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ABSTRACT

A central question for understanding behaviour during the Covid-19 pandemic, at both the individual and collective levels, is how people perceive the health and economic risks they face. We conducted a survey of over 1,500 Americans from May 6 – 13, 2020, to understand these risk perceptions. Here we report some preliminary results. Our most striking finding is that perceived personal health risks associated with Covid-19 fall sharply with age.

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I. INTRODUCTION

The Covid-19 pandemic presents a unique opportunity for investigating the formation of beliefs about an unprecedented, widespread, and life-threatening event. Are beliefs about the risks of infection, hospitalization, and death roughly accurate? Do beliefs about Covid-19 correlate with beliefs about other risks, such as other medical or economic risks? How do these beliefs depend on respondents' age, gender, places of residence, and so on? Finally, are beliefs related to behaviour?

To address these questions, we conducted an online survey of over 1,500 Americans from May 6-13, 2020. We elicited, among other things, respondent beliefs about the risks of infection, hospitalization, and death for people very similar to them along a number of demographic characteristics such as gender, age, race and location. We also elicited beliefs about risks faced by other people, as a function of the same demographics. In addition, we elicited beliefs about other medical risks for people like themselves, as well as about economic risks.

Here we report some preliminary analysis of the data. In general, beliefs about Covid-19 risks are inflated but quite reasonable at the median. In line with epidemiological consensus, according to which Covid-19 is much more threatening to the old than to the young, respondents – both the young and the old - perceive a higher mortality risk for the elderly when assessing the risks for others by age. Despite this, we observe a different and striking pattern about beliefs *across age groups*. Relative to older cohorts, younger respondents perceive dramatically higher risks of infection, hospitalization conditional on contracting Covid-19, and death conditional on contracting Covid-19, both when making assessments for people like themselves and when making assessments of others. In particular, younger people believe that younger people like themselves face much higher risks than older people feel that older people like themselves face. We uncover a very similar age gradient in an independent dataset collected by Belot et al (2020).

We show that people who are more pessimistic about Covid-19 risks are sharply more pessimistic about non-Covid-19 health conditions as well, but they are not more pessimistic about the economy. One possible interpretation for our findings, which we plan to examine using future waves of our survey, is that Covid-19 makes the prospect of disease and death particularly salient for the young.

This preliminary report draws on, and contributes to, a growing number of surveys on risk perceptions about the Covid-19 pandemic (Belot et al 2020, Dryhurst et al 2020, Fan Orhun, and Turjeman 2020, Galasso et al 2020, Bursztyn et al 2020) as well as related economic risks (Altig et al 2020). Relative to these surveys, we elicit beliefs about own and others' risks and document a surprising age gradient. We also examine links across individuals' perceptions of different risks: we show that increased pessimism about own Covid-19 outcomes is associated with broader pessimism about other health risks but not economic risks.

Our paper is more broadly connected to an earlier literature on the drivers of risk perception. Tversky and Kahneman (1974) and Lichtenstein et al (1978) show that people exaggerate the prevalence of risks -- including causes of death -- that are very memorable or salient. This mechanism may help explain our findings if Covid-19 is more salient to younger people. The fact that acute health risk is a relatively rare experience for young people, and the fact that they have a lower background risk overall, is consistent with this interpretation (Read et al 1999, Bordalo, Gennaioli, and Shleifer 2020).

II. DESIGN AND METHODOLOGY

To assess risk perceptions during the Covid-19 pandemic, we conducted a survey of a diverse sample of over 1,500 Americans. The survey asked an array of questions related to beliefs, preferences and behavioral responses, as well as sociodemographic characteristics. We do not incentivize participants for accuracy given the large uncertainty surrounding the data on many of these issues. We first describe the structure and implementation of the survey, and then discuss the questions we asked. The survey instrument can be found in Appendix B.

To reach a diverse sample of Americans, we partnered with Qualtrics, who handled the recruitment and compensation of our participants. We specified a desired 1,500 respondents, who met the following quotas:

- Gender: Female (~50%); Male (~50%)
- Age: 18-34 (~25%); 35-49 (~25%); 50 - 69 (~30%); 70 and older (~20%)
- Household Income: <$50K (~35%); $50K-100K (~35%); >100K (~30%)

- Region: Midwest (~20%); Northeast (~20%); South (~40%); West (~20%)
- Race: White (~66%); Black (~12%); Latinx (~12%); Asian (~10%)

To guarantee representation in line with these quotas, the 5 demographic questions requesting this information were presented immediately following the consent form, allowing for screening out of participants as quotas were met. In addition, any participant who indicated they were younger than 18 years old or resided outside of the United States was screened out.

We also wanted to guarantee a minimum level of quality and thoughtfulness of participant responses. Immediately following the demographic screener questions, participants were told: "We care about the quality of our survey data and hope to receive the most accurate measures of your opinions. It is important to us that you provide thoughtful, careful answers to each question in the survey. Do you commit to providing your thoughtful and careful answers to the questions in this survey?" Participants had to select "I commit to providing thoughtful and careful answers" from 3 possible options in order to continue in the survey.

Finally, we wanted to familiarize participants with the question format they would see on much of the survey, while providing a further screen of their thoughtfulness and quality. Because objective likelihoods of suffering particular health consequences related to Covid-19 are in some cases quite small, it could be difficult for a typical participant to express their beliefs in a probability or percentage format. More generally, individuals often have difficulty interpreting probabilities, particularly in more abstract contexts. Gigerenzer and Hoffrage (1995) suggest that presenting or eliciting frequencies, rather than probabilities, improves participant understanding.

To address these concerns, we asked questions in terms of frequencies, but also began by familiarizing participants with the question format. We told respondents: "Many of the questions on this survey will ask you to make your best estimate as to how many out of 1,000 Americans will experience different events or have different features. To give you some practice and get you used to thinking in these terms, we have a few example questions for you to work through."

For the first example, participants were told that, according to the United States Census, approximately 20 out of 1,000 Americans live in Massachusetts, and that this is equivalent to

approximately 2% or 2 out of every 100. We then asked them, using this estimate, to tell us how many out of 5,000 Americans live in Massachusetts. Participants had to provide an answer of 100 (i.e. 2% of 5,000) in order to continue in the survey.

For the second example, participants were told that they would estimate the size of a group of Americans with a certain attribute. In particular, they were asked to provide their guess of how many Americans have red hair, both out of 1,000 and out of 10,000 (these two answer fields appeared in a random order). Only participants who estimated that fewer than 1,000 out of 1,000 Americans had red hair could continue in the survey. Participants also had to provide consistent answers: their answer to the "out of 10,000" question had to be 10 times their answer to the "out of 1,000" question in order to continue in the survey.

Following their successful completion of this question, we informed participants of what their red hair estimate implied both as a percentage and in terms of how many Americans out of 100, out of 1,000, and out of 100,000 would have red hair. We also provided an accurate estimate as a useful reference point: roughly 15 out of 1,000 Americans are estimated to have red hair, which we described to them as 1.5%, 1.5 out of 100, 15 out of 1,000, or 1,500 out of 100,000.

After completing these questions in line with our specified quality conditions, participants continued to our questions of interest. Qualtrics did not provide us with data on the participants who were screened out, nor did they inform us of the rate at which participants were screened out.

Participants completed several blocks of questions: Covid-19 Related Health Risks for People Like Self, Other Health Risks for People Like Self, Economic and Other Risks, Covid-19 Related Health Risks for Others, Demographics, and Preferences and Behavior. We asked about many sources of risk to assess whether the salience of Covid-19 health risks influences how other health and economic risks are judged. More information on this aspect will come from future waves of the survey.

A. Covid-19 Related Health Risks for People Like Self

In this block, we first ask participants to think about 1,000 people "very similar to you (i.e., in terms of age, gender, race socioeconomic status, zip code, health status, etc.)". We then ask "of these 1,000 people, how many do you believe will contract Covid-19 in the next 9 weeks?" We

provide a time-frame to make the question more concrete, and we choose 9 weeks because we anticipate running multiple waves of this survey over time, approximately 9 weeks apart. We do not bound participants' answers.

Because this is the first risk elicitation question of this form, we contextualize this answer for all participants. In particular, after they provide their response, they are taken to a new survey page that informs them about the answer they just gave. Suppose they answered that they believe 300 of 1,000 people similar to them will contract Covid-19 in the next 9 weeks. The survey then repeats to them: "Just to clarify, by entering 300 for the question on the previous page, you are indicating that you believe 300 out of 1,000 people very similar to you will contract Covid-19 in the next 9 weeks. This is equivalent to 30%." Each participant is then asked if they would like to revise their answer, and if they indicate that they would, they have the opportunity to provide a new answer. In our analysis, we replace initial estimates with revised estimates for all participants who indicated they wished to revise their answer.

This block on Covid-19 related health risks for self includes two other risk assessment questions. Each asks people to consider 1,000 people very similar to them *who contract Covid-19 in the next 9 weeks*. They are then asked to estimate how many of these 1,000 people very similar to them who contract Covid-19 will require hospitalization. They are also asked to estimate how many of 1,000 people very similar to them who contract Covid-19 will die. The questions about hospitalization and death due to Covid-19 are both conditional on contracting Covid-19. These questions attempt to isolate beliefs about potential health consequences due to Covid-19 from beliefs about its prevalence or contagiousness.

B. Other Health Risks for People Like Self

We are interested in understanding how perceptions of Covid-19 related health risks compare to and interact with beliefs about other serious health risks faced by this same population. In this next block of questions, we adapt a similar question format to assessing other health risks. For each of the questions, participants are again prompted to consider 1,000 people "very similar to you (i.e., in terms of age, gender, race socioeconomic status, zip code, health status, etc.)". They are asked to estimate, out of those 1,000, how many will: (i) require hospitalization for a reason other than

Covid-19 in the next 5 years, (ii) die for a reason other than Covid-19 in the next 5 years, (iii) have a heart attack in the next 5 years, and (iv) develop cancer in the next 5 years.

C. Economic Risks and Other Threats

We would also like to understand how participants perceive the economic risks surrounding the Covid-19 pandemic. Because these questions do not easily lend themselves to the "out of 1,000" format used for the health questions, we use the Likert-scale. For four different economic outcomes, we ask participants to assess the likelihood of this outcome on a 1 – 7 scale, where 1 indicates extremely unlikely and 7 indicates extremely likely.

