/race groups assuming power of 80%, type I error rate of 0.05, and a baseline prevalence of 40%-60%. Dynata – a market research firm (https://www.dynata.com) that maintains a large first-party global data platform, including 62 million panelists with accompanying demographic information – selected a random sample from their database to match the U.S. Census estimates. Dynata sent invitations by email to 16,904 panelists matching the required demographic targets of the survey until each quota was filled. The survey response rate was 10.0% and completion rate among eligible respondents was 95.3%. Survey responses were excluded for the following reasons: age less than 18 (n=47), residence outside United States (n=3), ethnicity/race for which sample quota was already filled (n=171), refusal of consent (n=72), and partial interview (n=77). Security and data quality checks utilized included digital fingerprinting and spot-checking via third-party verification to confirm the identity of the respondents and prevent duplication. Participants received a small compensation for survey completion.

Questionnaire

A team of experts at Johns Hopkins Bloomberg School of Public Health collated COVID-19 questions from existing surveys and created new questions to address existing gaps in the literature. In a module on risk perception, the focus of this analysis, participants were presented with a series of thirteen activities related to social (e.g., visiting friends or dining in restaurants) and essential activities (e.g., medical visits or returning to work) and asked to respond to the question: *How safe or unsafe do you think the following activities are in terms of your getting COVID-19 or giving it to someone else?* (Supplementary Figure 1). Allowed responses included

extremely safe, somewhat safe, somewhat unsafe, extremely unsafe, unsure, and prefer not to say. For the purpose of this analysis, we collapsed extremely and somewhat categories into perceptions of 'safe' and 'unsafe'.

Statistical analysis

All analyses were adjusted for the study design using survey weights for race by Census region generated using the 2010 U.S. Census estimates. We presented a histogram of the prevalence of risk perceptions for the overall study population (responses of safe, unsafe, and unsure) for each of the thirteen activities. We assessed bivariate relationships between a three-level categorical (safe, unsafe, unsure) variable and participant characteristics for each activities. We reported the absolute percent difference in perceptions between levels of participant characteristics variables and assessed statistical significance using Pearson's chi-squared tests. We used multivariable logistic regression models to calculate unadjusted and adjusted odds ratios (OR and aOR) of perceiving each activity as unsafe vs. safe and associated 95% confidence intervals (CIs) (responses of unsure were excluded from regression analyses). Participant demographic and socioeconomic characteristics included in multivariable models were age, gender, race/ethnicity, education, income, census region, and political affiliation. To assess differences in risk perceptions by age and race, we presented regression models overall for all participants and stratified by White/Caucasian, Black/African American, and Hispanic/Latino groups. Multivariable logistic regression models were also extended to include interaction terms for age and race and assessed for significance using Wald tests ($p<0.05$). Statistical analyses were conducted in Stata 16.1 (StataCorp, College Station, Texas, USA).

Ethical approval

Participants provided electronic consent to participate by responding to a question on the survey. The study received ethical approval from the Institutional Review Board at Johns Hopkins Bloomberg School of Public Health, Baltimore, USA (IRB00012413).

RESULTS

Participant characteristics

Complete responses from 1,592 respondents were included in this analysis. Roughly half of respondents were less than 45 years old (52.2%) and female (49.5%) (weighted percentages; Table 1). Participants were 60.0% White/Caucasian, 12.4% Black/African American, and 18.4% Hispanic/Latino. Risk perceptions of unsafe for the 13 activities ranged from 29.6% to 73.5% and unsure from 3.7% to 11.6% (Figure 1). Large gatherings (of 10, 100, and church), indoor dining, and visits with elderly relatives had the highest proportion of unsafe responses (>58%) while activities outdoor (dining, visiting friends), visiting the doctor or dentist, and going to the grocery store had the lowest (<36%).

Table 1: Participant characteristics~

Characteristic	n=1,592*	Percent+
Age (years)		
18-24	187	10.3
25-34	352	21.7
35-44	305	20.2
45-54	245	16.3
55-64	239	14.7
65+	264	16.8
Gender		
Female	800	49.5
Male	786	50.5
Other	1	0.0
Race		

White/Caucasian	685	60.0
Black/African American	410	12.4
Hispanic/Latino	382	18.4
Asian/Pacific Islander	61	5.8
American Indian/Alaska Native	20	0.7
Other	34	2.8
Education		
High school or less	345	20.2
Associate degree	215	13.2
Some college (no degree)	289	17.9
Bachelor's Degree	450	28.9
Graduate Degree	288	19.7
Income		
<$20,000	273	16.3
$20,000-<$40,000	317	19.0
$40,000-<$70,000	416	26.9
$70,000-<$100,000	258	16.8
≥$100,000	315	21.0
Lost job		
No	1008	65.3
Yes	333	19.8
Retired	234	14.9
Census region		
Northeast	312	17.1
Midwest	347	20.8
South	561	38.3
West	372	23.9
Political party		
Republican	429	39.1
Democrat	699	32.2
Independent	371	25.2
Other	52	3.5

*Actual numbers of individuals surveyed

+Overall population percentage adjusted for survey sample design by weighting for race by Census region.

~ Participant responses not listed above include the following "other" and "prefer not to say" categories (number, percentage adjusted for survey sample design): age: n=0; gender: refuse (n=5, 0.3%); race: n=0; education: refuse (n=5, 0.2%), income: refuse (n=13, 0.6%); lost job: refuse (n=17, 0.9%); census: n=0; and political affiliation: refuse (n=41, 2.1%).

Large gatherings and activities in public

Perceptions of unsafe increased by >15% from the lowest to highest age categories (18-24 to 65+) for gathering of 10, gathering of 100, and going to church (all p<0.001), but decreased by a similar amount for going to the grocery store (p=0.015). Males were less likely than women to perceive these activities as unsafe, with significant differences (p<0.05), ranging from -3.3% to 7.4%, except gathering of 10. Perceptions differed by race only for gatherings of 10, highest among Hispanic/Latino (67.5%) and Asian/Pacific Islander respondents (67.1%) (p=0.011). Respondents with higher education were less likely to perceive gathering of 100 as unsafe (p=0.024). Perceptions of unsafe decreased with increasing income (p<0.05), with differences between <$20,000 and ≥$100,000 categories ranging from -3.2% to -10.2%. Democrats and independents were more likely to perceive activities as unsafe for all variables compared to Republicans (p<0.001).

In multivariable models (Figure 2, Supplementary Table 1, Supplementary Figure 2) perception of unsafe increased with age for gathering of 10 (aOR=1.24 (95% CI: 1.14, 1.35)), gathering of 100 (aOR=1.38 (95% CI: 1.25, 1.52)), and going to church (aOR=1.18 (95% CI: 1.09, 1.28)) and decreased for going to the grocery store (aOR= 0.89 (95% CI: 0.82, 0.96)). Men were less likely to perceive activities as unsafe. Across income groups, there was a significant decrease in perception of unsafe with increasing income for gathering of 10 (aOR=0.86 (95% CI: 0.77, 0.96)) and going to the grocery store (aOR=0.83 (95% CI: 0.74, 0.92)). Democrats and independents were more likely to report activities as unsafe relative to Republicans.

Indoor and outdoor dining and visits with relatives

Perceptions of unsafe increased between lowest and highest age categories (18-24 to 65+) by >10% for dining indoor ($p<0.001$) and visiting friends indoor ($p=0.001$), and decreased, ranging from -3.1% to -10.1%, for visiting elderly relatives ($p=0.039$), visiting friends outdoor ($p=0.001$), and dining outdoor ($p=0.006$). Men compared to women were less likely to perceive activities as unsafe, with significant differences ($p<0.05$), ranging from -3.3% to -10.3%, except for visiting friends outdoor. Activities in this category varied by race, with White/Caucasian respondents generally less likely to perceive them as unsafe. Respondents with higher education were less likely to perceive dining outdoor as unsafe ($p=0.040$). Perceptions of unsafe decreased with increasing income ($p<0.05$) for most of these activities, ranging from -3.8% to -11.8% (<$20,000 to ≥$100,000 categories), except for visiting friends indoor. Democrats and independents were more likely to report activities as unsafe relative to Republicans ($p<0.001$).

