



The Impact of Covid-19 on Online Discussions: the Case Study of the Sanctioned Suicide Forum

Elisa Sartori
elsartor@math.unipd.it
University of Padua
Italy

Luca Pajola
pajola@math.unipd.it
University of Padua
Italy

Giovanni Da San Martino
dasan@math.unipd.it
University of Padua
Italy

Mauro Conti
conti@math.unipd.it
University of Padua
Italy

ABSTRACT

The COVID-19 pandemic has been at the center of the lives of many of us for at least a couple of years, during which periods of isolation and lockdowns were common. How all that affected our mental well-being, especially the ones' who were already in distress? To investigate the matter we analyse the online discussions on Sanctioned Suicide, a forum where users discuss suicide-related topics freely. We collected discussions starting from March 2018 (before pandemic) up to July 2022, for a total of 53K threads with 700K comments and 16K users. We investigate the impact of COVID-19 on the discussions in the forum. The data show that covid, while being present in the discussions, especially during the first lockdown, has not been the main reason why new users registered to the forum. However, covid appears to be indirectly connected to other causes of distress for the users, i.e. anxiety for the economy.

CCS CONCEPTS

• Information systems → Social networks.

KEYWORDS

COVID-19, suicide

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1 INTRODUCTION

The coronavirus disease (COVID-19) is the pandemic that hit the worldwide population starting from 2019. The pandemic was tremendous, with 39M cases and 1.1M deaths registered up to October 2020 [5], and many lockdown restrictions all over the world [17].

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Thanks to the wide adoption of social media, the world population started discussing the pandemic online. Many researchers thus investigated the impact of covid on online discussions, resulting in several studies, including on the rise of Sinophobia [16] and the spread of misinformation [2, 9, 10, 12, 14].

This work focuses on the effects of the pandemic on the users of Sanctioned Suicide [15] – a pro-choice forum, which arguably showed distress before the pandemic. Specifically, we monitored suicide discussions on the forum from March 2018 to July 2022, for a total of 53K threads and 16K users involved. Our investigation attempts to determine whether covid becomes a predominant topic of discussion, and in what contexts covid shows up. We summarize our contribution as follows:

- Collection of a dataset containing Sanctioned Suicide discussions from March 2018 to July 2022, for a total of 53K threads.
- A set of analyses aiming at finding the role of the pandemic on the discussions in the Sanctioned Suicide forum.

2 DATASET

Sanctioned Suicide is a pro-choice site focused on the topic of suicide [15]. Users frequent the site to find information about methods, vent about their situation or ask for support from people that can understand them. The website is divided into three main forums: *Recovery*, *Suicide Discussion* and *Offtopic*. In *Recovery* discussions are focused on the offer or request for support from users on the road to recovery. On the contrary, *Suicide Discussion* is where users gather to collect information on procedures, substances, how to acquire them, etc. Lastly, *Offtopic* hosts discussions about hobbies and other more general themes. *Suicide Discussion* is by far the most popular with, at the time of writing, more than 69K threads, followed by *Offtopic* with 17.8K threads) and *Recovery* with 4.6K threads. Taking into consideration users' activity, we decided to focus only on the forum *Suicide Discussion*. Moreover, since we are interested in the impact of COVID-19, to ensure comparison before and during the pandemic, we cover a period from March 2018 to July 2022. Our investigation examines a subset of 53K threads with 700K comments and data about 16K users. Given the sensitive nature of the subject, we do not consider users' personal information but only statistics such as the date of registration and the number of total comments made. Using various sources [17, 18], we identify 6 periods of interest:

- PP** Pre-Pandemic, from 01/10/2019 to 31/12/2019, is the period before the first reported cases in China.
- PL1** Pre-Lockdown1, is the time frame from 01/01/2020 (announcement of first cases) to 11/03/2020.
- L1** Lockdown1, the period where most lockdowns happened in Europe and USA, from 12/03/2020 to 15/06/2020.
- PE1** Peace1, from 16/06/2020 to 19/10/2020, period between the two lockdowns.
- L2** Lockdown2, the time frame where most of the lockdowns happened in Europe, from 20/10/2020 to 06/01/2021.
- PE2** Peace2, is the period after the second lockdown, from 07/01/2021 to 31/03/2021.

Before proceeding with the analysis, we wanted to gain insight into the site and its users' activity levels across the months.

In Figure 1, we compare the monthly trends of registered users (*Users*), amount of threads created (*Threads created*) and total comments made (*Total comments*). Notice the joint peak among all trends in PL1, prior to the first lockdown. The three curves follow a very similar trend before the peak and diverge afterwards.

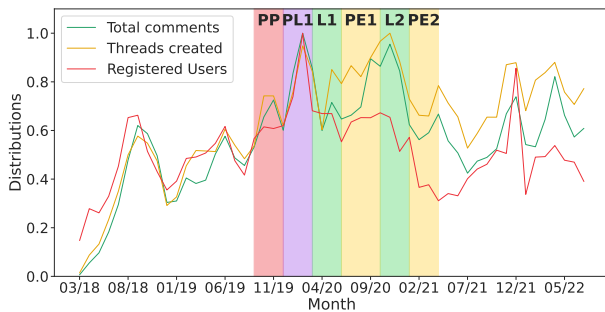


Figure 1: Forum statistics over time: number of comments, threads and registered users.

