SARS-CoV-2 Fatality Risk Perception in US Adult Residents

Christoph Niepel^{1*}, Dirk Kranz², Francesca Borgonovi³, & Samuel Greiff¹

¹University of Luxembourg

²University of Trier

³University College London

Christoph Niepel, Department of Behavioural and Cognitive Sciences, University of Luxembourg, 11, Porte des Sciences, 4366 Esch-sur-Alzette, Luxembourg; Email: christoph.niepel@uni.lu

Dirk Kranz, Department of Psychology, University of Trier, 54286 Trier, Germany;
E-mail: dirk.kranz@uni-trier.de

Francesca Borgonovi, Department of Social Science, University College London, 55-59 Gordon Square, London WC1H 0NU, United Kingdom; E-mail: f.borgonovi@ucl.ac.uk

Samuel Greiff, Department of Behavioural and Cognitive Sciences, University of Luxembourg, 11, Porte des Sciences, 4366 Esch-sur-Alzette, Luxembourg; Email: samuel.greiff@uni.lu

*Correspondence to: Christoph Niepel, Department of Behavioural and Cognitive Sciences, University of Luxembourg, 11, Porte des Sciences, 4366 Esch-sur-Alzette, Luxembourg; Phone: +352 466644 6747; Email: christoph.niepel@uni.lu

The study was approved by the ethics review panel of the University of Luxembourg (ERP 20-015 PANIC). No external funding was used to assist in conducting the study. The authors have no conflict of interests to declare. CN and SG conceptualized the study, CN, DK, FB, and SG performed the analyses and wrote up the manuscript.

SARS-CoV-2 Fatality Risk Perception in US Adult Residents

On December 31, 2019, China alerted the World Health Organization (WHO) of several cases of pneumonia induced by an unknown virus in the city of Wuhan. On March 11, 2020, it was declared a pandemic by the WHO¹ and by March 13, 2020, the new SARS-CoV-2 virus had already spread to 143 countries². In the absence of established pharmaceutical protocols to treat affected individuals or vaccines to halt infections, most countries have implemented containment and mitigation strategies, requiring individuals to dramatically alter their lifestyle limiting personal freedom. The extent to which these measures will be politically acceptable and respected by populations is likely to depend, among other factors, on individuals' perceived risk of suffering severe consequences following infection³. In fact, not all individuals are at equal risk of dying if infected. In particular, existing data from affected regions suggest that especially individuals with preexisting medical conditions and older individuals are at an increased risk of dying if infected⁴.

With this study, we aimed to provide time-critical insights on the SARS-CoV-2 fatality risk perception of the US population as a whole as well as for two crucial subgroups defined by existing medical conditions and age. We do so by using a sample of $N = 1182$ US adult residents (i.e., ≥ 20 years) stratified for age and gender (50.4% women, 48.6% men, 1% other; age: $M = 45.6$ years, $SD = 15.72$, range = 20 to 83). Data were collected online from March 13 to 15, 2020, on the platform Prolific⁵. The study was approved by the ethics review panel of the University of [blinded for review]; participation was voluntary and participants were compensated for their participation. Perceived personal risk of dying from SARS-CoV-2 if infected was assessed on a nine-point scale ranging from *Approximately zero* ($<0.0001\%$) to *Approximately three-quarters* (75%). We used published crude case-fatality risk estimators^{6,7} for the entire population (i.e., around 1%) as well as for the different subgroups defined by preexisting medical conditions (i.e., if no reported: around 1%; if reported: around 10%) and age (i.e., for 20 to 49 years: around 0.1%; for 50 to 69: around 1%; for 70 and older: around 10%). We operationalized preexisting medical conditions as a yes or no statement on whether the participant currently or ever experienced a serious medical condition such as heart disease, diabetes, chronic respiratory disease, high blood pressure, or cancer. To examine the effect of perceived personal risk on behavior, we assessed reasonable SARS-CoV-2-related behavior, which had been identified as key containment measures^{8,9} by means of an 8-item scale (e.g., "I am planning to/have already started avoiding crowded spaces"; five-point rating; $\alpha = 0.87$). Figure 1 depicts the results. Looking at the overall sample (Figure 1a), one in five Americans (20%) perceived the risk to die from SARS-CoV-2 if infected with the virus to be around 1% matching current epidemiological figures^{6,7}. Around 14% report higher risk, whereas the majority of around 67% report lower risk than the 1% mark. As many as one in two Americans (51%) reported that their own odds of dying if infected were approximately one in ten thousand or even lower, thereby severely underestimating fatality risk.