We present two pairs of questions, the first related to the stock market and the second related to the unemployment rate. Within each pair, we present both a favourable and unfavourable outcome. For the stock market the two outcomes are: (i) the U.S. stock market drops by 10% or more in the next 9 weeks, (ii) the U.S. stock market grows by 10% or more in the next 9 weeks. For the unemployment rate the two outcomes are: (i) the U.S. unemployment rate reaches 20% or more in the next 9 weeks, and (ii) the U.S. unemployment rate falls below 5% in the next 9 weeks. By eliciting beliefs about good and bad outcomes we can assess not only general optimism or pessimism, but also perceived tail uncertainty.

D. Covid-19 Related Health Risks for Others

Participants' assessments of their own personal risk of dying from Covid-19 likely depend on their beliefs about the relative importance of different risk factors. We assess how participants believe the chances of *dying* from Covid-19 vary for different demographic groups. For the sake of simplicity, respondent time, and statistical power, we focus on three easy-to-describe demographic characteristics: age, race, and gender.

We craft the questions to parallel those from the first block of the survey, assessing Covid-19 death risks for people like the respondents themselves. This time, we ask participants to consider "1,000 people in each of the following [AGE/RACE/GENDER] categories who contract Covid-19 in the next 9 weeks." We ask them, within each category, to assess how many of the 1,000 Americans who contract Covid-19 in the next 9 weeks will pass away due to Covid-19. For the age category, participants make a forecast for 1,000 Americans under 40 years old, for 1,000 Americans between

the ages of 40 – 69 years old, and for 1,000 Americans ages 70 and older. For the race category, participants make a forecast for 1,000 white Americans, for 1,000 Black Americans, for 1,000 Asian Americans, and for 1,000 Latinx Americans. For the gender category, participants make a forecast for 1,000 American men and for 1,000 American women.

E. Sociodemographic Characteristics

Recall that at the beginning of the survey, all participants are asked to report: year of birth, gender, race (White, Black, Asian, Latinx, check all that apply), approximate annual household income (choose from buckets of $25,000 increments), and region of the country (Northeast, South, Midwest, West). These questions appear as the very first five survey questions, so that Qualtrics can use them as screener questions in order to guarantee a stratified sample.

We also ask non-required sociodemographic questions at the end of the survey: state of residence, whether their current place of residence is best described as urban, suburban, or rural, their educational attainment, whether they have been diagnosed with diabetes, heart disease, lung disease, hypertension, obesity, cancer, or another serious immunocompromising condition, whether they have been hospitalized for non-Covid-19 related reasons within the last year, whether a member of their family has been hospitalized for non-Covid-19 related reasons within the last year, and whether they have been unemployed anytime over the last 9 weeks.

F. Preferences and Behavior

Finally, we ask participants about their behavioral responses to the Covid-19 pandemic, and about their preferences regarding policy responses. We ask them how soon they believe "stay at home" measures should be lifted, and whether they would resume their normal activities if stay at home measures were lifted today. We ask about avoidance of medical care, specifically, how reluctant they would be to go to the emergency room today if they or someone in their family had an urgent medical issue, and whether they have avoided filling prescriptions, doctor's appointments, or other forms of medical care in the last few weeks. We then ask them approximately how many times per week over the last few weeks they have left their home to shop, do errands, socialize, etc. (specifically excluding work or exercise). Finally, we ask them, in their opinion, how likely is a significant resurgence of Covid-19 in the fall/winter of 2020.

G. Treatment Assignment and Order

We were also interested in assessing whether the salience of a certain demographic categorization (age, race, or gender) influenced individual perceptions of Covid-19 risks about oneself. For this reason we randomly assigned each participant to one of four treatments that tweaks the order of questions so that the subject is asked to assess Covid-19 risks for certain demographic groups before answering the Covid-19 Related Health Risks for People Like Self.

Specifically, in the control condition the order is exactly as described above, and we randomly assign, at the participant level, the age, race, and gender questions within the Covid-19 Related Health Risks for Others. In the other three treatments, we extract one of the three questions about others – either the age question, the race question, or the gender question – and move it to the front of the survey, immediately preceding the Covid-19 Related Health Risks for People Like Self block. The idea is to prime participants to think about risks in terms of age, race, or gender, before thinking about risks for people like themselves. For participants assigned to one of these three treatments, the remaining 2 questions about others are kept in their original place, in a random order, within the Covid-19 Related Health Risks for Others block later in the survey.

H. Implementation

Qualtrics obtained 1,526 responses to our survey between May 6 and May 13, 2020. Of those 1,526, we drop 4 observations: (i) two of these observations did not provide an answer to our first Covid-19 question asking for beliefs of contracting Covid-19 in the next 9 weeks, and (ii) two of these observations consistently provided answers greater than 1,000 to our questions asking for Covid-19 risk assessments out of 1,000 people.[2] The median time taken to complete our survey is approximately 10.5 minutes.

[2] As part of our IRB approval, respondents were permitted to skip questions. As a result, our number of observations for any particular question is often fewer than 1,522, but typically close to 1,500. We report the number of observations in each piece of analysis below.

III. RESULTS

In Table 1, we provide summary statistics of the 1,522 respondents. As already discussed, the composition of the sample was targeted with respect to age, region of residence, race, income and gender. With respect to the other characteristics, roughly 50% of respondents live in suburban areas and 30% are urban, more than 50% have a bachelor degree or more, and a significant share of them, 37%, has been unemployed in the last nine weeks.

Table 1. Summary Statistics

Proportion in Each Age Bracket	
18 – 34	0.26
35 – 49	0.26
50 – 69	0.31
70 and older	0.17
Proportion Female	0.48
Proportion in Each Race Category (Non-Exclusive)	
White	0.70
Black	0.13
Asian	0.10
Latinx	0.12
Multiracial	0.05
Proportion in Each Region	
Northeast	0.21
South	0.38
Midwest	0.21
West	0.21
Proportion in Each Density Category*	
Rural	0.17
Suburban	0.52
Urban	0.31
Proportion in Each Income Bracket	
Less than $25k	0.11
$25k - $50k	0.22

$50k – $75k	0.23
$75k - $100k	0.14
$100k - $125k	0.13
$125k - $150k	0.07
Greater than $150k	0.11
Proportion in Each Education Bracket*	
Less than high school degree	0.01
High school graduate	0.13
Some college but no degree	0.20
Associate degree	0.10
Bachelor's degree	0.33
Master's degree	0.18
Doctoral degree	0.02
Professional degree	0.03
Proportion Unemployed Over Last 9 Weeks*	0.37
Proportion Hospitalized in Last Year*	0.09
Proportion with Family Member Hospitalized in Last Year*	0.15
Proportion with Different Serious Health Conditions	
Diabetes	0.13
Heart Disease	0.04
Lung Disease	0.03
Hypertension	0.26
Obesity	0.10
Cancer	0.04
Other Serious Immunocompromising Condition	0.14

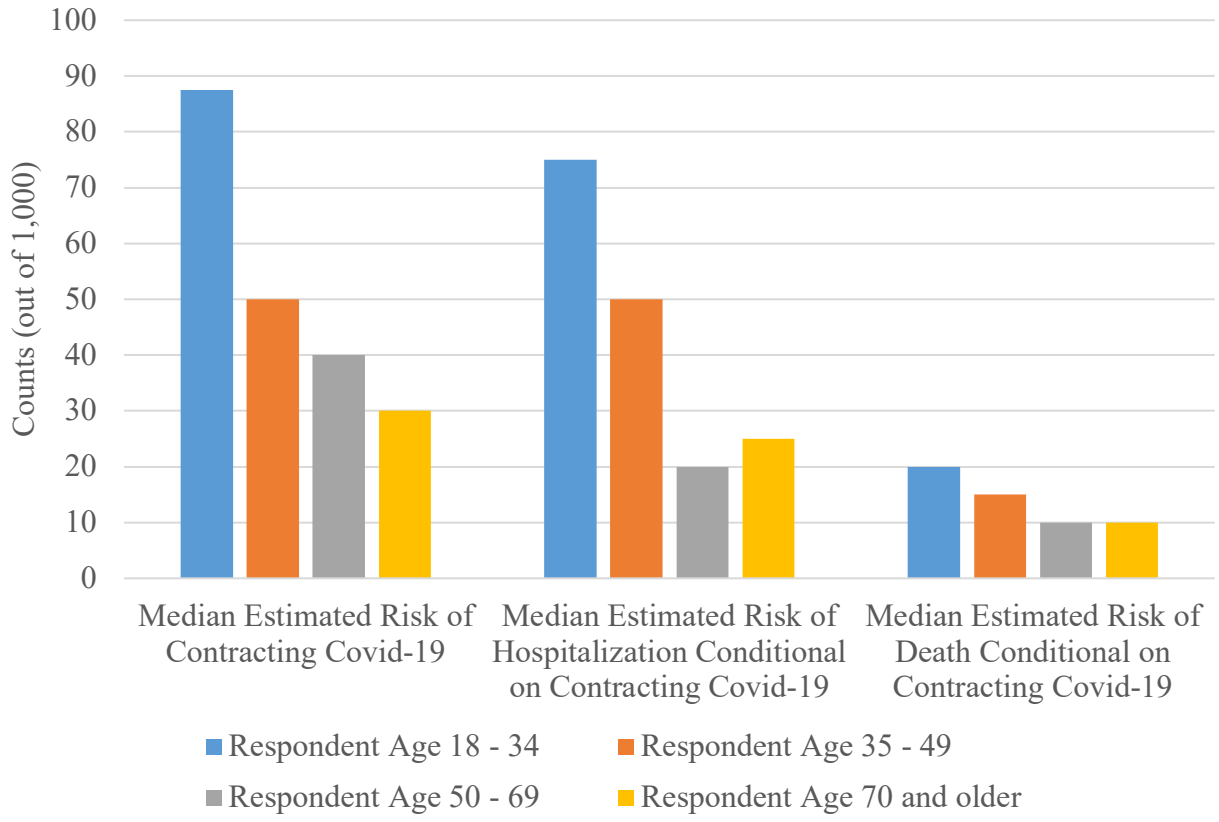
Notes: *indicates that not every person in the sample provided an answer to the question. Sample sizes are as follows: 1,520 for density, education; 1,519 for employment status, own hospitalization, family member hospitalization.

A. Respondent Age and Covid Risks about Self and Others

Consider our respondents' assessments of Covid-19 related health risks for themselves. Figure 1 below reports the median estimated risk of contracting Covid-19, of hospitalization conditional on contracting Covid-19, and of death conditional on contracting Covid-19. The full distribution of responses to these questions are provided in the Appendix. As expected, the responses are not

normally distributed, and the mean of the distribution is highly influenced by the relatively few people who provide extremely high estimates (above 500). For this reason, we graph medians rather than means. We break down these assessments by four age brackets: 18-34 years old, 35-49 years old, 50-69 years old, and 70 years old and older.