To better understand how users engage with the site, we compute the lifespan of threads (defined as the number of weeks between its creation and the last comment) and users' activity in the forum within a year (defined as the number of weeks from the registration to the last comment). In Figure 2 we report the density of both quantities. It is immediate to see that most users are active only in the first few weeks after their registration and that most threads have a relatively short lifespan.

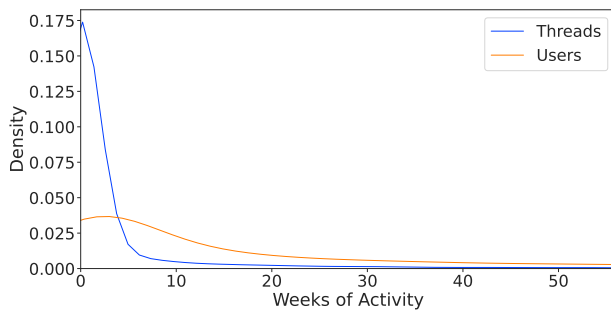


Figure 2: Threads' lifespan and users' activity span.

3 ANALYSIS

In this work we aim to answer the following research questions: **(RQ1)** is COVID-19 mentioned in Sanctioned Suicide discussions? **(RQ2)** did users join the forum during COVID-19 to discuss about it? **(RQ3)** what are the topics of the COVID-19-related discussions? **(RQ4)** what is the language used in Covid-related threads?

3.1 RQ1 - Is COVID-19 mentioned in Sanctioned Suicide discussions?

Methodology. We searched for threads containing the keywords covid, pandemic, and lockdown, as well as common (most frequent) words in the forum, such as suicide related ones (ctb,¹ suicide), *loneliness* discussions (i.e., alone, loneliness, lonely). Figure 3 reports the total number of threads per month and compares the number of threads in which the keywords above appear, as well as combinations of them, such as Suicide/Pandemic and Loneliness/Pandemic.

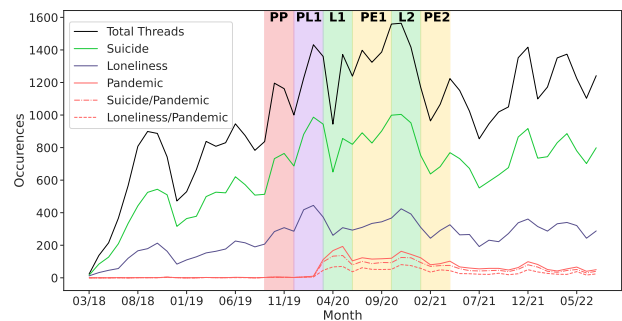


Figure 3: Number of threads in which suicide, loneliness, pandemic related keywords (and their combinations) appear.

Outcome. Covid-related discussions are present in the forum, they reach non-negligible numbers starting from the first lockdown **L1**, in which on average 13% of the discussions mentioned it, with a peak of 18% on April 2020, despite a general decrease in the number of threads around that month. While threads mentioning the pandemic occur also later in 2022, their trend is decreasing, for instance in May 2022 only 5% of the threads mention covid. Notice that the curve reporting the number of threads in which both the keywords *pandemic* and *suicide* appear is very similar to the one related to *pandemic* keywords, suggesting that covid had been mentioned mostly when talking about suicide, and not loneliness, for example.

3.2 RQ2 - Did users join the forum during COVID-19 to discuss about it?

Methodology. For this analysis, we trained BERTopic [4] on our corpus to learn the topics occurring in the forum. The model identified 89 topics, that we manually grouped based on their meaning into seven broader categories: hobbies, covid, mental health, social interactions, social and health (S&H) problems, suicide, and methods. After assigning one topic to each thread, in order to determine

¹Catching-the-bus (ctb) means jumping in front of a moving bus, thus it is an euphemism for suicide.

whether users joined the forum specifically to talk about covid, we checked the topic of the thread they wrote their first post, if it happened within one week from their registration in the forum. The stacked plot in Figure 4 shows, for each month, how many users posted first in a thread talking about a specific topic.

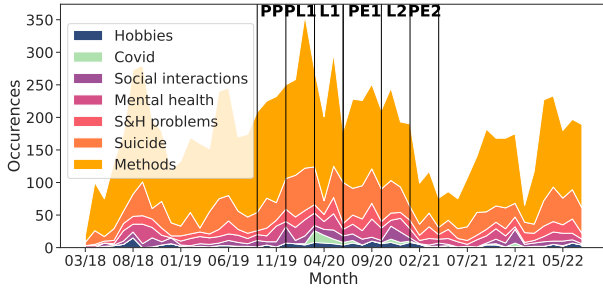


Figure 4: For each topic, number of users, for each month, whose first post is in a thread about it.

