


# Changes in Suicide and Resilience-related Google Searches during the Early Stages of the COVID-19 Pandemic

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## Keywords

suicide, Google Trends, online searches, COVID-19, pandemic, resilience, depression, anxiety, survival

## Introduction

Pandemics such as the 2019 coronavirus (COVID-19) outbreak have the potential to negatively impact mental health,<sup>1</sup> which may, in turn, influence suicide rates.<sup>2</sup> Due to the substantial lag before mortality data become available, it will be some time before that can be investigated. More readily available proxy indicators, such as Google search trends,<sup>3</sup> may be of value both for early characterization of the impact of COVID-19 on suicide and in formulating an early public health response. However, this has never been tested in the context of a pandemic. We aimed to characterize changes in suicide-related searches worldwide and in the United States (the country with the most reported COVID-19 cases to date) to identify potential early indications of impact on suicide which can later be compared to mortality data.

## Methods

Publicly available Internet search data were obtained from Google Trends (<http://google.com/trends>) for the word “suicide” and a list of potentially related terms (“suicide methods,” “how to commit suicide,” “how to kill yourself,” “sadness,” “depression,” “anxiety,” “hopeless”) as well as a list of terms potentially conveying the opposite (“survival,” “how to survive,” “resilience,” “hope”). As in previous research, minor modifications to search strings were required to prevent confounding (see Supplementary File for details).<sup>3</sup> The epoch of interest was the first month following the outbreak which was defined as March 2020, given that nearly all cases of COVID-19 both worldwide, apart from China, and in the United States were identified after March 1, 2020.<sup>4</sup> Given that weekly data are only available on Google Trends for a 5-year epoch, we defined the “pre-COVID-19” period as April 5, 2015 to February 29, 2020 and the “COVID-19” period as March 1, 2020 to April 4, 2020.

To investigate whether search volumes had changed between the two periods, we conducted interrupted time series regression using separate models for each search term. The outcome was the number of searches per week, and the key predictor was a binary-coded variable representing the COVID-19 period. All models controlled for long-term time trends (entered as a fractional polynomial to account for nonlinearity) and for short-term seasonality trends (entered as Fourier terms). This was fit using a generalized linear model using the Poisson family with a log-link function and using a scale parameter to account for overdispersion.

## Results

The results of the time series are presented in Figure 1 as well as in Supplementary Tables S1 and S2. There were significant reductions in searches for the word “suicide” both worldwide (−12%; 95% CI, −22% to −1%) and in the United States (−17%; 95% CI, −28% to −4%). The same was observed for “suicide methods” (worldwide: −39%, 95% CI, −59% to −9%; United States: −36%, 95% CI,

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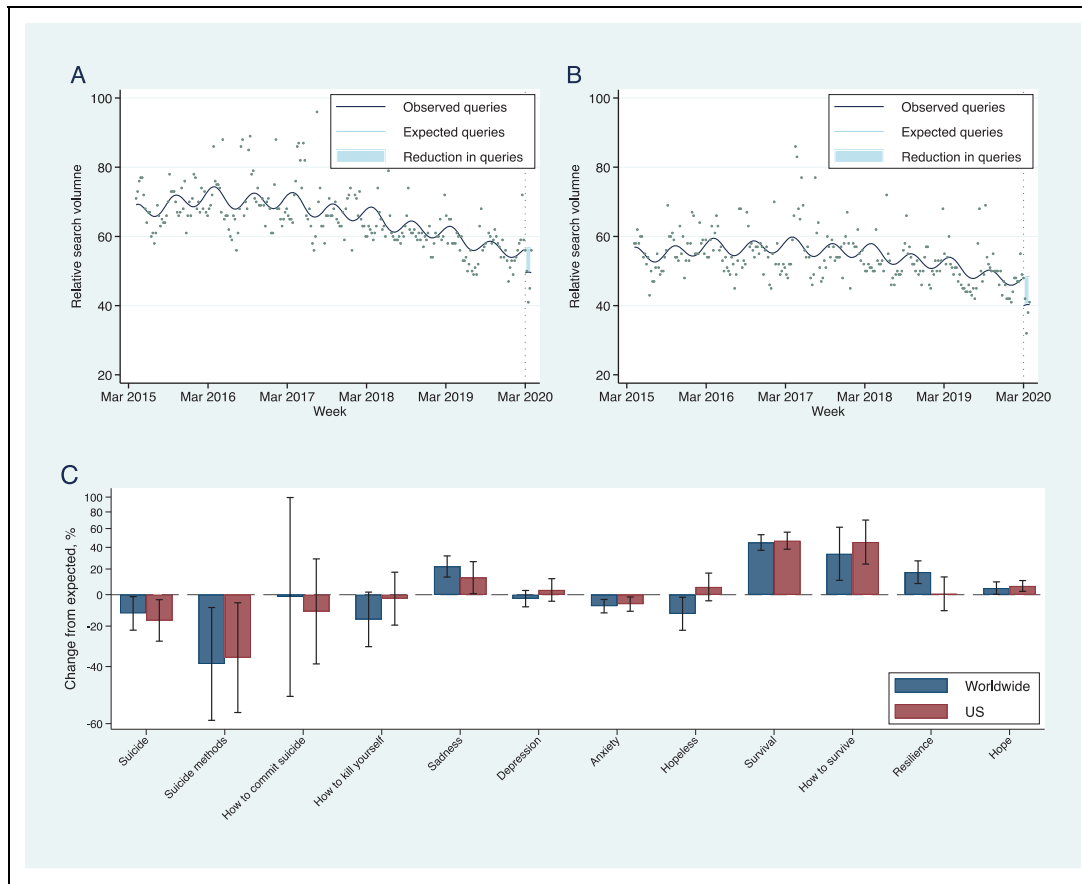
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**Figure 1.** Changes in suicide-related searches following the 2019 coronavirus pandemic. (A) Worldwide suicide queries. (B) U.S. suicide queries. (C) Change in specific queries.