In multivariable models (Figure 3), risk perception across age groups increased significantly for dining indoor (aOR=1.12 (95% CI: 1.04, 1.21)) and visiting friends indoor (aOR=1.15 (95% CI: 1.07, 1.24)). Men relative to women had lower odds of viewing these activities as unsafe, but this was only significant for visiting friends indoor. There was a significant decreasing trend across income groups for dining indoor (aOR=0.87 (95% CI: 0.78, 0.97)) and dining outdoor (aOR=0.87 (95% CI: 0.78, 0.96)) but not visiting friends in either setting. Compared to White/Caucasian respondents, Black/African American and Hispanic/Latino respondents were more likely to view dining outdoor and visiting friends outdoor as unsafe. Democrats were more likely to view these activities as unsafe relative to Republicans. There was a statistically significant interaction between age and race for visiting an elderly relative ($p=0.061$)

(Supplementary Table 2). The change in odds of perceiving visiting an elderly relative as unsafe for each 10-year increase in age was non-significant among White/Caucasian respondents (aOR=0.99 (95% CI: 0.89, 1.10)) and Hispanic/Latino respondents (aOR=1.11 (95% CI: 0.96, 1.29)) but significant among Black/African American respondents (aOR=1.35 (95% CI: 1.15, 1.58)).

Medical visits and returning to work

Perceptions of unsafe decreased (-16.2% and -6.3%, respectively) between the lowest and highest age categories (18-24 to 65+) for doctor visits ($p<0.001$) and going to the emergency room ($p=0.006$), and increased (4.2%) for returning to work ($p<0.001$). Men were less likely than women to perceive these activities as unsafe, with significant differences ($p<0.05$) ranging from -5.9% to -10.5%. Dentist visits were the only activity for which risk perception significantly differed by race ($p<0.001$). Respondents with lower education were more likely to respond "unsure," with differences ($p<0.05$) between lowest and highest categories (high school or less to graduate degree) ranging from -5.2% to -6.9%. Respondents with higher income were less likely to perceive these activities as unsafe with a range of difference between the lowest and highest categories (<$20,000 to ≥$100,000) of -4.3% and -12.5% ($p<0.05$). Democrats and independents were more likely to report activities as unsafe relative to Republicans ($p<0.001$).

In multivariable models (Supplementary Figure 3), a risk perception of unsafe across age groups decreased significantly for going to the doctor (aOR=0.84 (95% CI: 0.78, 0.91)) and emergency room (aOR=0.90 (95% CI: 0.84, 0.97)). Males were less likely to view going to the doctor, emergency room, and returning to work as unsafe. Compared to White/Caucasian respondents,

Hispanic/Latino respondents were more likely to view going to the dentist or emergency room as unsafe. Respondents with higher income were less likely to view these activities as unsafe; trends across income groups were statistically significant for going to the doctor (aOR=0.84 (95% CI: 0.75, 0.94)), dentist (aOR=0.87 (95% CI: 0.78, 0.97)), and emergency room (aOR=0.86 (95% CI: 0.78, 0.96)). Democrats and independents were more likely to view activities as unsafe. There was a statistically significant interaction between age and race for returning to work (p=0.039). The change in odds of perceiving returning to work as unsafe for each 10-year increase in age was smallest for White/Caucasian respondents (aOR=1.13 (95% CI: 1.00, 1.27)) followed by Hispanic/Latino respondents (aOR=1.21 (95% CI: 1.03, 1.42)) and Black/African American respondents (aOR=1.31 (95% CI: 1.12, 1.52)).

Census region

Differences between census regions in bivariate comparisons included higher proportions of respondents considering activities as unsafe in the west vs. north (gathering of 10, gathering of 100, grocery store, church, and dentist) and south vs. north (dining indoor). Census region was only predictive of risk perception in multivariable models for three activities (dining indoor: Midwest vs. Northeast: aOR=0.66 (95% CI: 0.44, 0.98); visiting friends indoor: Midwest vs. Northeast: aOR=0.68 (95% CI: 0.46, 1.00); and dining outdoor: South vs. Northeast aOR=1.44 (95% CI: 1.01, 2.06)).

DISCUSSION

We conducted a nationally representative survey of the U.S. population to understand risk perceptions related to transmission of COVID-19 for social interaction and essential activities. Overall, risk perceptions ranged widely, but were higher for activities that have been shown to

present increased risk for COVID-19 infection, particularly large gatherings and indoor activities, suggesting effective information dissemination to the public regarding COVID-19 risk factors.[13] Risk perceptions for age and race varied by the type of activity. Men were more likely to view activities as safe compared to women, similar to findings elsewhere.[14] Individuals with higher income were more likely to view activities as safe, perhaps a result of facing fewer barriers to physical distancing.[15] This could also reflect wealth differentials in the experience of the pandemic at this point of time, with increased COVID-19 transmission and case volumes in low-income and minority populations.[16] There were few differences by education. Nearly universally, Democrats and independents were more likely than Republicans to view activities as unsafe, potentially a reflection of the highly polarized U.S. climate in which information about COVID-19 has been influenced by politics.

Previous studies about perceived health and economic risks associated with COVID-19 have shown significant differences in risk perception by age, gender, education, and other sociodemographic factors. A cross-sectional survey of U.S. adults conducted in March 2020 found lower risk perceptions, but higher prevalence of social distancing behaviors, among older adults.[17] Other studies have shown mixed results by age, with some reporting higher risk perceptions for older adults[18] and others lower.[19] Our study showed that older respondents were more likely to view social gatherings with many people and indoor activities as unsafe, and more likely to view activities such as going to the grocery store, participating in outdoor activities, visiting elderly relatives, and visiting the doctor or emergency room as safe.

Studies have found lower perceived risk of COVID-19 infection and mortality among Black/African American persons.[17] Another study reported higher risk perceptions concerning COVID-19 in Native American/Alaska Native and Asian groups relative to Black/African American persons.[18] A large cross-sectional national US sample showed that Hispanic and first-generation immigrants had significantly higher risk perceptions of COVID-19 infection and death than other groups, and anxiety, discrimination, and selecting to take the survey in Spanish were related to perceived risk.[20] Associations between respondent race/ethnicity and risk perceptions in our study varied by activity; for some, such as attending gatherings, visiting grocery stores, and attending church, there were no significant differences between groups. However, Black/African American and, especially, Hispanic/Latino respondents were more likely to view several activities, such as dining and visiting friends outdoor, as unsafe compared to White/Caucasian respondents. Evidence suggests that Black and Hispanic groups have had higher rates of infection and mortality from COVID-19.[21] This raises questions as to how structural racism and socioeconomic and health disparities influence access to information and trust in health services and authorities in the context of the COVID-19 pandemic. Authors of a qualitative study in a rural Latino community suggested that risk perceptions and concerns were linked to stress of loss of employment.[22] Responsibility rests with politicians, health authorities, and community leaders to communicate evidence-based information in a manner that is honest and clear, easily accessible, and culturally appropriate. Respondents in the study of perceptions in the rural Latino community suggested, for example, a personalized approach to delivering information, by utilizing email or text messages from nearby universities, their medical providers, or the local health department.[9, 22]

Political affiliation and risk perceptions were among the strongest associations identified our study. Democrats and independents had higher risk perceptions than Republicans for nearly all of the activities assessed. Other studies have documented links between Republican affiliation or conservative ideology and lower risk perceptions of COVID-19 infection.[23] A recent study of an international cohort of social media users found that COVID-19 risk perception and trust in science mediate the relationship between conservative political ideological and lower compliance with COVID-19 preventive interventions.[24] Another online study of participants reported that intentions to socially distance tended to be lower among conservatives than liberals, yet those with low trust in science were less likely to support social distancing regardless of ideology; further, messages delivered by conservative public figures were more likely to reduce the ideological social distancing intentions gap.[25]

Examining how sociodemographic factors and other determinants influence risk perceptions can help identify how inequities lead to increased health risks in specific disadvantaged groups. Risk perceptions are complex and intertwined with other constructs – such as understanding of disease and trust in science – and these factors should be considered when determining how risk perceptions related to preventive behaviors. While some studies have shown close correlation between perceived disease severity and preventive behaviors, others have reported discrepancies between perceived disease risk and adherence to prevention behaviors. A study in China, for example, conducted in May 2020 found that perceived understanding of the disease and preventive interventions can mediate the effect of risk perceptions on social distancing behaviors.[26] Along with studies linking risk perceptions, trust in science, and behaviors, these findings suggest that without understanding how these complicated relationships function, efforts

to change risk perceptions alone may be inappropriate and inadequate for affecting behavior.[27, 28]

Early efforts to control the COVID-19 pandemic, prior to widespread availability of vaccines, have been reliant upon non-pharmaceutical interventions (i.e., social distancing, mask use, lock downs). A review of educational initiatives to promote such interventions, found that their effectiveness is dependent upon individual and community willingness to participate and collaborate with local authorities; and key factors, influencing willingness included ethical, psychological, and practice factors.[29] Moreover, educational initiatives, communication strategies, and timely information sharing at the community level are critical to implementation of these interventions. Messaging approaches that are tailored to their audience and rooted behavioral change theoretical constructs, such as risk perceptions and self-efficacy, may be most effective.[30, 31] Hence, a nuanced understanding of knowledge, risk perceptions, and self-efficacy for different populations, especially disadvantaged groups, is a critical prerequisite to efforts to control spread of disease through behavioral interventions.