Figure 1. Estimated Covid-19 Risks for "People Like You"



The age gradient is striking. The young attach higher probabilities to people like themselves contracting Covid-19, of being hospitalized conditional on infection, and of dying conditional on infection. Arguably, young respondents have a lifestyle that exposes them to wider networks, and this may explain why they feel more likely to be infected. But their assessment of health risks conditional on infection are puzzling in light of the evidence that Covid-19 is significantly less severe for younger people.

On average, the median belief about the conditional fatality rate in our data lies between 1% and 2% and thus moderately exceeds average published estimates in the medical literature. For

instance, the meta-analysis by Meyerowitz-Katz et al (2020) reports a point estimate of 0.64% for the infection fatality rate.

But the objective age gradient is very far from beliefs. The 18-34 group in our data reports a median believed conditional fatality rate of 2%. However, available epidemiological estimates for the US or other developed countries using different samples and methods indicate a conditional death rate for this age group of at most about 0.2% (Ferguson et al. 2020, Covid CDC Response Team 2020, Modi et al. 2020, Russell et al. 2020). The young appear to assess their mortality risk to be more than 10 times the available data. In contrast, the respondents in the 70 years or older group report a median conditional death rate of about 1%. The same epidemiological estimates indicate for this group a conditional death rate between 5% and 10%. The elderly assess their mortality risk to be between 5 and 10 times lower than current best estimates.

Figure 2 reports the median assessment of beliefs of Covid-19 death risk for others. Recall that we ask subjects to assess the mortality risk conditional on contracting Covid-19 for 1,000 people in each of three age groups: people under 40 years old, between 40 and 69 years old, and above 70 years old. Again, the table reports the median answers in different age groups.

Figure 2 Mortality Risk of Others

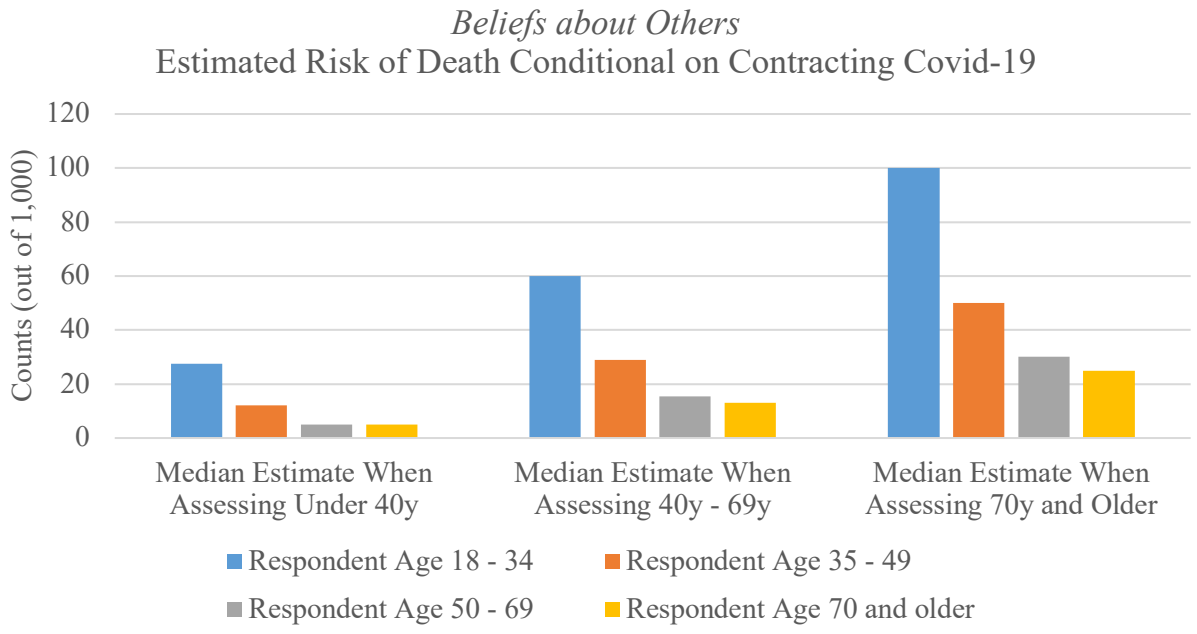


Figure 2 shows three findings. First, respondents report higher mortality estimates when thinking about others than when thinking about people like themselves. Second, people appear to be aware of the age gradient of Covid-19 risks: assessed mortality risk increases with age within each respondent age group. Third, and crucially, young people, as compared to older people, report substantially higher mortality rates for every age group. Young people are more pessimistic than older people not only about their own mortality risk but also about everyone else's mortality risk.

In some ways, these findings are similar to previous analyses on mortality risk assessments outside of Covid-19. Heimer et al. (2019) run a survey with US respondents on survival probabilities. They show that young people under-estimate their own survival probability while old people over-estimate it. They argue that this is due to young people attaching higher weight to rare causes of death such as traffic accidents etc. Lichtenstein et al. (1978) famously showed that people tend to over-estimate unlikely causes of death and under-estimate likely causes of death.

However, the patterns in Figures 1 and 2 paint a more dramatic picture. It is not that low risks are inflated and compressed towards the mean, as for example with Kahneman and Tversky's (1979) probability weighting function; in that case, the young might overestimate their risk of dying relative to the elderly, but would still estimate a lower risk. Rather, the age gradient in beliefs about own risks in Figure 1 is the opposite of reality. Moreover, Figure 2 shows that the young perceive higher risks for others also. One possible, though not the only, explanation is that this is a form of "contrast effect": for the young, the possibility of death is so surprising and hence salient, that their risk assessments react strongly to news about Covid-19 (Tversky and Simonson 1993). In future work we plan to assess this possibility more fully.

One question is whether the patterns of Figures 1 and 2 are a product of age per se or instead reflect individual characteristics correlated with age. To assess this possibility, Table 2 regresses perceived Covid-19 risks on age and on a range of other individual traits, including all sociodemographic data we collect. In the second column of each panel, we present an even more demanding test of this age pattern. We add as a control the average mortality risk a respondent estimates for others, which captures her overall Covid-19 pessimism.[3] Importantly, this measure also proxies for the extent to which Covid-19 risk is top of mind, which may vary across age

[3] In particular, we take the average of each respondent's assessed risks for race, the average of their assessed risks for age, and the average of their assessed risks for gender, and we average those three averages.

groups.[4] Finally, in all specifications we also control for the respondent's estimate of the number of Americans who have red hair (out of 1,000). This controls for the possible tendency of some participants to report high numbers in general. Panel A analyses beliefs about infection, Panel B beliefs about hospitalization, and Panel C beliefs about death.

Table 2. Estimated Covid-19 Risks for "People Like You"

	A: Estimated Own Risk of Contracting Covid-19		**B: Estimated Own Risk of Hospitalization | Contracting Covid-19**		**C: Estimated Own Risk of Death | Contracting Covid-19**	
Respondent Age	-1.52****	-0.55**	-1.47****	-0.45*	-1.14****	-0.35**
	(0.25)	(0.23)	(0.27)	(0.25)	(0.18)	(0.16)
Average Assessed Risk for Others		0.67****		0.69****		0.51****
		(0.035)		(0.038)		(0.023)
Female	3.50	-1.81	-4.15	-10.1	-1.52	-7.02
	(8.05)	(7.24)	(8.79)	(7.97)	(5.71)	(4.88)
Black	8.62	-7.54	19.0	0.77	20.3**	8.42
	(12.0)	(10.8)	(13.1)	(11.9)	(8.52)	(7.29)
Asian	30.5**	21.8*	7.19	-4.90	14.7	7.68
	(13.5)	(12.1)	(14.6)	(13.2)	(9.56)	(8.16)
Latinx	-2.62	-7.19	2.11	-3.47	14.1	12.0
	(14.4)	(13.0)	(15.8)	(14.3)	(10.2)	(8.72)
Multiracial	-24.5	-21.9	-16.8	-12.8	-25.0*	-21.7*
	(19.9)	(17.8)	(21.9)	(19.8)	(14.2)	(12.0)
South	-12.5	-4.61	0.84	7.12	-1.42	3.53
	(11.0)	(9.86)	(12.1)	(10.9)	(7.81)	(6.67)
Midwest	4.55	10.0	19.2	23.2*	5.90	8.27
	(12.5)	(11.2)	(13.7)	(12.4)	(8.87)	(7.58)
West	9.92	10.5	21.0	18.2	15.5*	11.0
	(12.1)	(10.9)	(13.3)	(12.0)	(8.60)	(7.35)
Suburban	-7.03	-3.65	-5.22	-2.69	-9.20	-7.67
	(10.9)	(9.77)	(11.9)	(10.7)	(7.72)	(6.60)
Rural	-11.2	-11.1	8.49	9.08	-0.59	-2.18
	(12.2)	(11.0)	(13.3)	(12.1)	(8.65)	(7.40)
Income ($1,000s)	-0.26***	-0.21**	-0.16	-0.09	-0.14**	-0.067
	(0.095)	(0.085)	(0.10)	(0.094)	(0.067)	(0.058)
Education Category	5.31*	4.87*	6.50**	5.80**	4.95**	4.71***
	(2.83)	(2.53)	(3.08)	(2.78)	(2.00)	(1.71)
Number of Serious Health Conditions	7.44	5.02	14.7***	12.1**	18.2****	15.3****
	(5.14)	(4.63)	(5.60)	(5.08)	(3.65)	(3.12)
Has been hospitalized	-1.49	-15.6	62.5****	50.7****	27.0**	17.0*
	(15.0)	(13.5)	(16.6)	(15.0)	(10.7)	(9.16)
Family hospitalized	43.9****	30.3***	14.3	-4.41	-6.94	-18.2**
	(12.0)	(10.8)	(13.1)	(11.9)	(8.55)	(7.32)
Unemployed	14.8*	10.8	11.2	5.75	4.41	2.63
	(8.25)	(7.42)	(9.01)	(8.16)	(5.86)	(5.01)

[4] Average pessimism may also be due to political attitudes. Some papers have documented greater tolerance of Covid-19 risk by Republicans, who tend to be older (Allcott et al 2020). We did not measure political affiliation in this survey, so we cannot directly control for it. Because beliefs about others captures many other factors, including the salience of Covid-19 risk for a respondent, controlling for beliefs about others can be viewed as a very restrictive way of controlling also for political affiliation.