–57% to –6%). Changes in searches for “how to commit suicide” and “how to kill yourself” were not significant.

Searches for sadness increased with fewer searches for “anxiety” and for “hopeless” (worldwide only) but no change in “depression” searches. There was also a significant increase in searches for “survival,” “how to survive,” and “hope” worldwide and in the United States as well as “resilience” (worldwide only).

## Discussion

This study examined suicide and mental health–related searches associated with the COVID-19 pandemic. It demonstrates that the initial stages of the pandemic were accompanied by a substantial reduction in searches related to suicide, anxiety, and hopelessness with no change in searches for depression. Concurrently, there were more searches related to hope, survival, and resilience but also sadness.

Taken together, these findings assist in developing a conceptual model for the world’s initial reaction to the crisis. They suggest that, as may have been expected, the pandemic has triggered an increased focus on finding ways to survive and to overcome challenges but possibly also more negative emotionality. The latter may be perceived by many as a

natural reaction to stressful circumstances rather than a pathological one (i.e., “sadness” rather than “depression”). Both a focus on survival and/or a perception that suffering is expected/appropriate given the circumstances could plausibly lead to a reduction in societal and individual focus on suicide. This, in turn, could suggest a reduction in suicide-related outcomes such as suicide attempts and deaths although that remains to be studied. If that pattern emerges, it could suggest that suicide in very early phase pandemics behaves more like wars in which rates may decrease rather than economic catastrophes where the opposite is often observed.

It should be emphasized that this study only examined the early phase of the global pandemic. Thus, even if suicide rates are found to be reduced in March 2020, prolonged public health measures such as mandatory isolation, social distancing, and economic factors may well have long-term effects on suicide-related online searches, suicide deaths, and mental health in general, which could follow a different trajectory. A small body of research has shown that catastrophic public events, including pandemics, can result in negative mental health outcomes particularly over the long run.<sup>5,6</sup> Notably, suicide rates in older adults increased substantially in Hong Kong following the SARS epidemic of 2003.<sup>6</sup>

This study demonstrates that Google search results related to suicide decreased and related to survival/resilience increased in the initial phase of the COVID-19 pandemic. Whether these findings will be associated with changes in actual suicide rates deserves future scrutiny.

### Authors' Note

All authors contributed for study concept and design. All authors contributed for acquisition, analysis, or interpretation of data. Sinyor drafted the manuscript. Statistical analysis was performed by Spittal. All authors critically reviewed the manuscript for intellectual content. All authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

### Declaration of Conflicting Interests

The author(s) declared potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dr. Sinyor declares that he has received in-kind assistance from Google Canada in developing a website to deliver a free youth health literacy curriculum.

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### Supplemental Material

Supplemental material for this article is available online.

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