Lastly, risk perceptions are likely to vary by location, local COVID-19 incidence, and over time as more information becomes available, factors such as 'pandemic fatigue' increase in prevalence, and more recent experiences exert a stronger influence on how people view the pandemic. In the U.S., many published studies to date were conducted during the early phases of the pandemic and focused on perceived risks of infection or mortality and health behaviors, often without detailed information on race/ethnicity.[27, 32] Our findings supplement this body of evidence by providing insights into perceived risks for specific activities, sufficient sample size

to explore associations by race/ethnicity, and status of these perceptions during a later stage of the COVID-19 pandemic.

This study had limitations. Selection bias associated with online surveys is well established, for example, underrepresenting individuals who are older, without internet access, have lower income, and have less formal education; this effect is difficult to quantify, in either direction or magnitude, and may limit the generalizability of our results. However, the digital divide in internet access has shrunk over time.[33] Despite our large sample size, samples for strata of important participant characteristics, including certain racial and ethnic minorities, were too small to provide sufficient statistical power for our analyses; still, we had sufficient statistical power to examine racial and ethnic differences between Black/African American, Hispanic/Latino, and White/Caucasian groups, which very few studies have done. Our questionnaire did not collect data on some characteristics that could affect risk perceptions, including presence of underlying health conditions, type of employment, or whether the respondent knew someone who had been infected with COVID-19. Future surveys should consider utilizing a larger sample size to allow for examination of racial and ethnic differences with greater statistical power and inclusion of questions about important determinants of risk perceptions, such as chronic health conditions.

CONCLUSION

Our findings suggest the importance of socioeconomic differences, health disparities, and structural racism for efforts to control the COVID-19 pandemic, including preventive behaviors, care seeking for testing and treatment, and vaccination strategies. Further research should

address how evidence-based interventions and programs can be tailored in consideration of these barriers with a goal of increased health equity in the pandemic response.

Competing interests: SHM reports personal fees from Gilead Sciences, outside the submitted work. SSS reports grants/products from Gilead Sciences and grants/products from Abbott Diagnostics, outside the submitted work.

Funding: This research was supported by a grant from the Johnson & Johnson Foundation (J&J Grant 90089979) and Johns Hopkins University COVID-19 Research Respond Fund.

Acknowledgments: We appreciate the team at Dynata for working closely with us during collection of the data. We would also like to recognize the Johns Hopkins University COVID-19 Research Response Fund for their initial support in getting this project off the ground. Thank you also to Dr. Gregory Kirk for help in developing the initial project plan. Lastly, thank you to the Johnson & Johnson Foundation for supporting this research project.

Data sharing: Data can be made available upon reasonable request.

Patient and Public Involvement: Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

Authors' contribution: SM, SS, DG, SA, and AL created the questionnaire and designed the survey. DG worked with Dynata to collect the data. DE, AZ, PB, and JE conducted the analysis and drafted the manuscript. All authors contributed to the analysis, interpretation of the results,

and reviewed and provided inputs to the manuscript. All authors meet the ICMJE criteria for authorship.

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Figure title and legends

Figure 1: Participant risk perceptions for each activity

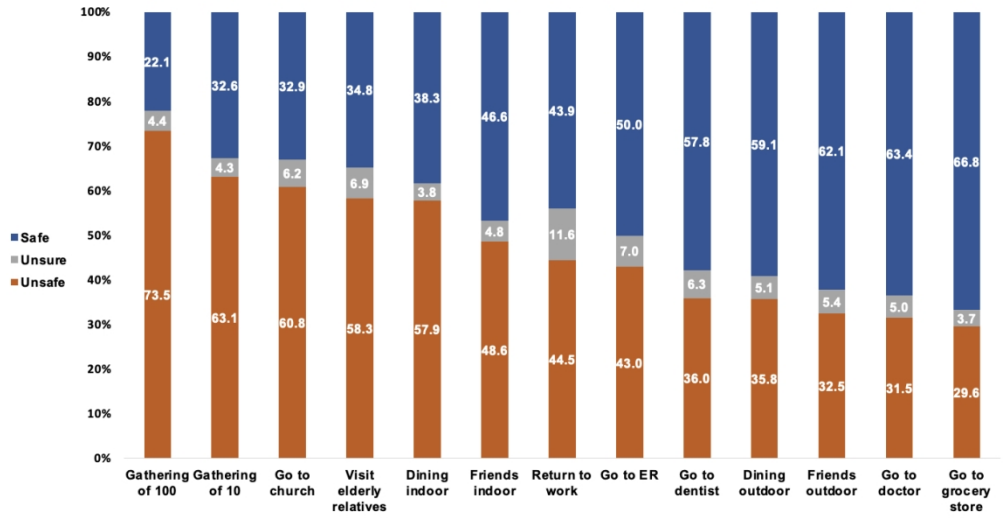
Figure 1: Percentages are the weighted estimates adjusted for race by Census region to match the overall U.S. population. Extremely safe and somewhat safe and extremely unsafe and somewhat unsafe response categories were collapsed into safe and unsafe, respectively.

Figure 2: Adjusted odds ratios of perceiving large gatherings and activities in public as unsafe for all participants

Figure 2: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

Figure 3: Adjusted odds ratios and 95% CIs of perceiving indoor and outdoor dining and visits with friends and relatives as unsafe for all participants

Figure 3: Reference groups are age: 18-24, gender: female, race: White/Caucasian, education: high school or less, income: <$20,000, political party: republican.



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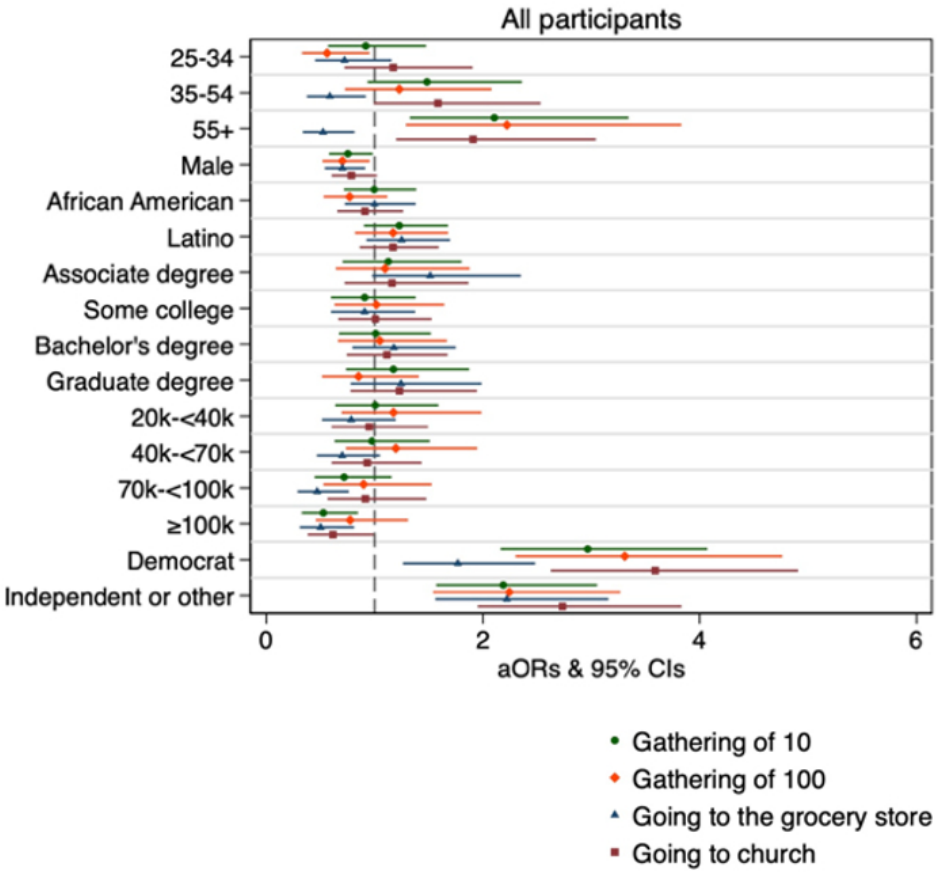

Figure 2: Adjusted odds ratios of perceiving large gatherings and activities in public as unsafe for all participants