Red Hair Estimate	0.29**** (0.048)	0.17**** (0.043)	0.15*** (0.050)	0.022 (0.046)	0.11*** (0.033)	0.028 (0.028)
Saw Age First	17.1 (10.8)	10.3 (9.72)	49.1**** (11.8)	41.5**** (10.7)	30.5**** (7.67)	24.0**** (6.58)
Saw Gender First	11.5 (10.9)	6.59 (9.74)	53.2**** (11.9)	47.7**** (10.8)	14.1* (7.71)	11.1* (6.59)
Saw Race First	8.80 (10.8)	10.2 (9.69)	42.6**** (11.8)	42.3**** (10.6)	23.6*** (7.68)	24.0**** (6.55)
Constant	139.3**** (22.9)	51.8** (21.0)	88.4**** (25.0)	1.28 (23.1)	54.3**** (16.2)	-15.6 (14.2)
R-sq.	0.09	0.27	0.08	0.25	0.09	0.31
N	1.502	1,490	1.492	1,481	1.509	1,498

Notes: All specifications exclude any respondent who provided an answer greater than 1,000 for that specific question of interest. In addition, respondents are excluded from the second column of each panel if they reported an average assessed risk for others greater than 1,000. Multiracial takes 1 if the participant selected more than 1 ethnicity/race category. Number of serious health conditions is the total number of health conditions self-reported.

The estimates confirm the message in the raw data: pessimism regarding the possibility of contracting Covid-19, the possibility of being hospitalized due to Covid-19, and of dying from it sharply declines with age. General pessimism, captured by mortality beliefs about others, correlates with pessimism about self, but even controlling for general pessimism the age gradient in perceived Covid-19 risks survives. Pessimism about Covid-19 also increases with education and with the number of medical conditions.

In Table 3, we bring a similar empirical approach to analysing beliefs about others. We regress each of the three age beliefs about others on the respondents' sociodemographic characteristics. The dependent variable is the respondent's belief about the risk of death for each of the three age groups we asked about: Americans under 40 (Panel A), Americans between 40 – 70 (Panel B), and Americans 70 and older (Panel C). The intercepts of these regressions increase with the age group for which risk is assessed, confirming that subjects factor an age-increasing risk gradient into their assessments. But even conditional on all other demographic information, older respondents assess significantly lower risk than younger respondents for each age group when assessing others. The age effect is largest when predicting mortality rates for the oldest group (70 and older), and smallest when predicting mortality rates for the youngest group (under 40).

Table 3. Estimated Risk of Death for Others Conditional on Contracting Covid-19, by Age

	Estimated Risk of Death Conditional on Contracting Covid-19 for Others		
	Assessing Under 40y	**Assessing 40y – 69y**	**Assessing 70y and Older**
Respondent Age	-1.30**** (0.14)	-1.97**** (0.21)	-2.20**** (0.33)
Female	3.91 (4.58)	7.50 (6.73)	8.43 (10.7)

Black	7.19 (6.83)	29.4*** (10.0)	37.8** (15.9)
Asian	3.59 (7.63)	15.0 (11.2)	13.5 (17.8)
Latinx	-6.56 (8.19)	-5.71 (12.0)	12.5 (19.2)
Multiracial	-5.67 (11.3)	11.2 (16.7)	23.6 (26.6)
South	-2.21 (6.27)	-0.49 (9.21)	-20.7 (14.6)
Midwest	-0.26 (7.13)	0.52 (10.5)	-1.99 (16.6)
West	6.28 (6.90)	6.28 (10.1)	-8.79 (16.1)
Suburban	-5.31 (6.21)	5.15 (9.12)	-1.50 (14.5)
Rural	1.30 (6.95)	5.75 (10.2)	1.77 (16.2)
Income ($1,000s)	-0.001 (0.054)	-0.096 (0.080)	-0.038 (0.13)
Education Category	-2.09 (1.61)	-1.31 (2.36)	-3.37 (3.74)
Total Number of Serious Health Conditions	6.38** (2.93)	4.98 (4.31)	-3.41 (6.82)
Has been hospitalized	21.0** (8.51)	17.9 (12.5)	32.5 (20.0)
Family hospitalized	5.59 (6.87)	16.9* (10.1)	32.5** (16.0)
Unemployed	-1.75 (4.70)	5.90 (6.90)	15.4 (11.0)
Red Hair Estimate	0.16**** (0.026)	0.18**** (0.038)	0.17*** (0.060)
Saw Age First	-0.62 (6.16)	13.4 (9.06)	32.2** (14.4)
Saw Gender First	0.78 (6.20)	21.4** (9.11)	39.4*** (14.4)
Saw Race First	-3.60 (6.16)	6.43 (9.05)	4.84 (14.3)
Constant	100.4**** (13.1)	144.7**** (19.2)	222.8**** (30.5)
R-sq.	0.12	0.12	0.092
N	1,506	1,506	1,498

Notes: All specifications exclude any respondent who provided an answer greater than 1,000 for that specific question of interest. Multiracial takes 1 if the participant selected more than 1 ethnicity/race category. Number of serious health conditions is the total number of health conditions self-reported.

After seeing these striking patterns by age, we learned of a publicly available international dataset that contains, among other things, respondent beliefs about likelihood of infection, hospitalization and death due to Covid-19 (Belot et al 2020). In this dataset, respondents assess risks in percentages and the formulation of the question elicits beliefs about an average person. We analysed the role of respondent age and found that our results clearly replicate in this very different

dataset. In particular, among US respondents, older respondents (compared to younger respondents) provide significantly lower estimates of: i) the percentage of people infected in their local area, ii) the percentage of people requiring hospitalization due to Covid-19, and the percentage of infected people who die. If we expand our focus to the full sample of respondents, including those from China, Italy, Japan, South Korea, the UK, and the US), the same pattern holds as well. Younger people in other countries, not just in the United States, perceive Covid-19 as being more dangerous than older people do (details in Table A1 in the Appendix).

B. Covid Risks vs. Non Covid Risks

How does the pandemic affect the way in which people think about risks other than direct exposure to Covid-19? In principle, one could think of two mechanisms. First, to the extent that Covid-19 focuses attention on health risks, it may cause heightened risk assessments for a wide range of both health and other risks. Consistent with this mechanism, Guiso et al. (2013) offer survey evidence of heightened aversion to financial risk after the 2008 crisis, or after watching a scary movie. Alternatively, the focus on Covid-19 may detract attention from non-health issues, dampening individual perceptions of risk in other domains.

To assess this issue, we use our questions on non-Covid-19 health risks (hospitalization, death, heart attack, and cancer within the next 5 years, see Section II.B) as well as on economic risks (stock market and unemployment, see Section II.C). We can then make a first pass assessment of the spillover from Covid-19 risks to other risks. Clearly, in this first wave we cannot assess whether the surprise associated with the Covid-19 shock led to a generalized change in non-Covid-19 risks. This will become more feasible as we repeat the survey in the future, and potentially tailor randomized information treatments to this question. However, in this current wave, we can ask whether, in the cross section, respondents with higher assessments of Covid-19 risk for themselves and others attach higher or lower likelihood to other risks.

In Table 4, we regress respondents' assessments of non-Covid-19 health risks for people like themselves on our full array of demographic variables. In the second column of each panel, we add beliefs about Covid-19 health risks. Here we include both the estimated mortality risk for people like self, and the average mortality risk estimated for others. Stated mortality risk for similar

people may capture the extent to which Covid-19 risk is top of mind, but may also capture unobserved individual health conditions or general concern about own health risks. Beliefs about Covid-19 risks for others may instead be a more direct measure of the extent to which Covid-19 causes health risks to be top of mind.

Table 4. Beliefs about Non-Covid Health Risks

	Estimated Own Risk of Event in Next 5 Years							
	Non-Covid Hospitalization		**Non-Covid Death**		**Heart Attack**		**Cancer**	
Respondent Age	-0.57*	0.45	-0.56**	0.35*	-0.010	0.64***	0.013	0.72***
	(0.30)	(0.29)	(0.23)	(0.20)	(0.19)	(0.18)	(0.20)	(0.19)
Own Risk of Death		0.19***		0.29***		0.22***		0.23***
		(0.049)		(0.035)		(0.029)		(0.031)
Avg. Risk for Others		0.59***		0.39***		0.31***		0.33***
		(0.051)		(0.036)		(0.031)		(0.033)
Female	-1.29	-6.16	-8.16	-11.8*	-0.84	-3.42	1.14	-0.42
	(9.63)	(8.99)	(7.23)	(6.38)	(6.04)	(5.49)	(6.43)	(5.85)
Black	12.5	-6.50	4.09	-7.73	-1.54	-13.5	-5.16	-18.4**
	(14.4)	(13.5)	(10.8)	(9.52)	(9.05)	(8.21)	(9.62)	(8.73)
Asian	-1.95	-12.2	10.0	1.06	3.41	-5.62	-8.88	-18.0*
	(16.0)	(14.9)	(12.1)	(10.6)	(10.1)	(9.14)	(10.7)	(9.74)
Latinx	11.1	3.99	24.8*	19.4*	8.61	4.46	9.32	3.36
	(17.4)	(16.2)	(13.0)	(11.4)	(10.8)	(9.84)	(11.5)	(10.4)
Multiracial	24.2	28.4	-19.1	-10.7	-18.8	-12.6	1.49	9.20
	(23.8)	(22.1)	(17.9)	(15.7)	(15.0)	(13.5)	(15.9)	(14.4)
South	28.5**	33.9***	23.3**	30.3***	21.1**	22.9***	14.6*	16.8**
	(13.2)	(12.3)	(9.90)	(8.72)	(8.30)	(7.51)	(8.82)	(7.98)
Midwest	50.9***	51.5***	29.0**	32.1***	21.4**	20.0**	31.1***	29.6***
	(15.0)	(14.0)	(11.3)	(9.93)	(9.43)	(8.55)	(10.0)	(9.08)
West	29.0**	29.5**	28.8***	26.1***	24.4***	17.0**	25.9***	19.2**
	(14.6)	(13.6)	(10.9)	(9.63)	(9.12)	(8.29)	(9.71)	(8.82)
Suburban	-10.2	-7.01	-13.0	-8.44	-5.65	-4.57	0.64	2.47
	(13.0)	(12.1)	(9.80)	(8.63)	(8.18)	(7.41)	(8.71)	(7.88)
Rural	1.58	0.87	2.78	2.72	5.03	2.96	8.11	6.64
	(14.6)	(13.6)	(11.0)	(9.68)	(9.17)	(8.32)	(9.76)	(8.85)
Income ($1,000s)	-0.13	-0.032	-0.20**	-0.10	-0.17**	-0.085	-0.15*	-0.066
	(0.11)	(0.11)	(0.085)	(0.075)	(0.071)	(0.065)	(0.076)	(0.069)
Education Category	0.20	-2.10	-2.77	-4.89**	-0.76	-2.26	0.35	-1.39
	(3.39)	(3.16)	(2.54)	(2.25)	(2.13)	(1.93)	(2.26)	(2.05)