Outcome. Not surprisingly the users first interaction with Sanctioned Suicide relates to methods and suicide. The peaks of social interaction-related discussions are cyclical, mostly during the Christmas period. Interestingly, quite a few users first posted in threads openly discussing about mental health, social and health problems, suggesting that Sanctioned Suicide is also perceived as a place in which personal issues can be discussed. Regarding the pandemic, even at the highest peak, i.e. on March 2020, only 6% of the users first posted about covid, suggesting that covid was not the main reason bringing users to the forum.

3.3 RQ3 - What other topics are discussed in COVID-19-related threads?

Methodology. We now aim to explore the interconnections among the 7 major topics we identified in Sanctioned Suicide discussions. We begin by describing the procedure used to build the correlation matrix among the topics. Be M a zero matrix of size $|T| \times |T|$, where T is the set of topics (seven in our case). Be $\langle t_i, c_i \rangle$ a Sanctioned Suicide thread, where t_i denotes the i -th main thread, and c_i the list of its comments $[c_i^0, \dots, c_i^n]$. Be BERTopic a function $\mathcal{B} : X \rightarrow T$, that, given a text x , returns its correspondent topic. Through \mathcal{B} , we assigned a label to each main thread and comments, resulting in $\langle \mathcal{B}(t_i), \mathcal{B}(c_i) \rangle$, where $\mathcal{B}(c_i) = [\mathcal{B}(c_i^0), \dots, \mathcal{B}(c_i^n)]$. For each thread, we update M :

$$M[j, \mathcal{B}(t_i)] = M[\mathcal{B}(t_i), j] + 1 \forall j \in \mathcal{S}(\mathcal{B}(c_i)), \quad (1)$$

where $\mathcal{S}(\mathcal{B}(c_i))$ represent the set of unique values from the given list. Finally, we standardize M by dividing each column (representing a thread topic) by the total amount of occurrences. Figure 5 shows the resulting M .

Outcome. The first evident finding – as expected – is that topics defined in the main thread text occurs also in the discussions. Indeed, the diagonal shows a correlation always greater than 0.90. The distribution of the comments not referring to the main topic of the thread tend to have one or two peaks, mainly around *methods* and secondarily around *suicide*, the only exception being the threads

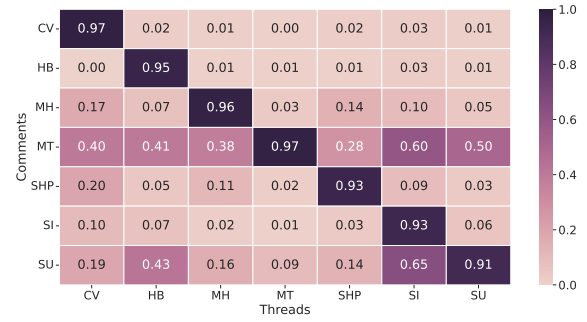


Figure 5: Correlation between the topic of a thread and of its comments. The topics are covid (CV), hobbies (HB), mental health (MH), methods (MT), social and health problems (SHB), social interaction (SI), and suicide (SU).

about covid that appear to have comments from almost every other topic. Such result suggests that covid-related threads often arise in the search of methods to commit a suicide.

3.4 RQ4 - What is the language used in Covid-related threads?

Methodology. We conclude our analyses by inspecting the use of language related to words like pandemic, covid, and lockdown. We built our graph inspired by a similar analysis presented by Tahmasbi et al. [16] that shows sinophobic behavior of social network users during the pandemic. The procedure follows that proposed by Zannettou et al. [19]. In particular, we train a *word2vec* model [7] over the threads posted after the first case of COVID-19 (starting from PL1). The corpus is preprocessed, first by removing stopwords (e.g., and, the, etc.), and then by stemming the remaining words with the PorterStemmer². We limit our vocabulary to the top 50,000 words occurring in our corpus. Finally, we create a two-hop graph starting from pandemic, covid, and lockdown by defining an edge between two words if the cosine similarity their embeddings is greater or equal than a certain threshold, 0.6 in our case. Figure 6 shows the resulting two hop graph, in which the size of the glyphs depends on their frequency in the corpus. The graph further presents clusters computed with the Louvain algorithm [3]. Edges thickness is proportional to the similarity among the (embeddings of the) corresponding words.

Outcome. The pandemic cluster (in orange) contains the three original words (i.e., pandemic, lockdown, and covid), that are highly connected with words like *coronavirus*, *quarantine*, *virus*. Interestingly, it presents also words like *recession* (one hop) from covid, *Wuhan* (two hop, through *coronavirus*), or more general virus infections like *swine* and *ebola*. Furthermore, COVID-19 countermeasure topics such as *antivaxx*, *vaccin*, and *moderna* are present.

The green community appears at *one-hop* between *vax* and covid. From *vax*, related words belong to pathologies (e.g., *hiv*, *lyme*, *autoimmune*), demonstrating that Sanction Suicide users discuss about personal diseases. On the contrary, the third community (in purple) contains words related to society discussions. The

²<https://radimrehurek.com/gensim/parsing/porter.html>

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