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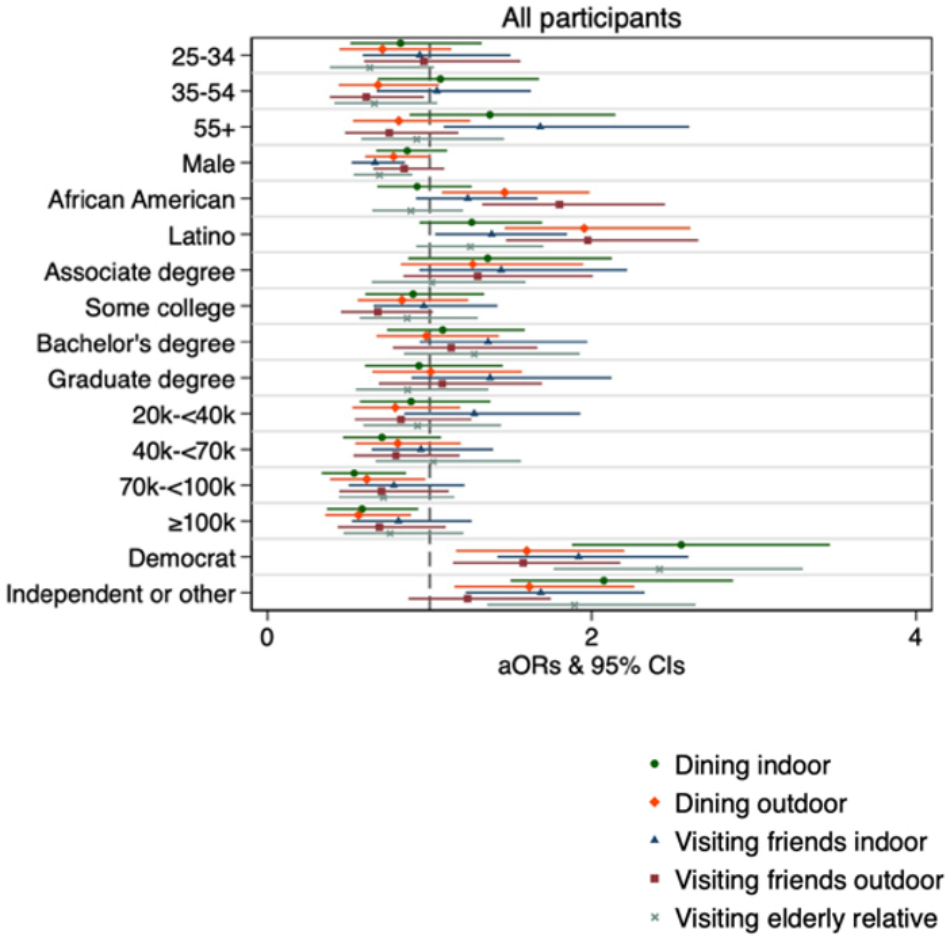
259x230mm (72 x 72 DPI)



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260x248mm (72 x 72 DPI)

Supplementary Figure 1: Risk perceptions questionnaire module

* 22. How **safe or unsafe** do you think the following activities are in terms of your getting COVID-19 or giving it to someone else?

	Extremely Safe	Somewhat Safe	Somewhat Unsafe	Extremely Unsafe	Unsure	Prefer not to say
Going to the **grocery store**?	○	○	○	○	○	○
Attending a **gathering of more than 10 people**?	○	○	○	○	○	○
Attending a **gathering of more than 100 people**?	○	○	○	○	○	○
Going to the **doctor's office**?	○	○	○	○	○	○
Going to the e**mergency room**?	○	○	○	○	○	○
Going to the **dentist**?	○	○	○	○	○	○
Going to **church** for a religious service/ceremony	○	○	○	○	○	○

* 23. How **safe or unsafe** do you think the following activities are in terms of your getting COVID-19 or giving it to someone else?

	Extremely Safe	Somewhat Safe	Somewhat Unsafe	Extremely Unsafe	Unsure	Prefer not to say
Returning to work as before the outbreak?	○	○	○	○	○	○
Dining outdoors at restaurants?	○	○	○	○	○	○
Dining indoors at restaurants?	○	○	○	○	○	○
Visiting friends or relatives in their homes and staying **indoors**?	○	○	○	○	○	○
Visiting friends or relatives in their homes and staying **outdoors**?	○	○	○	○	○	○
Visiting **elderly** relatives?	○	○	○	○	○	○

Supplementary Table 1: Unadjusted and adjusted Odds Ratios and 95% CIs for Perceiving Activities as Unsafe

Characteristic	Gathering of 10 or more		Gathering of 100 or more		Going to grocery store		Going to church	
Age (years)	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
18-24	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25-34	0.84 (0.55, 1.28)	0.91 (0.57, 1.46)	**0.57 (0.36, 0.90)**	**0.56 (0.33, 0.95)**	0.68 (0.44, 1.03)	0.72 (0.4[illegible].06)	0.92 (0.60, 1.42)	1.16 (0.71, 1.88)
35-44	0.82 (0.53, 1.27)	1.17 (0.71, 1.92)	0.67 (0.42, 1.08)	0.86 (0.49, 1.50)	**0.55 (0.36, 0.85)**	0.63 (0.3[illegible].03)	0.83 (0.53, 1.28)	1.11 (0.67, 1.83)
45-54	1.50 (0.95, 2.37)	**2.01 (1.16, 3.46)**	1.68 (0.97, 2.90)	**2.12 (1.11, 4.02)**	**0.51 (0.32, 0.81)**	**0.54 (0.3[illegible].99)**	**1.95 (1.20, 3.18)**	**2.56 (1.47, 4.46)**
55-64	1.43 (0.89, 2.28)	**1.85 (1.11, 3.08)**	1.37 (0.80, 2.35)	1.68 (0.92, 3.07)	**0.53 (0.33, 0.83)**	**0.59 (0.3[illegible].97)**	1.34 (0.84, 2.13)	**1.73 (1.03, 2.90)**
65+	**2.20 (1.37, 3.54)**	**2.39 (1.41, 4.06)**	**3.14 (1.72, 5.74)**	**3.08 (1.60, 5.94)**	**0.44 (0.28, 0.69)**	**0.46 (0.2[illegible].67)**	**1.89 (1.18, 3.01)**	**2.10 (1.25, 3.52)**
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Male	0.79 (0.62, 1.00)	**0.73 (0.56, 0.96)**	**0.73 (0.56, 0.95)**	**0.68 (0.50, 0.92)**	**0.69 (0.54, 0.88)**	**0.71 (0.5[illegible].92)**	**0.74 (0.58, 0.94)**	**0.76 (0.58, 0.99)**
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black/African American	**1.33 (1.00, 1.77)**	1.02 (0.73, 1.42)	1.12 (0.82, 1.52)	0.80 (0.55, 1.16)	1.29 (0.98, 1.71)	0.99 (0.7[illegible].37)	1.25 (0.94, 1.65)	0.94 (0.68, 1.31)
Hispanic/Latino	**1.39 (1.05, 1.84)**	1.25 (0.92, 1.71)	**1.39 (1.00, 1.92)**	1.22 (0.85, 1.75)	**1.35 (1.01, 1.79)**	1.24 (0.9[illegible].68)	1.32 (0.99, 1.75)	1.20 (0.88, 1.64)
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Associate degree	0.96 (0.63, 1.46)	1.13 (0.70, 1.80)	0.93 (0.58, 1.49)	1.09 (0.63, 1.86)	1.10 (0.73, 1.64)	1.51 (0.9[illegible].44)	1.01 (0.67, 1.53)	1.17 (0.73, 1.89)
Some college	0.94 (0.64, 1.38)	0.88 (0.58, 1.34)	1.00 (0.65, 1.56)	0.96 (0.60, 1.56)	0.80 (0.54, 1.18)	0.92 (0.6[illegible].39)	1.01 (0.69, 1.49)	0.98 (0.65, 1.48)
Bachelor's Degree	0.85 (0.61, 1.20)	0.96 (0.64, 1.45)	0.89 (0.60, 1.30)	0.97 (0.61, 1.54)	0.76 (0.54, 1.07)	1.21 (0.8[illegible].84)	1.02 (0.72, 1.44)	1.05 (0.70, 1.57)
Graduate Degree	0.87 (0.60, 1.28)	1.16 (0.73, 1.86)	0.72 (0.47, 1.09)	0.82 (0.49, 1.36)	0.84 (0.58, 1.23)	1.27 (0.7[illegible].23)	0.99 (0.68, 1.45)	1.22 (0.77, 1.93)
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
$20,000-<$40,000	1.16 (0.77, 1.74)	1.00 (0.64, 1.58)	1.32 (0.83, 2.10)	1.18 (0.70, 1.99)	0.82 (0.56, 1.21)	0.79 (0.51, 1.[illegible].20)	1.06 (0.71, 1.60)	0.94 (0.60, 1.48)
$40,000-<$70,000	1.00 (0.68, 1.47)	0.99 (0.64, 1.54)	1.29 (0.84, 1.98)	1.24 (0.76, 2.03)	0.74 (0.52, 1.06)	0.70 (0.47, 1.[illegible].02)	1.04 (0.72, 1.51)	0.95 (0.62, 1.47)
$70,000-<$100,000	0.80 (0.53, 1.21)	0.77 (0.48, 1.24)	0.87 (0.56, 1.37)	1.01 (0.59, 1.73)	**0.50 (0.33, 0.77)**	**0.46 (0.28, 0.[illegible])**	1.02 (0.68, 1.54)	1.01 (0.63, 1.63)
≥$100,000	**0.55 (0.38, 0.81)**	**0.57 (0.35, 0.91)**	0.67 (0.44, 1.02)	0.88 (0.51, 1.51)	**0.56 (0.37, 0.83)**	**0.49 (0.30, 0.[illegible])**	0.68 (0.46, 1.00)	0.68 (0.42, 1.09)
Political party								