# of Health Conditions	7.19	2.01	3.88	-1.80	11.0***	5.85*	9.76**	4.99
	(6.16)	(5.78)	(4.63)	(4.11)	(3.86)	(3.53)	(4.11)	(3.76)
Has Been Hospitalized	23.8	2.99	31.2**	4.98	-0.51	-15.4	12.5	-1.95
	(18.2)	(17.2)	(13.6)	(12.2)	(11.4)	(10.4)	(12.1)	(11.1)
Family hospitalized	72.5***	64.6***	27.8**	24.7**	19.2**	12.6	11.7	4.00
	(14.5)	(13.5)	(10.8)	(9.61)	(9.07)	(8.27)	(9.65)	(8.79)
Unemployed	7.40	1.03	-2.29	-5.12	-2.15	-4.30	-2.07	-4.35
	(9.90)	(9.23)	(7.43)	(6.55)	(6.21)	(5.64)	(6.61)	(6.00)
Red Hair Estimate	0.092*	-0.012	0.035	-0.048	0.094***	0.0097	0.072**	-0.022
	(0.055)	(0.052)	(0.041)	(0.037)	(0.034)	(0.032)	(0.036)	(0.034)
Saw Age First	-1.04	-15.7	3.27	-8.33	4.56	-8.92	1.88	-11.6
	(13.0)	(12.2)	(9.71)	(8.65)	(8.13)	(7.44)	(8.66)	(7.93)
Saw Gender First	-10.1	-20.8*	-12.8	-18.2**	-0.071	-7.88	-4.80	-12.8
	(13.0)	(12.2)	(9.78)	(8.65)	(8.18)	(7.43)	(8.70)	(7.90)
Saw Race First	-11.9	-18.6	-10.3	-16.6*	-1.26	-8.85	-4.63	-12.7
	(13.0)	(12.1)	(9.72)	(8.63)	(8.14)	(7.42)	(8.65)	(7.89)
Constant	129.9***	52.7**	117.9***	46.7**	53.3***	8.91	50.6***	2.36
	(27.6)	(26.2)	(20.6)	(18.6)	(17.3)	(16.0)	(18.3)	(16.9)
R-squared	0.05	0.19	0.04	0.23	0.03	0.19	0.03	0.19
N	1474	1461	1491	1478	1486	1473	1492	1479

Notes: All specifications exclude any respondent who provided an answer greater than 1,000 for that specific question of interest. In addition, respondents are excluded from the second column of each panel if they reported an average assessed risk for others greater than 1,000 or an own assessed risk of death greater than 1,000. Multiracial takes 1 if the participant selected more than 1 ethnicity/race category. Number of serious health conditions is the total number of health conditions self-reported.

In the first column, where we do not control for beliefs about Covid-19, we find that older individuals, as compared to younger, believe they have smaller chances of a non-Covid-19 hospitalization or a non-Covid-19 death within the next 5 years. The effects are smaller than the effects for Covid-19 health risks (about one third of the size). There is also no significant impact of age on estimated risk of having a heart attack or of developing cancer. One natural possibility is that these results conflate two mechanisms: heart attack or cancer are much more frequent in old age, so even though Covid-19 may prompt young people to think about these risks, the old are already focused on them, so that no age effect is discerned here.

When we introduce beliefs about Covid-19 risks in column 2 of each panel, the results are quite striking. Beliefs about Covid-19 risk are strongly predictive of beliefs of non-Covid-19 health risks. While own perceived Covid-19 risks might capture unobserved individual health conditions,

it is striking that beliefs about Covid-19 risks for others are so strongly associated with self-assessment of non Covid-19 risks.[5] This is suggestive of the possibility that Covid-19 may indeed renders all health risks salient, increasing their assessment across the board.

Once we account for Covid-19 beliefs, perceptions of non-Covid-19 health risks are estimated to increase with age. This is particularly true for beliefs about the risk of heart attack and cancer. Again, while we can only speculate, this seems consistent with a salience based mechanism. It's possible that Covid-19 makes disease and death salient for the young, boosting their assessment of health risk across the board. Controlling for this, the elderly correctly estimate higher health risks for themselves.

Consider next how beliefs about Covid-19 affect perceptions of economic risks. The spread of the pandemic has entailed sizable economic costs through voluntary and mandatory distancing, leading to widespread business shutdowns. It is plausible to expect that assessment of economic risks should increase in a respondent's belief about overall Covid-19 risks, as measured by assessed risks for others but not necessarily for themselves. Table 5 presents the results.

Table 5. Beliefs about Economic Risks

	Estimated Chances of Event in Next 9 Weeks On 1 – 7 Likert Scale where 7 is Extremely Likely							
	Stocks Down		**Stocks Up**		**Unemployment Up**		**Unemployment Down**	
Respondent Age	-0.015***	-0.015***	-0.0047*	-0.0036	0.0012	0.0019	-0.026***	-0.024***
	(0.0025)	(0.0026)	(0.0027)	(0.0028)	(0.0025)	(0.0026)	(0.0030)	(0.0031)
Own Risk of Death		0.00013		0.00079**		-0.00011		0.0011**
		(0.00043)		(0.00040)		(0.00043)		(0.00052)
Avg. Risk for Others		0.00027		0.0000053		0.00067		0.00079
		(0.00044)		(0.000011)		(0.00045)		(0.00054)
Female	0.16**	0.16**	-0.21**	-0.21**	0.23***	0.22***	0.14	0.14
	(0.079)	(0.080)	(0.087)	(0.088)	(0.080)	(0.081)	(0.097)	(0.098)
Black	0.39***	0.37***	-0.23*	-0.24*	0.31**	0.29**	0.20	0.16
	(0.12)	(0.12)	(0.13)	(0.13)	(0.12)	(0.12)	(0.15)	(0.15)
Asian	0.13	0.12	-0.30**	-0.32**	-0.069	-0.074	-0.027	-0.089
	(0.13)	(0.13)	(0.15)	(0.15)	(0.13)	(0.14)	(0.16)	(0.16)
Latinx	0.12	0.13	0.098	0.086	0.39***	0.39***	0.28	0.22

[5] Recall that each of these specifications also control for the respondents' estimate of the number of 1,000 Americans who have red hair. To the extent that some people are just more numerate, or provide in general lower, more reasonable numbers, this red hair estimate arguably soaks up a lot of this individual variation.

	(0.14)	(0.14)	(0.16)	(0.16)	(0.14)	(0.14)	(0.17)	(0.17)
Multiracial	-0.055	-0.066	0.013	0.040	-0.31	-0.32	-0.51**	-0.44*
	(0.20)	(0.20)	(0.22)	(0.22)	(0.20)	(0.20)	(0.24)	(0.24)
South	0.063	0.059	0.19	0.20*	-0.22**	-0.22**	0.29**	0.33**
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)	(0.13)	(0.13)
Midwest	0.18	0.18	0.033	0.037	-0.067	-0.070	0.040	0.067
	(0.12)	(0.12)	(0.14)	(0.14)	(0.12)	(0.13)	(0.15)	(0.15)
West	0.25**	0.25**	0.054	0.050	-0.016	-0.024	0.064	0.060
	(0.12)	(0.12)	(0.13)	(0.13)	(0.12)	(0.12)	(0.15)	(0.15)
Suburban	0.22**	0.23**	-0.15	-0.16	0.066	0.070	-0.32**	-0.31**
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)	(0.13)	(0.13)
Rural	0.23*	0.24**	0.079	0.072	0.083	0.087	0.16	0.17
	(0.12)	(0.12)	(0.13)	(0.13)	(0.12)	(0.12)	(0.15)	(0.15)
Income ($1,000s)	-0.0017*	-0.0017*	0.0034***	0.0035***	0.00066	0.00067	0.0020*	0.0023**
	(0.00093)	(0.00094)	(0.0010)	(0.0010)	(0.00095)	(0.00096)	(0.0011)	(0.0012)
Education Category	0.12***	0.12***	-0.053*	-0.057*	0.100***	0.098***	-0.070**	-0.076**
	(0.028)	(0.028)	(0.031)	(0.031)	(0.028)	(0.028)	(0.034)	(0.034)
# of Health Conditions	0.077	0.085*	0.022	0.0079	0.11**	0.11**	0.14**	0.11*
	(0.051)	(0.051)	(0.056)	(0.056)	(0.051)	(0.052)	(0.062)	(0.063)
Has Been Hospitalized	0.17	0.17	0.00048	-0.071	-0.12	-0.12	0.41**	0.28
	(0.15)	(0.15)	(0.16)	(0.16)	(0.15)	(0.15)	(0.18)	(0.18)
Family hospitalized	0.16	0.13	0.17	0.18	-0.034	-0.054	0.23	0.22
	(0.12)	(0.12)	(0.13)	(0.13)	(0.12)	(0.12)	(0.14)	(0.15)
Unemployed	0.0071	-0.0010	0.0018	-0.0012	0.13	0.12	-0.11	-0.13
	(0.081)	(0.082)	(0.090)	(0.090)	(0.082)	(0.083)	(0.100)	(0.10)
Red Hair Estimate	-0.00041	-0.00047	0.0017***	0.0017***	-0.00061	-0.00077	0.0017***	0.0014**
	(0.00045)	(0.00046)	(0.00049)	(0.00050)	(0.00045)	(0.00047)	(0.00055)	(0.00056)
Saw Age First	0.094	0.097	-0.074	-0.083	0.18*	0.17	-0.011	-0.048
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)	(0.13)	(0.13)
Saw Gender First	0.00063	-0.0044	-0.031	-0.026	0.20*	0.18*	-0.11	-0.14
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)	(0.13)	(0.13)
Saw Race First	0.13	0.12	0.15	0.14	0.14	0.13	-0.020	-0.052
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)	(0.13)	(0.13)
Constant	4.36***	4.33***	3.57***	3.50***	4.42***	4.37***	3.90***	3.72***
	(0.22)	(0.23)	(0.25)	(0.25)	(0.23)	(0.24)	(0.27)	(0.28)
Observations	1513	1494	1513	1501	1513	1494	1513	1494
R-squared	0.07	0.07	0.04	0.04	0.03	0.03	0.12	0.12

Notes: Respondents are excluded from the second column of each panel if they reported an average assessed risk for others greater than 1,000 or an own assessed risk of death greater than 1,000. Multiracial takes 1 if the participant selected more than 1 ethnicity/race category. Number of serious health conditions is the total number of health conditions self-reported.