In a second step, we looked at the relative risk perceptions across the two subgroups defined by medical condition and age with different baseline risks. Figure 1b and 1c depict the results for the medical condition subgroups. Although individuals with preexisting medical conditions understand that their own risk of dying from SARS-CoV-2 if infected is higher than the average 1%, they severely underestimate their risk (77% vs. 74% in the no preexisting condition group). These results are mirrored by those of the three age subgroups. Figure 1d to 1f depict the results. Even though older Americans tend to know that their relative risk is higher than 1%, they are underestimating their risk (69%). Slightly more than half (58% for both) of both younger age groups severely underestimate their relative risk of dying of SARS-CoV-2 if infected.

In a third step, we tested the relation between fatality risk perception and behavior. A significant Spearman's rho correlation ($r = 0.21$, $p < 0.001$) indicates that participants with a lower perceived risk tend to perform less behaviors that can reduce SARS-CoV-2 transmission rates (e.g., not shaking hands or avoiding crowded spaces).

Overall, given the current epidemiological figures^{6,7}, our findings suggest that many US adult residents underestimate their absolute and relative fatality risk if infected by SARS-CoV-2. These results are worrying because risk perception, as our study suggests, guides behavior that can reduce transmission rates³ and thus save lives.

- 1 WHO. WHO Virtual press conference on COVID-19 [Internet]. 2020 March 11 [cited 2020 March 16]. Available from: https://www.who.int/docs/default-source/coronaviruse/transcripts/who-audio-emergencies-coronavirus-press-conference-full-and-final-11mar2020.pdf?sfvrsn=cb432bb3_2
- 2 WHO. Coronavirus disease (COVID-2019) situation reports. Situation report—55 [Internet]. 2020 March 15 [cited 2020 March 16]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200315-sitrep-55-covid-19.pdf?sfvrsn=33daa5cb_6
- 3 Sheeran P, Harris PR, Epton T. Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychol. Bull.* 2014;140(2):511–43.
- 4 Oke J, Heneghan C. Global Covid-19 Case Fatality Rates [Internet]. Oxford (UK): Centre for Evidence-Based Medicine; 2020 March 17 [updated 2020 March 27; cited 2020 March 27]. Available from: <https://www.cebm.net/covid-19/global-covid-19-case-fatality-rates/>
- 5 www.prolific.co [2020 March 27]
- 6 The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020. *China CDC Weekly* [Internet]. 2020 February [cited 2020 March 27];2(8):113–122. Available from: <http://weekly.chinacdc.cn/fileCCDCW/journal/article/ccdcw/2020/8/PDF/COVID-19.pdf>
- 7 Joint Mission. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) [Internet]. 2020 February 28 [cited 2020 March 27]. Available from: <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
- 8 Ferguson N, Laydon D, Nedjati Gilani G, Imai N, Ainslie K, Baguelin M, et al. Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID19 mortality and healthcare demand. Imperial College London (UK): COVID-19 Response Team [Internet]. 2020 March 16 [cited 2020 March 27]. Available from: <https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf> DOI: <https://doi.org/10.25561/77482>
- 9 WHO. Coronavirus disease (COVID-19) advice for the public [Internet]. Geneva (Switzerland): WHO; 2020 February 05 [updated 2020 March 18; cited 2020 March 27]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

Figure 1: Perceived absolute and relative SARS-CoV-2 fatality risk perception in US adult residents.

Absolute Fatality Risk Perception

Relative Fatality Risk Perception: Medical Condition

Relative Fatality Risk Perception: Age Groups