Republican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**3.13 (2.35, 4.18)**	**2.88 (2.10, 3.96)**	**3.16 (2.29, 4.34)**	**3.18 (2.20, 4.59)**	**1.92 (1.42, 2.60)**	**1.80 (1.28, 2.53)**	**3.28 (2.48, 4.34)**	**3.47 (2.53, 4.77)**
Independent or other	**2.12 (1.55, 2.90)**	**2.12 (1.52, 2.96)**	**2.14 (1.53, 3.01)**	**2.15 (1.47, 3.15)**	**2.34 (1.68, 3.25)**	**2.25 (1.57, 3.32)**	**2.30 (1.69, 3.12)**	**2.62 (1.87, 3.69)**
Characteristic								
Age (years)	**Dining indoor**		**Dining outdoor**		**Visiting friends indoor**		**Visiting friends outdoor**	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
18-24	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25-34	0.78 (0.51, 1.19)	0.82 (0.51, 1.31)	**0.64 (0.42, 0.97)**	0.71 (0.44, 1.13)	1.09 (0.72, 1.65)	0.93 (0.59, 1.47)	0.92 (0.60, 1.41)	0.97 (0.60, 1.57)
35-44	0.76 (0.49, 1.18)	0.94 (0.58, 1.54)	**0.50 (0.32, 0.77)**	0.70 (0.43, 1.14)	0.99 (0.65, 1.51)	0.93 (0.57, 1.50)	**0.54 (0.34, 0.83)**	0.68 (0.41, 1.12)
45-54	1.21 (0.78, 1.89)	1.23 (0.74, 2.05)	**0.49 (0.31, 0.78)**	0.66 (0.40, 1.09)	1.39 (0.91, 2.14)	1.19 (0.73, 1.96)	**0.46 (0.29, 0.75)**	**0.54 (0.32, 0.91)**
55-64	1.28 (0.81, 2.02)	1.35 (0.82, 2.21)	0.72 (0.47, 1.12)	0.86 (0.53, 1.39)	**1.87 (1.20, 2.92)**	**1.80 (1.13, 2.85)**	0.66 (0.42, 1.05)	0.74 (0.45, 1.22)
65+	1.47 (0.93, 2.32)	1.39 (0.84, 2.29)	0.67 (0.44, 1.05)	0.77 (0.47, 1.24)	**1.93 (1.25, 2.98)**	1.58 (0.97, 2.56)	0.67 (0.43, 1.05)	0.76 (0.46, 1.25)
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Male	**0.78 (0.62, 0.98)**	0.85 (0.66, 1.09)	**0.73 (0.58, 0.92)**	0.78 (0.60, 1.01)	**0.63 (0.51, 0.79)**	**0.65 (0.51, 0.84)**	0.83 (0.66, 1.05)	0.85 (0.66, 1.10)
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black/African American	1.27 (0.97, 1.66)	0.93 (0.68, 1.28)	**1.84 (1.40, 2.42)**	**1.46 (1.07, 1.98)**	**1.42 (1.09, 1.85)**	1.24 (0.93, 1.68)	**2.23 (1.69, 2.93)**	**1.79 (1.31, 2.44)**
Hispanic/Latino	**1.41 (1.07, 1.86)**	1.27 (0.94, 1.71)	**2.08 (1.58, 2.73)**	**1.94 (1.45, 2.60)**	**1.46 (1.12, 1.91)**	**1.39 (1.05, 1.85)**	**2.12 (1.60, 2.80)**	**1.97 (1.47, 2.65)**
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Associate degree	0.98 (0.65, 1.46)	1.36 (0.87, 2.13)	0.97 (0.65, 1.43)	1.26 (0.82, 1.94)	1.12 (0.76, 1.66)	1.44 (0.95, 2.22)	0.94 (0.63, 1.41)	1.30 (0.84, 2.00)
Some college	0.79 (0.54, 1.14)	0.89 (0.60, 1.33)	0.80 (0.55, 1.16)	0.84 (0.56, 1.25)	0.87 (0.61, 1.25)	0.96 (0.66, 1.42)	**0.65 (0.44, 0.95)**	0.68 (0.45, 1.02)
Bachelor's Degree	0.79 (0.57, 1.09)	1.06 (0.72, 1.56)	0.75 (0.54, 1.05)	0.99 (0.68, 1.44)	1.04 (0.76, 1.43)	1.35 (0.93, 1.96)	0.85 (0.61, 1.19)	1.14 (0.78, 1.68)
Graduate Degree	0.73 (0.51, 1.06)	0.94 (0.60, 1.46)	0.69 (0.47, 1.00)	1.02 (0.65, 1.59)	1.06 (0.74, 1.52)	1.39 (0.90, 2.14)	0.76 (0.53, 1.10)	1.07 (0.68, 1.69)
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
$20,000-<$40,000	1.06 (0.71, 1.57)	0.89 (0.57, 1.37)	0.84 (0.57, 1.23)	0.79 (0.52, 1.19)	**1.51 (1.03, 2.20)**	1.28 (0.85, 1.94)	0.99 (0.67, 1.46)	0.82 (0.54, 1.26)
$40,000-<$70,000	0.81 (0.56, 1.18)	0.71 (0.47, 1.08)	0.77 (0.54, 1.10)	0.80 (0.54, 1.19)	1.02 (0.71, 1.46)	0.96 (0.65, 1.41)	0.80 (0.55, 1.15)	0.79 (0.53, 1.18)