The results in Table 5 suggest that several demographic characteristics, such as gender, race, location, and education have a significant and consistent effect on the perception of economic risks, but the age of the respondent does not. The perception of economic risks appears to be driven by different factors than the perception of health risks. One way to think about these results is through the lens of memory based models of beliefs (Kahana 2012, Bordalo, Gennaioli, and Shleifer 2020), which might suggest that the Covid-19 pandemic is a cue that brings to mind risks in similar domains, namely health, but not in dissimilar domains such as the economy. This is consistent with the Covid-19 cue driving differential perceptions of health risks but not economic risks.

C. Beliefs and Behavior

Finally, we ask whether beliefs about Covid-19 risks predict behavioural responses. In Table 6 we regress our five behavioural questions on our full array of sociodemographic variables, as well as the respondent's assessment of mortality risk for people like themselves and the average risk for others.

Two main results emerge here. First, beliefs matter. Both individual views on lockdown policies as well as individual behaviour become more conservative, favouring harsher or longer lockdown measures, for respondents who are more pessimistic about Covid-19 risks.

Table 6. Preferences and Behavioral Responses

	When to Lift Stay at Home Order? (1=Immediate; 5=After Vaccine)	**Would You Resume Normal Activities Today if Lifted? (1=Def. Yes; 5 = Def. No)**	**How Often Have You Been Going Out? (1=Never; 4 = 3+/week)**	**Reluctance to Go to ER if Had Medical Emergency? (1 = Extremely; 4 = None at** all)	**Avoiding Routine Medical Care? (1=Completely; 3=Not at All)**
Estimated Own Risk of Death	0.00048	0.00013	-0.00042*	-0.0013***	-0.00050**
	(0.00033)	(0.00038)	(0.00024)	(0.00029)	(0.00020)
Avg. Estimated Risk for Others	0.0011***	0.0012***	-0.00021	-0.00028	0.000089
	(0.00035)	(0.00040)	(0.00025)	(0.00030)	(0.00021)
Age	0.00080	0.013***	0.0055***	0.0025	0.0080***

	(0.0020)	(0.0023)	(0.0015)	(0.0017)	(0.0012)
Female	0.16**	0.40***	-0.26***	-0.28***	-0.10***
	(0.063)	(0.072)	(0.046)	(0.054)	(0.038)
Black	0.40***	0.37***	0.15**	-0.17**	0.026
	(0.094)	(0.11)	(0.068)	(0.081)	(0.057)
Asian	0.33***	0.33***	-0.11	-0.11	0.0046
	(0.10)	(0.12)	(0.076)	(0.090)	(0.063)
Latinx	0.30***	0.19	0.20**	-0.15	0.059
	(0.11)	(0.13)	(0.082)	(0.097)	(0.068)
Multiracial	-0.11	-0.12	-0.043	0.13	-0.0058
	(0.15)	(0.18)	(0.11)	(0.13)	(0.094)
South	-0.18**	0.13	0.030	0.036	-0.042
	(0.086)	(0.098)	(0.062)	(0.074)	(0.052)
Midwest	-0.20**	0.088	0.097	0.17**	0.028
	(0.097)	(0.11)	(0.071)	(0.084)	(0.059)
West	-0.044	0.046	0.054	0.062	-0.080
	(0.094)	(0.11)	(0.069)	(0.082)	(0.057)
Suburban	-0.012	0.13	-0.076	-0.032	0.0037
	(0.085)	(0.097)	(0.062)	(0.073)	(0.051)
Rural	0.020	-0.068	-0.14**	-0.054	-0.061
	(0.095)	(0.11)	(0.069)	(0.082)	(0.058)
Income ($1,000s)	-0.00029	-0.00086	0.000045	0.00034	0.000039
	(0.00074)	(0.00085)	(0.00054)	(0.00064)	(0.00045)
Education Category	0.014	0.044*	-0.022	-0.028	-0.038***
	(0.022)	(0.025)	(0.016)	(0.019)	(0.013)
# of Serious Health Conditions	0.14***	0.076*	-0.049*	-0.050	-0.076***
	(0.040)	(0.046)	(0.029)	(0.035)	(0.024)
Has Been Hospitalized	0.073	-0.30**	0.025	-0.049	-0.15**
	(0.12)	(0.13)	(0.086)	(0.10)	(0.071)
Family hospitalized	0.00091	0.020	0.10	-0.0075	-0.077
	(0.094)	(0.11)	(0.069)	(0.081)	(0.057)
Unemployed	0.15**	0.092	-0.081*	-0.072	-0.091**
	(0.064)	(0.074)	(0.047)	(0.056)	(0.039)
Red Hair Estimate	-0.00033	-0.00031	-0.00025	0.00026	-0.00034
	(0.00036)	(0.00041)	(0.00026)	(0.00031)	(0.00022)
Saw Age First	0.10	0.020	0.035	0.098	0.028
	(0.085)	(0.097)	(0.062)	(0.073)	(0.051)
Saw Gender First	-0.070	-0.15	0.036	0.067	0.11**
	(0.085)	(0.097)	(0.062)	(0.073)	(0.051)
Saw Race First	0.025	-0.035	-0.035	0.030	0.079
	(0.084)	(0.097)	(0.062)	(0.073)	(0.051)
Constant	2.45***	1.96***	2.39***	2.82***	2.43***

	(0.18)	(0.21)	(0.13)	(0.16)	(0.11)
Observations	1497	1498	1498	1498	1497
R-squared	0.07	0.1	0.05	0.07	0.08

Notes: Respondents are excluded if they reported an average assessed risk for others greater than 1,000 or an own assessed risk of death greater than 1,000. Multiracial takes 1 if the participant selected more than 1 ethnicity/race category. Number of serious health conditions is the total number of health conditions self-reported.

Second, for policy oriented questions, what matter are beliefs about the Covid-19 risk faced by others, while for self-restricting behaviour what matters is beliefs about own Covid-19 risk. Individuals who perceive higher risks for others on average believe we should wait longer to lift stay at home orders, and are less likely to be willing to resume their normal activities if the orders were lifted today. Individuals who perceive greater mortality risk for themselves indicate going out less frequently, being more reluctant to go to an emergency room if they had a medical emergency, and avoiding more routine medical care. Perhaps one key implication of the findings in Table 6 is that beliefs reported in our survey are actually informative and meaningful, in that policy preferences and self-reported behaviour are consistent with beliefs.

IV. CONCLUSION

The most striking finding of our first survey wave is that younger people have sharply higher assessments of Covid-19 health risks, for themselves as well as for others, than older people. These beliefs predict heightened perception of other health risks (but not of economic risks). They also predict preferences for more restrictive behaviour for self and others.

One way to rationalize this preliminary evidence is to think of Covid-19 as a "disease and death" shock that was particularly surprising and hence salient for the young. In this view, such a shock led the young to inflate Covid-19 as well as non-Covid-19 health related risks. We plan to explore this as well as other hypotheses using the future waves of the survey. If confirmed, these findings may have important lessons for the way in which we respond to large shocks, not just during pandemics. First, shocks may have a greater impact if they are more surprising or occur against a lower background risk. Second, increased risk in certain domains may spill over into heightened sensitivity to risk in similar domains. In financial markets, for instance, these principles might imply that safe asset markets may be particularly sensitive to crash risks, and that risk in a specific

market or institution may spill over to heightened risk perceptions in similar markets and institutions.

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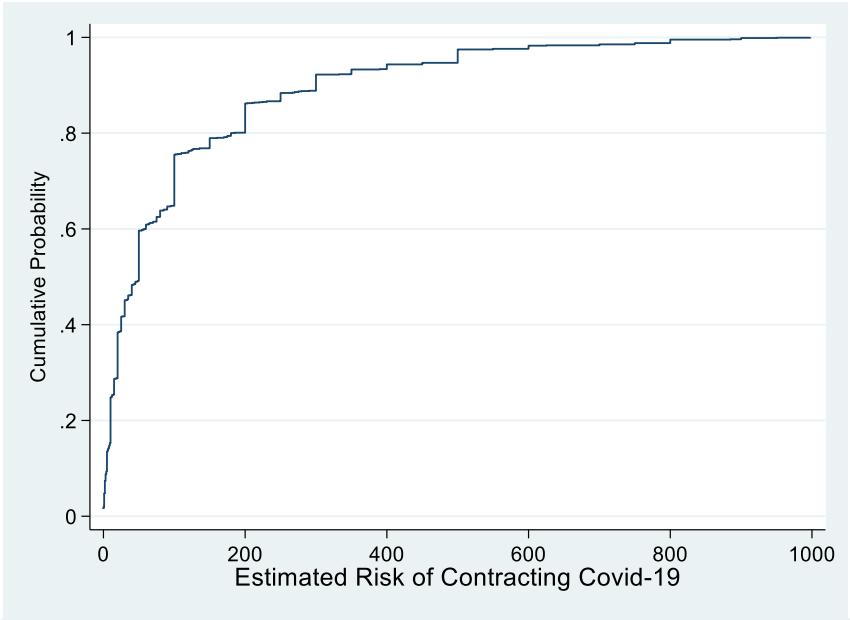
APPENDIX A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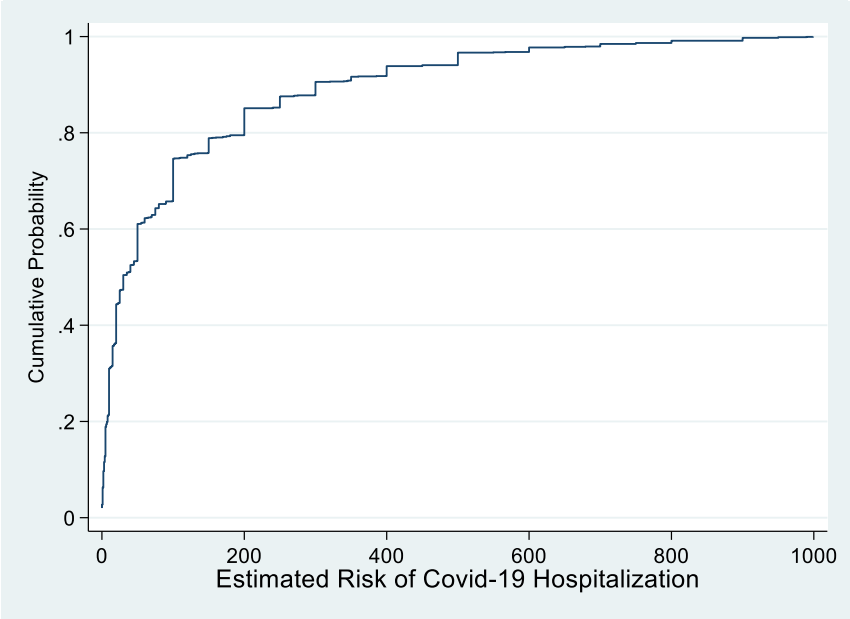
Estimated Risk of Contracting Covid-19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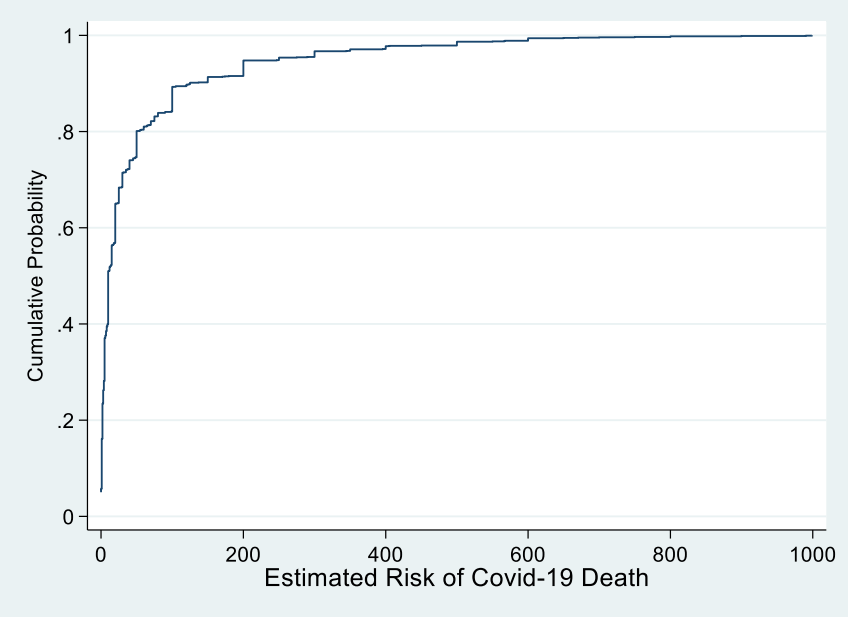
Estimated Risk of Covid-19 Hospitalization



