

Exploring the Singularity Between Google Searches and Suicide Deaths After Celebrity Suicides

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Abstract: The purpose of this study is to suggest the need to strengthen suicide prevention monitoring for the mentally vulnerable by analyzing the specificity and relation between the suicide search volume of Google Trends and the number of suicide deaths according to celebrities' suicides. The focus of this study is on the high suicide death rates that occurred in specific months between 2019 and 2020. For analysis, data were extracted from raw data and provisional database from deaths due to Specific Cause of Death (intentional self-harm) by month and sex of the Statistics Korea from 2019 to 2020. In addition, Google Trends was analyzed to identify search volume big data based on search terms entered by users along with research reviews. The core of the analysis results is that the number of Google searches based on suicide search terms increased due to the suicide of celebrities, and the number of suicide deaths also increased. In this paper, it is argued that more specific follow-up measures are necessary to prevent further suicide, and as a countermeasure, continuous monitoring of suicide frequency searches in Google Trends after celebrity suicides and special attention are required along with observation of the mentally weak.

Keywords: *suicide death, Google search, imitation suicide, Werther effect, prevention monitoring*

1. Introduction

According to the World Health Organization, about 700,000 people die of suicide every year, which means that one person commits suicide every 40 seconds, indicating that suicide is a global phenomenon (WHO, 2020). In particular, South Korea (hereafter Korea) is a high-risk country for suicide, with the highest suicide rate among OECD countries. Korean government have regarded suicide as a public health and social problem, and established the Act for the Prevention of Suicide and the Creation of Culture of Respect for Life from 2011, suicide prevention activities have been promoted. In particular, the Korean standard suicide prevention education program "Seeing, Listening, and Speaking" was developed and distributed by the Korea Suicide Prevention Center, and by 2019 1.2 million people have completed the program (Park, et al., 2020). However, despite these efforts by the government and the private sector, Korea's suicide rate in 2019 still ranked first in the OECD. Accordingly, WHO recognizes that the world is not reaching the 2030 suicide reduction target, and is urging countries to implement comprehensive suicide prevention policies through LIVE LIFE approach to suicide prevention. The problem is that the outbreak of the COVID-19 from January 2020 has increased the stress of global citizens due to the spread of non-face-to-

face as well as the collapse of the global medical system. COVID-19, which made normal communication impossible due to social distancing and wearing masks, was also bound to seriously affect the mental health of Koreans. Medical experts have warned that the COVID-19 pandemic would lead to increased suicides and the occurrence of poor care for patients with psychological anxiety (UN, 2020; PAHO, 2020). Recently, WHO has identified mental health as an essential component of country-specific COVID-19 responses, but in fact, most of them are found to be unable to afford mental health care.

Suicide is a phenomenon in which social, psychological, medical, religious, and philosophical factors are combined. Recent researches have identified it as a serious social problem and argued that it is preventable. Emile Durkheim asserted that suicide is a 'social phenomenon' influenced by social and structural factors, rather than an 'individual event' that occurs randomly, by analyzing cross-country comparisons and changes in suicides within countries during the period of rapid social change in Europe. Among the various factors of suicide, the Werther effect is known to increase suicidal risk by imitating the suicide of famous celebrities and politicians due to socio-environmental factors (Fu, & Chan, 2013). Therefore, in order to mitigate the Werther effect, it is necessary to closely analyze the effect of celebrity suicide on the vulnerable and take preventive measures. On the other hand, studies examining the correlation between suicide rate and suicide search

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volume showed that Google's annual suicide rate and the number of suicide searches increased similarly, so a study based on a similar methodology seems to be also needed (Lee, 2020; Kristoufek, Moat, & Preis, 2016; Song, et al., 2014).

In this regard, this study focuses on the high suicide death in specific months before and after COVID-19 in Korea, observes that an increase in the suicides of specific persons can lead to an increase in the suicide rate, and aims to explore the importance of postvention by presenting the evidences through social platforms. To this end, it identifies the suicide cases of Korean celebrities occurred in specific months in 2019, 2020, and investigates the national suicide rates and searches volume for suicide through Google Trends from 2019 to 2020. The main composition of this paper is as follows. First, it is to examine the relevance between suicide deaths and suicide search volume. Second, it is to confirm whether suicides of Korean celebrities had an effect on suicide deaths. Finally, it is to present implications on suicide prevention monitoring by comprehensively analyzing all the presented data.

2. Materials And Methods

2.1. Data Collection

This paper used raw data from deaths due to Specific Cause of Death (intentional self-harm) by month and sex of the Statistics Korea to analyze the status of suicide rates of Koreans for the specific years. The analysis period was 2019 and 2020 consecutively, and for 2020 data, provisional suicide death data from the Statistics Korea was used (The Statistics Korea, 2019). In Korea, the final statistics on the cause of death are announced in September of the following year, so it used a simple aggregated provisional value by linking administrative data from the Statistics Korea Office and the National Police Agency. In addition, OECD raw data such as Trends in Suicide, selected OECD countries, (or nearest year) was used to understand the suicide rates of countries and Korea (OECD data).

2.2. Google Trends Search

Due to the limitations of data collection, it was insufficient to apply panel data analysis, so Google Trends to analyze big data was used for in-depth research. Google Trends quantifies a user's web interest in a keyword by returning a normalized value between 0 and 100, called relative search volume, that is proportional to the ratio between keyword-related searches and total web searches. Therefore, it analyzes big data of search words entered by users around the world, and provides standardized search volume that users input in a specific area at a specific time. In this research, the Google search terms in Korean, such as

“jasal”, “Sul* jasal”, “Goo**jasal” and “Park** jasal” were used, and analysis period was from January 2019 to December 2020 (Part of the name has been anonymized in order not to defame the three deceased). In Korean, the term “jasal” means to take one's own life.