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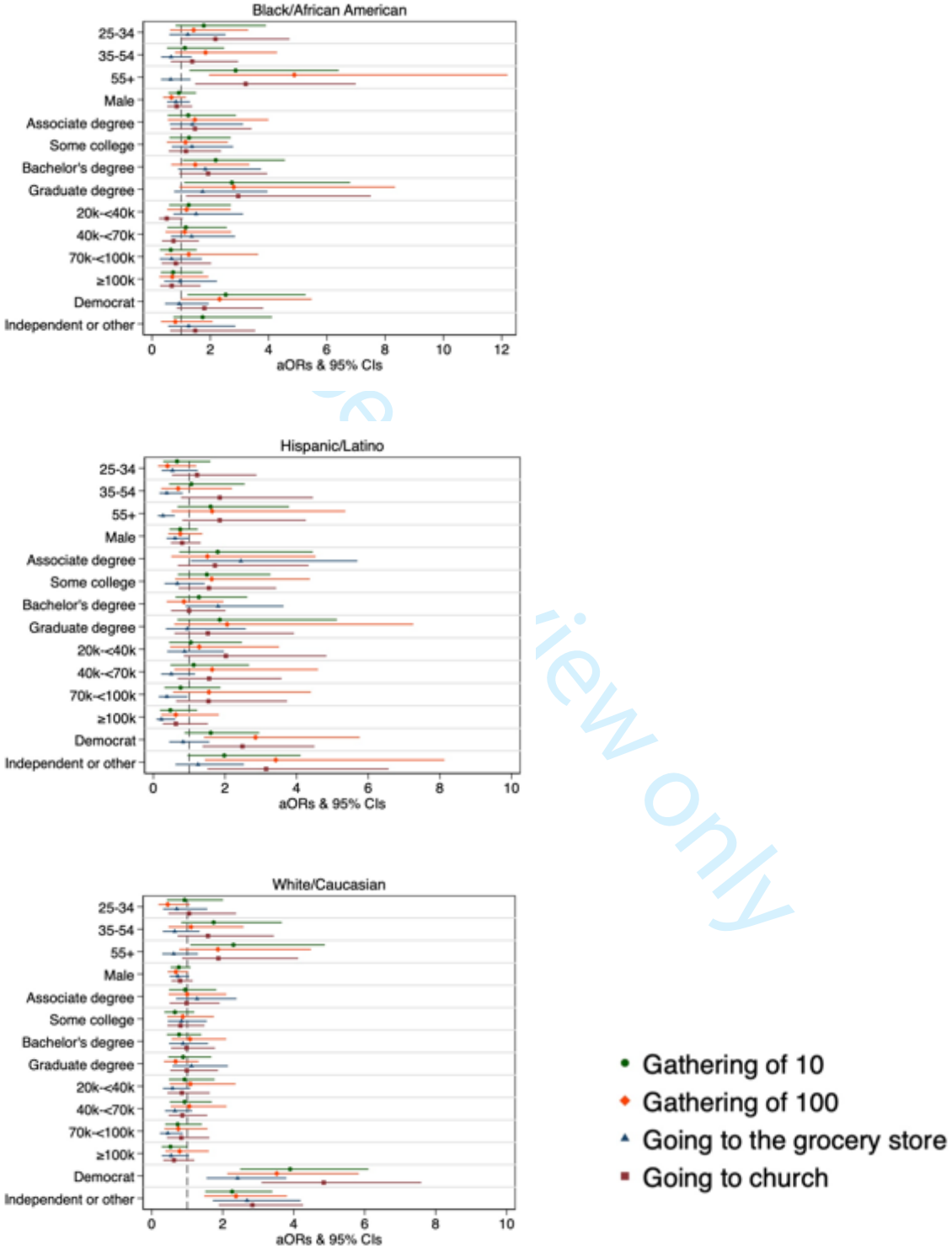
$70,000-<$100,000	**0.62 (0.42, 0.93)**	**0.56 (0.35, 0.89)**	**0.66 (0.45, 0.98)**	**0.61 (0.38, 0.97)**	0.95 (0.64, 1.39)	0.81 (0.53, 1.23)	0.86 (0.58, 1.29)	0.68 (0.43, 1.09)
≥$100,000	**0.60 (0.41, 0.88)**	**0.60 (0.38, 0.97)**	**0.51 (0.34, 0.75)**	**0.56 (0.35, 0.88)**	0.94 (0.65, 1.36)	0.83 (0.55, 1.26)	0.71 (0.48, 1.06)	0.67 (0.42, 1.08)
Political party								
Republican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**2.56 (1.94, 3.38)**	**2.52 (1.85, 3.43)**	**1.95 (1.47, 2.58)**	**1.61 (1.17, 2.22)**	**2.13 (1.62, 2.81)**	**1.91 (1.41, 2.59)**	**1.87 (1.40, 2.48)**	**1.59 (1.15, 2.20)**
Independent or other	**1.87 (1.38, 2.53)**	**2.04 (1.48, 2.83)**	**1.65 (1.21, 2.26)**	**1.62 (1.16, 2.28)**	**1.66 (1.23, 2.25)**	**1.66 (1.22, 2.26)**	1.29 (0.94, 1.78)	1.25 (0.88, 1.77)

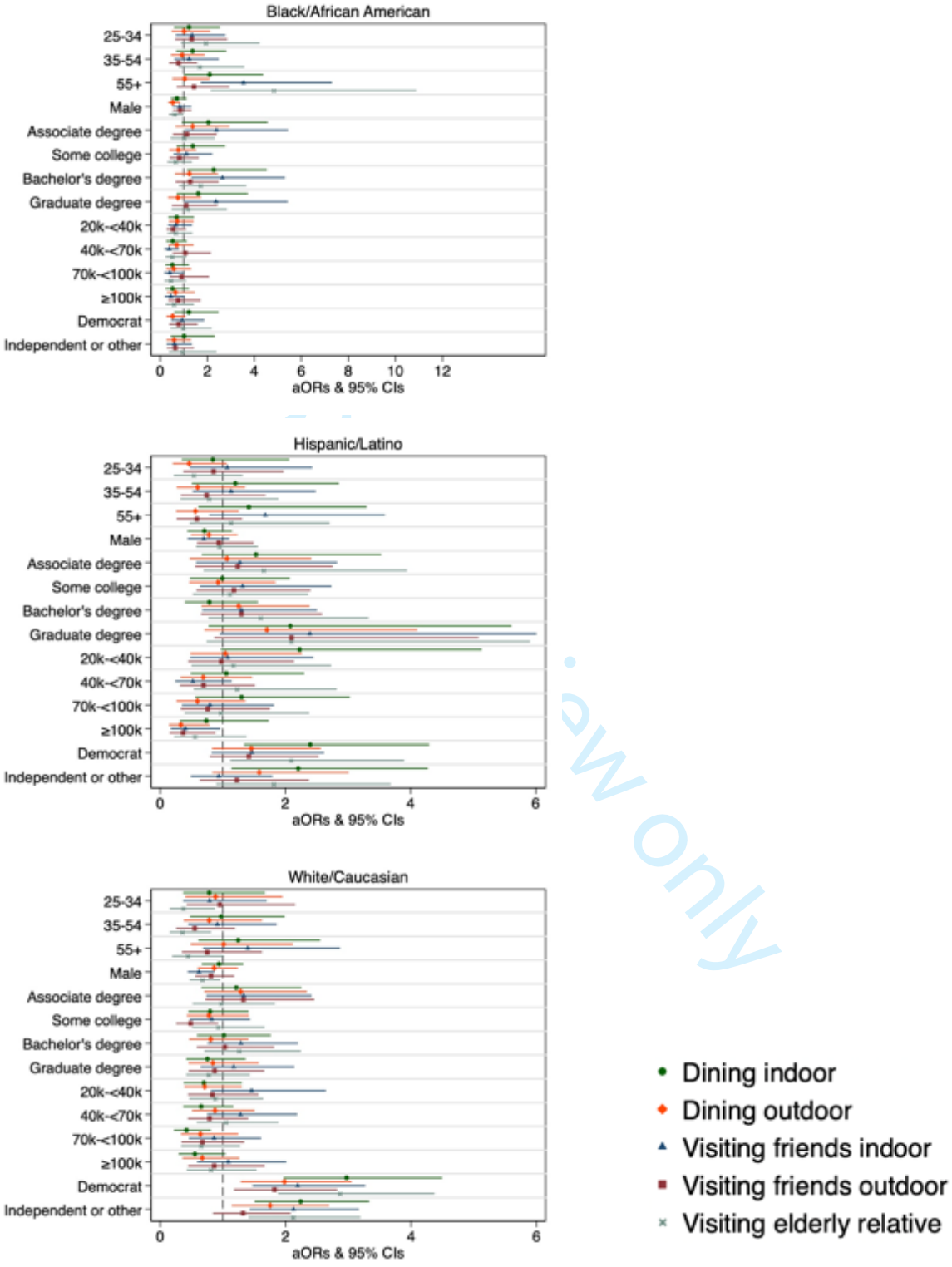
Characteristic								
Age (years)	**Going to doctor**		**Going to dentist**		**Going to ER**			
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**		
18-24	Ref	Ref	Ref	Ref	Ref	Ref		
25-34	0.78 (0.51, 1.19)	0.75 (0.46, 1.20)	**0.63 (0.41, 0.97)**	0.75 (0.47, 1.21)	0.91 (0.59, 1.40)	0.76 (0.48, 1.21)		
35-44	0.71 (0.45, 1.10)	0.69 (0.42, 1.13)	0.77 (0.50, 1.20)	1.01 (0.62, 1.65)	0.91 (0.58, 1.40)	0.84 (0.52, 1.36)		
45-54	0.71 (0.46, 1.12)	0.69 (0.42, 1.15)	0.73 (0.47, 1.14)	0.86 (0.52, 1.44)	1.00 (0.64, 1.55)	0.86 (0.53, 1.41)		
55-64	**0.60 (0.38, 0.95)**	**0.59 (0.36, 0.97)**	0.81 (0.52, 1.27)	0.91 (0.55, 1.49)	0.89 (0.57, 1.40)	0.74 (0.46, 1.21)		
65+	**0.40 (0.25, 0.65)**	**0.32 (0.19, 0.54)**	0.66 (0.42, 1.03)	0.72 (0.44, 1.18)	**0.63 (0.40, 0.98)**	**0.48 (0.29, 0.81)**		
Gender								
Female	Ref	Ref	Ref	Ref	Ref	Ref		
Male	**0.68 (0.54, 0.86)**	**0.74 (0.57, 0.96)**	**0.75 (0.60, 0.95)**	0.83 (0.64, 1.07)	**0.61 (0.48, 0.76)**	**0.62 (0.48, 0.81)**		
Race								
White/Caucasian	Ref	Ref	Ref	Ref	Ref	Ref		
Black/African American	**1.42 (1.08, 1.87)**	1.25 (0.91, 1.72)	**1.50 (1.14, 1.97)**	1.25 (0.91, 1.70)	1.09 (0.83, 1.42)	0.95 (0.71, 1.28)		
Hispanic/Latino	1.24 (0.94, 1.64)	1.19 (0.88, 1.61)	**1.63 (1.23, 2.15)**	**1.63 (1.22, 2.18)**	**1.42 (1.09, 1.86)**	**1.34 (1.03, 1.75)**		
Education								
High school or less	Ref	Ref	Ref	Ref	Ref	Ref		
Associate degree	1.01 (0.67, 1.52)	1.38 (0.89, 2.15)	1.13 (0.76, 1.68)	1.42 (0.92, 2.18)	1.16 (0.78, 1.72)	**1.55 (1.01, 2.38)**		
Some college	0.78 (0.53, 1.15)	1.07 (0.71, 1.63)	0.93 (0.64, 1.35)	0.97 (0.65, 1.45)	0.96 (0.66, 1.39)	1.16 (0.78, 1.72)		
Bachelor's Degree	0.74 (0.52, 1.04)	1.10 (0.74, 1.65)	0.74 (0.53, 1.04)	0.94 (0.64, 1.39)	0.92 (0.67, 1.28)	1.28 (0.87, 1.89)		
Graduate Degree	0.94 (0.65, 1.37)	1.54 (0.97, 2.46)	0.77 (0.53, 1.12)	1.10 (0.70, 1.72)	0.90 (0.63, 1.30)	1.35 (0.87, 2.10)		
Income								
<$20,000	Ref	Ref	Ref	Ref	Ref	Ref		