Appendix Figure 1. CDF Plots of Covid-19 Health Risks

Excludes respondents who provided an answer greater than 1,000.

Appendix Table 1. Impact of Age in Belot et al (2020) Data

	United States Only			All Data (China, Italy, Japan, South Korea, UK, US)		
	Belief of Percentage of People in Local Area Infected	Belief of Percentage of People who Contract Covid-19 that Require Hospitalization	Belief of Percentage of People who Contract Covid-19 that Die	Belief of Percentage of People in Local Area Infected	Belief of Percentage of People who Contract Covid-19 that Require Hospitalization	Belief of Percentage of People who Contract Covid-19 that Die
Age	-0.27**** (0.047)	-0.19*** (0.054)	-0.20**** (0.055)	-0.13**** (0.017)	--0.12**** (0.021)	-0.11**** (0.020)
Other Demo. Controls	YES	YES	YES	YES	YES	YES
Constant	39.2**** (3.54)	47.3**** (4.08)	41.2**** (4.12)	16.9**** (1.28)	42.6**** (1.62)	25.7**** (1.52)
R-sq.	0.13	0.05	0.08	0.14	0.03	0.07
N	1,054	1,054	1,054	6,080	6,080	6,080

Notes: Our goal was to control for sociodemographic variables that were also collected in our survey. These controls are gender (excluding any participant who did not select male or female), income, employment status (coded to match our employment question so that any participant who has indicated they have temporarily or more permanently lost their job is coded as having been unemployed), and current living area. In addition, the US specifications include a dummy variable for reporting being a minority. And, the all data specifications include dummies for each country.

CONSENT QUALTRICS

This survey is part of a scientific research project by researchers at Harvard University. Your decision to complete this survey is voluntary. You may refuse to participate or discontinue participation at any time without any consequences or any loss of benefits that you are otherwise entitled to receive. There is no way for us to identify you. The results of the research may be presented at scientific meetings or published in scientific journals. Clicking on the 'Yes, I accept' button on the bottom of this page indicates that you are at least 18 years of age and agree to complete this survey voluntarily.

Description of the Research

This study is conducted by Katherine Coffman and Andrei Shleifer, all researchers at Harvard University. We would like you to participate in a study that will help us understand your beliefs, attitudes, and perceptions about health and economics, and how the COVID-19 pandemic may have impacted these. We expect that this study should take you no more than 15 minutes.

Description of Human Subject Involvement

The detailed instructions are explained on a later screen. In today's survey, we will ask you about your beliefs about the likelihood of different events, both related and unrelated to COVID-19, and your attitudes toward some economic, public health, and social issues.

Compensation for Participation

You will be compensated the amount you agreed upon before you entered into the survey through the Qualtrics platform.

What We Will Collect and Share

We will not collect any identifying information in the survey. The anonymous information from this survey could be used for future research studies or distributed to another investigator for future research studies without additional informed consent.

Risks & Discomforts of Participation

The study does not involve deception of any kind and should not lead to physical discomfort -- If you choose to participate, the effects should be comparable to those you would experience from viewing a computer monitor and using a mouse or keyboard. The study poses no more than minimal risk -- there are no losses involved in participating in this study.

Expected Benefits to Others

There are no direct benefits to participation. However, others may ultimately benefit from the knowledge obtained in this study.

Questions or Concerns

By participating in the study, you are not waiving any legal claims, rights, or remedies. If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study, please contact:

Katherine Coffman

Harvard Business School

kcoffman@hbs.edu

This research has been reviewed and approved by the Harvard University Area Institutional Review Board ("IRB"). You may talk to them at (617) 496-2847 or cuhs@harvard.edu. Reasons to contact them may include:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

If you consent to participate, please click next to proceed. Otherwise, exit the survey now.

Demographics Base/Universal

What is your year of birth?

What is your sex?

Male

Female

Choose one or more races that you consider yourself to be:

White
Asian
Black or African American
Latinx

Information about income is very important to understand. Would you please give your best guess?
Please indicate the answer that includes your entire household income in (previous year) before taxes.

Less than $25,000
$25,000 to $49,999
$50,000 to $74,999
$75,000 to $99,999
$100,000 to $124,999
$125,000 to $150,000
$150,000 or more

What region best describes where you live?

Northeast
South
Midwest
West

We care about the quality of our survey data and hope to receive the most accurate measures of your opinions. It is important to us that you provide thoughtful, careful answers to each question in this survey.

Do you commit to providing your thoughtful and careful answers to the questions in this survey?

I commit to providing thoughtful and careful answers
I do not commit to providing thoughtful and careful answers
I can't promise either way

Many of the questions in this survey will ask you to make your best estimate as to how many **out of 1,000 Americans** will experience different events or have different features. To give you some practice and get you used to thinking in these terms, we have a few example questions for you to work through.

Example 1: According to the United States Census, **approximately 20 out of 1,000 Americans** live in Massachusetts. This is equivalent to approximately 2%, or 2 out of every 100.

Using this estimate, tell us **how many out of 5,000 Americans** live in Massachusetts?

Example 2: This time, instead of us giving you the estimate of how many out of 1,000 Americans have a certain feature, we are going to ask you to give us your best estimate.

Think about **a group of Americans**. How many of them do you believe have red hair?

Out of **${e://Field/red_first} Americans**, how many have red hair?

Out of **${e://Field/red_second} Americans**, how many have red hair?

When asked, "Out of 1,000 Americans, how many have red hair?", you entered that you believe ${q://QID49/ChoiceTextEntryValue/1} out of 1,000 Americans have red hair.

This is equivalent to / 10 } percent.

This answer also says that:

- You believe / 10 } out of **100** Americans have red hair.
- And, you believe ${q://QID49/ChoiceTextEntryValue/1} out of **1,000** Americans have red hair.
- And, you believe * 100 } out of **100,000** Americans have red hair.

In case you are curious, the true number of Americans with red hair is estimated to be roughly **15 out of 1,000** Americans.

This is equivalent to 1.5 percent, or 1.5 out of 100 Americans, **15 out of 1,000 Americans**, or 1,500 out of 100,000 Americans.

When asked, "Out of 1,000 Americans, how many have red hair?", you entered that you believe ${q://QID49/ChoiceTextEntryValue/12} out of 1,000 Americans have red hair.

This is equivalent to / 10 } percent.

This answer also says that:

- You believe / 10 } out of **100** Americans have red hair.
- And, you believe ${q://QID49/ChoiceTextEntryValue/12} out of **1,000** Americans have red hair.
- And, you believe * 100 } out of **100,000** Americans have red hair.

In case you are curious, the true number of Americans with red hair is estimated to be roughly **15 out of 1,000** Americans.

This is equivalent to 1.5 percent, or 1.5 out of 100 Americans, **15 out of 1,000 Americans**, or 1,500 out of 100,000 Americans.

Please click next to get started on the survey. We ask that you read each question carefully, and do your best to provide a thoughtful estimate.

Covid Risks Overall

These questions concern the **current Covid-19 pandemic**.

Think about **1,000 people very similar to you** (i.e., in terms of age, gender, race, socioeconomic status, zip code, health status, etc.). For each of the following, please enter how many of them you believe will:

Out of 1000, how many contract Covid-19 in the next 9 weeks?

Just to clarify, by entering ${q://QID1/ChoiceTextEntryValue/1} for the question on the previous page, you are indicating that you believe ${q://QID1/ChoiceTextEntryValue/1} out of 1000 people very similar to you will contract Covid-19 in the next 9 weeks. This is equivalent to / 10 } percent.

Do you want to change your answer?

I do not want to change my answer.
Yes, please allow me to go back and change my answer

Please feel free to revise your answers below.

These questions concern the **current Covid-19 pandemic**.

Think about **1,000 people very similar to you** (i.e., in terms of age, gender, race, socioeconomic status, zip code, health status, etc.). For each of the following, please enter how many of them you believe will:

Out of 1000, how many contract Covid-19 in the next 9 weeks?