$20,000-<$40,000	0.71 (0.49, 1.04)	**0.62 (0.41, 0.94)**	0.79 (0.54, 1.16)	0.70 (0.46, 1.06)	0.84 (0.58, 1.23)	0.70 (0.46, 1.06)
$40,000-<$70,000	0.72 (0.50, 1.04)	**0.63 (0.42, 0.96)**	0.72 (0.50, 1.04)	0.68 (0.46, 1.02)	0.86 (0.60, 1.23)	0.72 (0.48, 1.08)
$70,000-<$100,000	**0.59 (0.40, 0.88)**	**0.52 (0.32, 0.84)**	**0.63 (0.43, 0.94)**	**0.62 (0.39, 0.97)**	**0.66 (0.44, 0.98)**	**0.57 (0.36, 0.88)**
≥$100,000	**0.51 (0.34, 0.75)**	**0.44 (0.27, 0.72)**	**0.54 (0.37, 0.79)**	**0.53 (0.33, 0.84)**	**0.58 (0.40, 0.85)**	**0.51 (0.32, 0.81)**
Political party						
Republican	Ref	Ref	Ref	Ref	Ref	Ref
Democrat	**1.43 (1.07, 1.93)**	1.31 (0.94, 1.81)	**1.79 (1.34, 2.40)**	**1.64 (1.20, 2.25)**	**1.72 (1.31, 2.27)**	**1.47 (1.08, 2.01)**
Independent or other	**1.38 (1.00, 1.92)**	1.39 (0.98, 1.96)	**1.74 (1.26, 2.39)**	**1.76 (1.26, 2.47)**	**1.61 (1.18, 2.19)**	**1.58 (1.14, 2.20)**

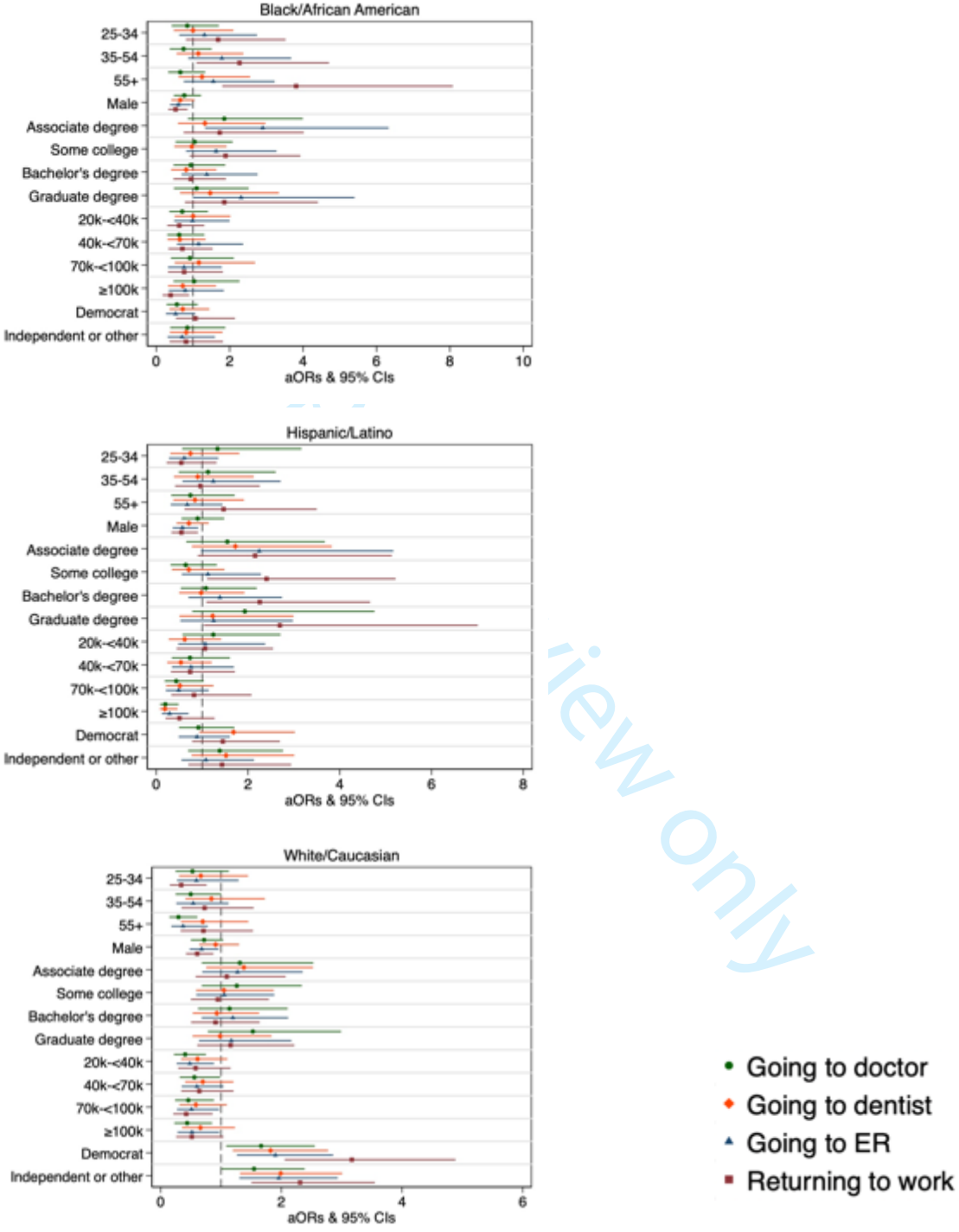
Supplementary Figure 2: Adjusted odds ratios of perceiving large gatherings and activities in public as unsafe for participants stratified by race



Adjusted odds ratios of perceiving indoor and outdoor dining and visits with friends and relatives as unsafe participants stratified by race



Adjusted odds ratios of perceiving medical visits and returning to work as unsafe for participants stratified by race