Think again about **1,000 people very similar to you** (i.e., in terms of age, gender, race, socioeconomic status, zip code, health status, etc.), this time **who contract Covid-19 in the next 9**

weeks. Please enter how many of those 1000 people who contract Covid-19 in the next 9 weeks you believe will:

Out of 1000 who contract it, how many require hospitalization due to Covid-19 in the next 9 weeks?

Out of 1000 who contract it, how many pass away due to Covid-19 in the next 9 weeks?

Other Health Risks

These questions concern **other (non-Covid 19) health conditions**.

Think about **1,000 people very similar to you** (i.e., in terms of age, gender, race, socioeconomic status, zip code, health status, etc.). . For each of the following, please enter how many of them you believe will:

Require hospitalization due to a reason other than Covid-19 in the next 5 years?

Pass away from a reason other than Covid-19 in the next 5 years?

Have a heart attack in the next 5 years?

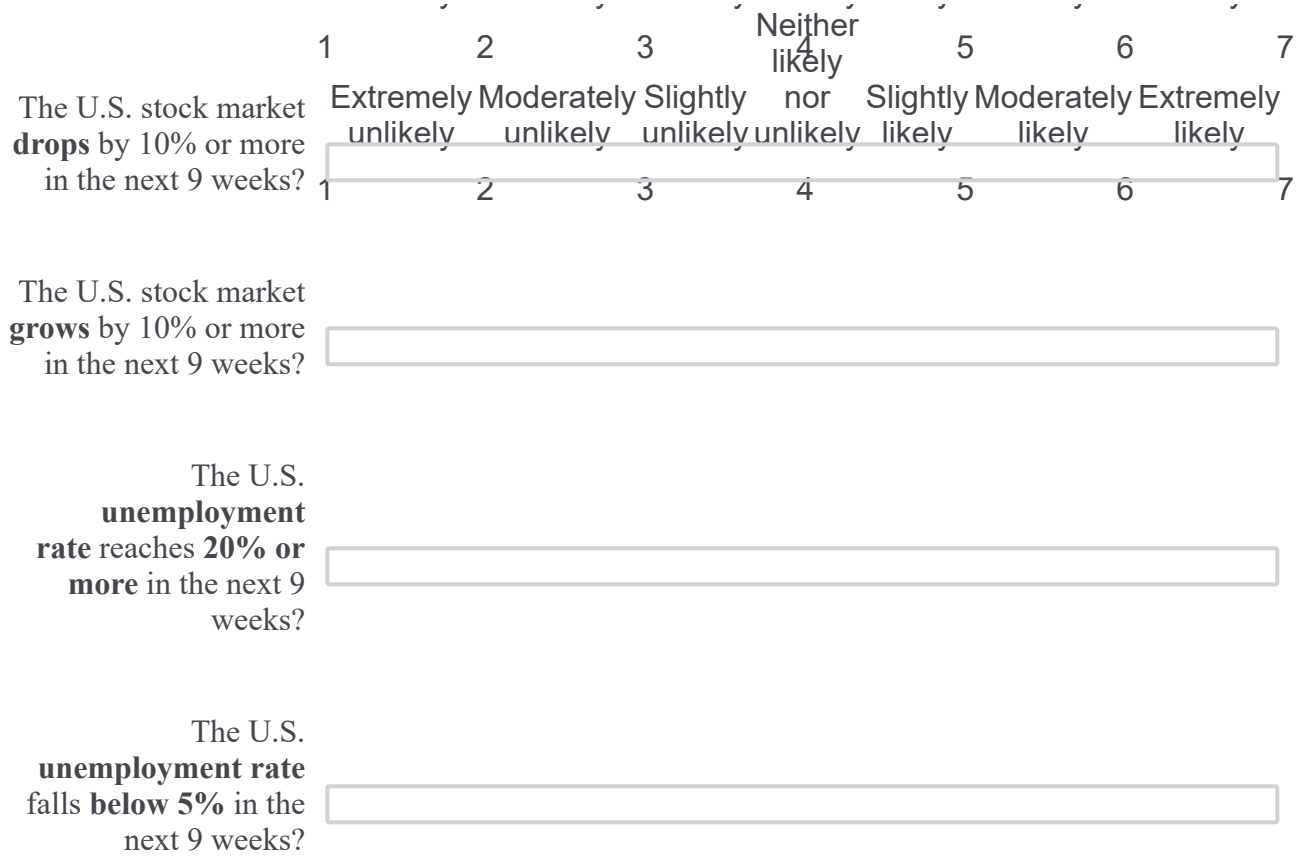
Develop cancer in the next 5 years?

Non Health Risks

These questions **concern non-health related events**.

For each of the following, please use the slider scale to indicate how likely this event is:

Extremely unlikely	Moderately unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Moderately likely	Extremely likely



Biggest Threat

Please order the following in terms of the **most pressing, important issue facing the United States today** (1) to the least pressing issue (4) facing the United States today?

The Covid-19 pandemic and public health

International conflict

Immigration

An economic crisis

AGE

These questions **concern the current Covid-19 pandemic**.

Think about **1,000 people** in each of the following AGE categories **who contract Covid-19 in the next 9 weeks**. How many of those 1,000 Americans with Covid-19 in the category do you believe will **pass away from Covid-19 in the next 9 weeks**:

Out of 1000 people who contract Covid-19 between the ages of 0 – 39 years

Out of 1000 people who contract Covid-19 between the ages of 40 – 69 years

Out of 1000 people who contract Covid-19 between the ages of 70 years or older

GENDER

These questions **concern the current Covid-19 pandemic**.

Think about **1,000 people** in each of the following GENDER categories **who contract Covid-19 in the next 9 weeks**. How many of those 1,000 Americans with Covid-19 do you believe will **pass away from Covid-19 in the next 9 weeks**:

Out of 1000 men who contract Covid-19

Out of 1000 women who contract Covid-19

RACE

These questions **concern the current Covid-19 pandemic**.

Think about **1,000 people** in each of the following RACE AND ETHNICITY categories **who contract Covid-19 in the next 9 weeks**. How many of those 1,000 Americans with Covid-19 do you believe will **pass away from Covid-19 in the next 9 weeks**:

Out of 1000 White Americans who contract Covid-19

Out of 1000 African-American or Black Americans who contract Covid-19

Out of 1000 Asian Americans who contract Covid-19

Out of 1000 Latinx Americans who contract Covid-19

Demos 2

In what state do you currently reside?

What best describes where you live?

Rural

Suburban

Urban

What is the highest level of school you have completed or the highest degree you have received?

Less than high school degree

High school graduate (high school diploma or equivalent including GED)

Some college but no degree

Associate degree in college (2-year)

Bachelor's degree in college (4-year)

Master's degree

Doctoral degree

Professional degree (JD, MD)

Please indicate which of the following, if any, you have been diagnosed with:

Diabetes

Heart disease

Lung disease

Hypertension

Obesity

Cancer

Other serious immunocomprising condition

Have you been hospitalized for non-Covid-19 reasons in the past year?

Yes

No

Has someone in your family been hospitalized for non-Covid-19 reasons in the past year?

Yes

No

Have you been unemployed anytime in the last nine weeks?

Yes

No

In your view, how soon should lockdown or "stay-at-home" measures be lifted?

Immediately

Within the next few weeks

Within the next few months

Within the coming year

Not until a vaccine or effective treatment is developed

Would you resume your normal activities if lockdown or "stay-at-home" measures were lifted today?

Definitely yes

Probably yes

Might or might not

Probably not

Definitely not

If you or someone in your family had an urgent medical issue **today**, how reluctant would you be to go to the emergency room?

Extremely reluctant

Somewhat reluctant

A little reluctant

Not reluctant at all

Have you avoided filling prescriptions at the pharmacy, doctor's appointments, or other forms of medical care in the last few weeks?

Yes, completely

Somewhat

Not at all

Over the last few weeks, approximately how many times per week have you left your home to shop, do errands, socialize, etc.?

Do **not** include work or outdoor exercise.

Never

Once a week

Twice a week

Three or more times a week

What do you think the likelihood is of a significant resurgence of Covid-19 in fall/winter 2020?

Extremely likely

Somewhat likely

Neither likely nor unlikely

Somewhat unlikely

Extremely unlikely

You have now reached the end of this survey. Thank you for your participation.

Please click "Next" to record your response and complete the survey.

CONSENT MTurk

This survey is part of a scientific research project by researchers at Harvard University. Your decision to complete this survey is voluntary. You may refuse to participate or discontinue participation at any time without any consequences or any loss of benefits that you are otherwise entitled to receive. There is no way for us to identify you. The results of the research may be presented at scientific meetings or published in scientific journals. Clicking on the 'Yes, I accept' button on the bottom of this page indicates that you are at least 18 years of age and agree to complete this survey voluntarily.

Description of the Research

This study is conducted by Katherine Coffman and Andrei Shleifer, all researchers at Harvard University. We would like you to participate in a study that will help us understand your beliefs, attitudes, and perceptions about health and economics, and how the COVID-19 pandemic may have impacted these. We expect that this study should take you no more than 15 minutes.

Description of Human Subject Involvement

The detailed instructions are explained on a later screen. In today's survey, we will ask you about your beliefs about the likelihood of different events, both related and unrelated to COVID-19, and your attitudes toward some economic, public health, and social issues.

Compensation for Participation

You will be paid $3 for completing this HIT. Your payment will be made through the Amazon Mechanical Turk platform within 48 hours of your completion of the survey.

What We Will Collect and Share

We will not collect any identifying information in the survey. The anonymous information from this survey could be used for future research studies or distributed to another investigator for future research studies without additional informed consent.

Risks & Discomforts of Participation

The study does not involve deception of any kind and should not lead to physical discomfort -- If you choose to participate, the effects should be comparable to those you would experience from viewing a computer monitor and using a mouse or keyboard. The study poses no more than minimal risk -- there are no losses involved in participating in this study.

Expected Benefits to Others

There are no direct benefits to participation. However, others may ultimately benefit from the knowledge obtained in this study.

Questions or Concerns

By participating in the study, you are not waiving any legal claims, rights, or remedies. If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study, please contact:

Katherine Coffman
Harvard Business School
kcoffman@hbs.edu

This research has been reviewed and approved by the Harvard University Area Institutional Review Board (“IRB”). You may talk to them at (617) 496-2847 or

cuhs@harvard.edu. Reasons to contact them may include:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

If you consent to participate, please click next to proceed. Otherwise, exit the survey now.