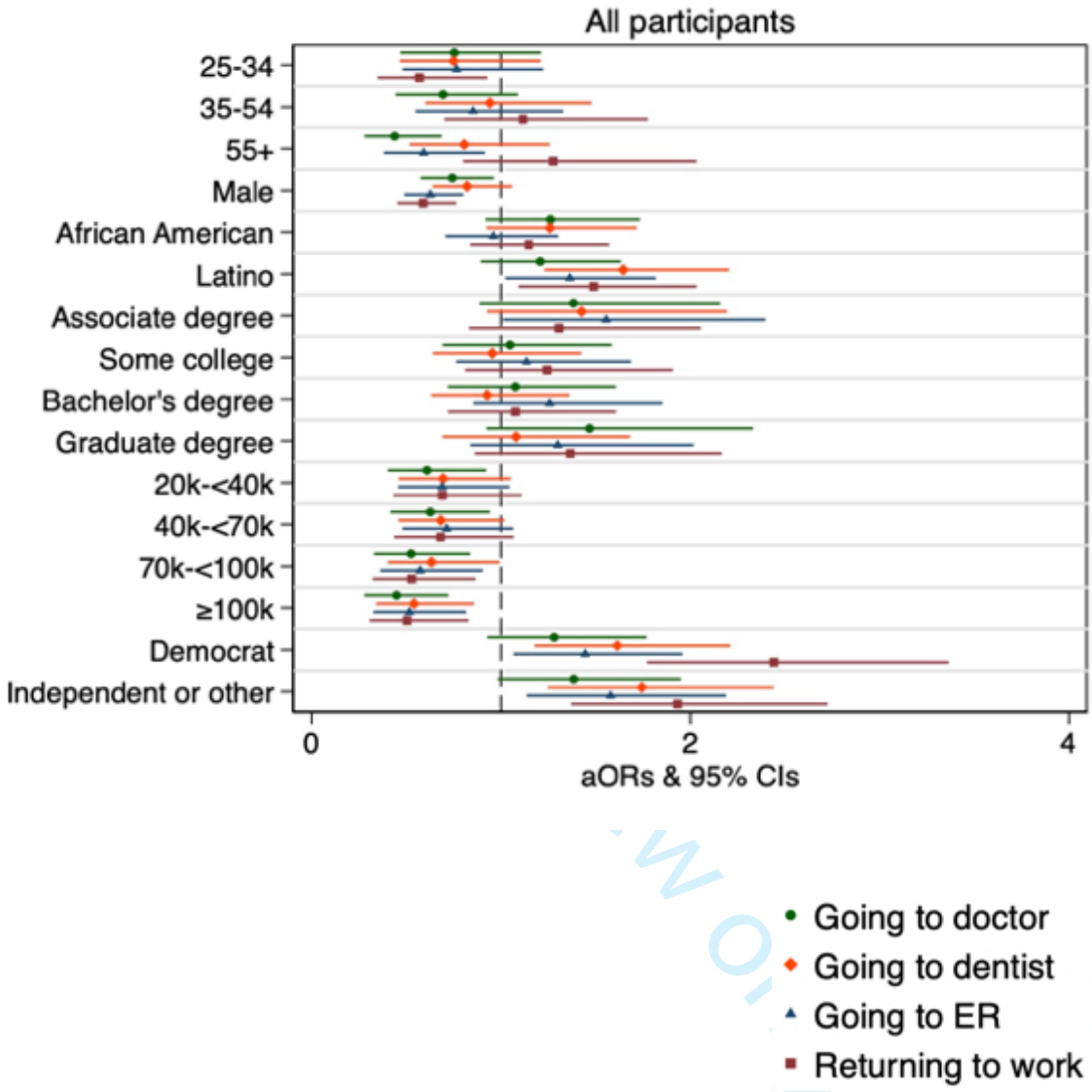
Supplementary figure 2: Reference groups are age: 18-24, gender: female, education: high school or less, income: <$20,000, political party: republican.

Supplementary Table 2: Unadjusted and Adjusted Odds Ratios and 95% CIs for Perceiving Visiting Elderly Relatives and Returning to Work as Unsafe with Interaction Term for Age and Race

	Unadjusted odds ratios (95% CIs) of Perceiving an Activity as Unsafe	
Age (years)	**Visiting elderly relatives**	**Returning to work**
18-24	Ref	Ref
25-34	0.62 (0.40, 0.96)	0.62 (0.40, 0.95)
35-44	0.53 (0.34, 0.83)	0.79 (0.51, 1.23)
45-54	0.66 (0.41, 1.05)	1.04 (0.65, 1.68)
55-64	0.79 (0.49, 1.27)	0.92 (0.58, 1.47)
65+	0.97 (0.61, 1.55)	1.53 (0.95, 2.45)
Gender		
Female	Ref	Ref
Male	0.65 (0.52, 0.83)	0.60 (0.47, 0.76)
Race		
White/Caucasian	Ref	Ref
Black/African American	1.24 (0.94, 1.64)	1.51 (1.15, 1.98)
Hispanic/Latino	1.49 (1.12, 1.98)	1.57 (1.18, 2.08)
Education		
High school or less	Ref	Ref
Associate degree	0.77 (0.51, 1.16)	1.04 (0.69, 1.57)
Some college (no degree)	0.74 (0.51, 1.08)	1.09 (0.74, 1.60)
Bachelor's Degree	0.97 (0.68, 1.37)	0.81 (0.57, 1.14)
Graduate Degree	0.63 (0.43, 0.92)	0.97 (0.66, 1.41)
Income		
<$20,000	Ref	Ref
$20,000-<$40,000	1.08 (0.72, 1.62)	0.75 (0.50, 1.14)
$40,000-<$70,000	1.10 (0.76, 1.60)	0.69 (0.47, 1.01)
$70,000-<$100,000	0.84 (0.56, 1.26)	0.59 (0.39, 0.89)
≥$100,000	0.71 (0.48, 1.04)	0.53 (0.36, 0.80)
Political party		
Republican	Ref	Ref
Democrat	2.43 (1.84, 3.21)	2.99 (2.25, 3.97)
Independent or other	1.72 (1.26, 2.33)	2.06 (1.50, 2.82)

Characteristic	Adjusted odds ratios (95% CIs) of Perceiving an Activity as Unsafe	
Age (years)	**Visiting elderly relatives**	**Returning to work**
18-24 White/Caucasian	Ref	Ref
25-34 White/Caucasian	**0.36 (0.15, 0.83)**	**0.31 (0.15, 0.67)**
35-44 White/Caucasian	**0.34 (0.14, 0.78)**	0.55 (0.26, 1.17)
45-54 White/Caucasian	**0.36 (0.15, 0.85)**	0.85 (0.40, 1.81)
55-64 White/Caucasian	**0.41 (0.17, 0.97)**	0.47 (0.21, 1.06)
65+ White/Caucasian	0.46 (0.19, 1.08)	0.89 (0.41, 1.94)
Race		
18-24 Black/African American	**0.22 (0.08, 0.57)**	**0.34 (0.15, 0.81)**
18-24 Hispanic/Latino	0.56 (0.19, 1.59)	0.72 (0.28, 1.84)
Age x Race interactions		
25-34#Black/African American	**4.33 (1.40, 13.41)**	**4.95 (1.72, 14.24)**
25-34#Hispanic/Latino	1.68 (0.50, 5.68)	2.22 (0.71, 6.95)
35-44#Black/African American	3.03 (0.95, 9.68)	2.79 (0.94, 8.26)
35-44#Hispanic/Latino	2.92 (0.83, 10.27)	2.50 (0.77, 8.07)
45-54#Black/African American	**5.56 (1.59, 19.48)**	**3.87 (1.18, 12.71)**
45-54#Hispanic/Latino	2.24 (0.60, 8.42)	1.32 (0.40, 4.40)
55-64#Black/African American	**10.66 (2.91, 39.00)**	**9.24 (2.75, 31.04)**
55-64#Hispanic/Latino	3.37 (0.93, 12.22)	2.96 (0.89, 9.85)
65+#Black/African American	**6.48 (1.89, 22.21)**	3.12 (0.98, 9.92)
65+#Hispanic/Latino	2.60 (0.72, 9.40)	3.60 (0.99, 13.02)
Gender		
Female	Ref	Ref
Male	**0.69 (0.53, 0.90)**	**0.57 (0.44, 0.75)**
Education		
High school or less	Ref	Ref
Associate degree	1.06 (0.67, 1.68)	1.38 (0.87, 2.19)
Some college (no degree)	0.90 (0.59, 1.38)	1.27 (0.82, 1.99)
Bachelor's Degree	1.35 (0.89, 2.05)	1.10 (0.73, 1.66)
Graduate Degree	0.92 (0.58, 1.47)	1.43 (0.89, 2.30)
Income		
<$20,000	Ref	Ref
$20,000-<$40,000	0.88 (0.56, 1.37)	0.67 (0.42, 1.08)
$40,000-<$70,000	0.97 (0.63, 1.49)	0.66 (0.42, 1.05)
$70,000-<$100,000	0.67 (0.41, 1.09)	**0.54 (0.33, 0.90)**
≥$100,000	0.72 (0.44, 1.16)	**0.52 (0.31, 0.87)**
Political party		
Democrat	Ref	Ref
Republican	**2.40 (1.74, 3.31)**	**2.36 (1.70, 3.28)**
Independent or other	**1.96 (1.40, 2.76)**	**1.94 (1.36, 2.76)**

Supplementary Figure 3: Adjusted odds ratios and 95% CIs of perceiving medical visits and returning to work as unsafe for all participants



Supplementary figure 3: Reference groups are age: 18-24, gender: female, race:

White/Caucasian, education: high school or less, income: <$20,000, political party: republican.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7
Bias	9	Describe any efforts to address potential sources of bias	5-6
Study size	10	Explain how the study size was arrived at	5-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	7
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	5-7
		(*e*) Describe any sensitivity analyses	7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8-9
		(b) Give reasons for non-participation at each stage	8-9
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10-13

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-13
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-13
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.