2.3. Research Reviews

To draw conclusions, this study referred to a number of literatures explaining suicides. Multiple researches on suicide imitation or suicide contagion according to socio-cultural factors have been increasing since Durkheim (Wray, Colen, Pescosolido, 2011; Ha, & Yang, 2021). In particular, the Werther effect is related to suicides occurring in a similar way when a respected person or a celebrity with social influence commits suicide. This phenomenon is known as “imitation suicide” or “copycat suicide,” and David Philips was the first to use the term Werther effect, arguing that popular suicide stories have a negative impact on the public (Philips, 1974; Stack, 1987). In fact, a recent study in Japan observing the deaths of two celebrities by suicide during the COVID-19 pandemic suggests that media coverage of their unexpected suicides may have affected vulnerable individuals (Ueda, Nordström, & Matsubayashi, 2021). Studies on the Werther effect highlight that stress can lead to depression, increasing the risk of suicide. However, there are unfortunately not many studies on imitative suicide in Korea.

Suicide causes serious losses not only to individuals but also to the nation, so it must be prevented above all else. Therefore, the state should play an important role in establishing suicide prevention policies and maintaining a healthy society. In general, suicide prevention policies are divided into suicide prevention, suicide intervention, and postvention. Among these, postvention refers to measures taken for those who originally attempted suicide but failed, but also includes measures to reduce risk factors for suicide in the community and support activities of family, friends, and colleagues (Seghatoleslam, et al., 2012).

Meanwhile, studies that dealt with the suicide rate and search volume have empirically revealed that there is a correlation between the two. For example, a study in the UK found that performing suicide searches on Google data was significantly better than estimating suicide using only historical suicide data (Song, et al., 2014) and a study in Korea using Google Trends proved the correlation between stress and suicide search volume through the analysis (Gunn, Goldstein, & Lester, 2020). It is worth noting that the previous two studies used Google Trends as an analytical tool to uncover suicide factors.

Due to the high suicide rate in Korea, one of the tasks of the National Action Plan of Suicide Prevention

established to reduce the number of suicides to less than 10,000 is to secure and apply micro data to identify and prevent suicide types. In particular, at the public level, it has been examined ways to utilize systematic big data, mainly targeting high-risk groups of suicides (KDI, 2018). In 2018, the Ministry of Health and Welfare, the Foundation for Suicide Prevention, and the Journalists Association enacted the suicide reporting recommendation guideline 3.0, which is more stringent than the 2.0 in 2013. The purpose of this

recommendation guideline was to share the social responsibility of reporting suicide and to encourage the media and individuals to participate in suicide prevention as shown in Table 1. Recently, the Ministry of Health and Welfare is implementing a plan to prevent imitation suicide by establishing a mutual cooperation system with the media, police and fire departments to prevent suicide in 2022, and responding organically and immediately when a suicide report occurs (Ministry of Health and Welfare, 2022).

Table 1: Suicide Reporting Recommendation Guideline 3.0

Five Principles	
1	Use expressions such as “death” or “died” in article titles instead of “suicide” or words meaning suicide
2	Do not report specific suicide methods, tools, locations or motives
3	Suicide-related photos and videos may encourage imitation suicide, so use them with caution.
4	Do not glorify or rationalize suicide, but provide information on the negative consequences of suicide and suicide prevention
5	When reporting a suicide case, respect the personality of the deceased and the privacy of the bereaved family

This paper intends to highlight the monitoring of Google Trends search results as one of the predictive evidence of suicidal thoughts. To this end, it is collected statistical raw data from the National Statistical Office along with Google Trend search results revealed at the time of the suicide deaths of celebrities, found specificities in the analysis results, and derived important meanings from the results.

3. Results

3.1. Comparison of Suicide Deaths in 2019 and 2020

As shown in OECD health data, Korea had the highest suicide rate in the OECD (OECD data, 2021). Looking at the standardized suicide rate replaced by the OECD standard population, Korea recorded 24.6 suicide rate per

100,000 people, which is more than double the OECD average suicide rate of 11.3. From 2003 to 2019, with the exception of 2017, Korea ranks first in the OECD country's suicide rate.

In 2019 alone, an average of 38 people per day committed suicide. The number of suicides in 2019 for comparison with the 2020 data is shown in Table 2. According to Table 2, the total number of suicides in 2019 was 13,799, with 9,730 for men and 4,069 for women, 781 more than in 2020. Also, the average monthly suicide deaths were about 811 for men and about 339 for women. Here, the average monthly female suicide death in 2019 was 339, but it should be noted that the number of female suicides increased significantly in October and November to 428 and 385.

Table 2: Deaths due to Specific Cause of Death (Intentional Self-harm) by Month and Sex in 2019

2019	Total	01	02	03	04	05	06	07	08	09	10	11	12
Total	13,799	1,114	971	1,182	1,131	1,274	1,108	1,248	1,152	1,093	1,248	1,098	1,180
Male	9,730	796	694	871	831	919	783	874	824	796	820	713	809
Female	4,069	318	277	311	300	355	325	374	328	297	428	385	371

On the other hand, Table 3 shows the suicide rate of Koreans reported by the Statistics Korea, although provisional data is provided during the pandemic period from January 2020 to December with the outbreak of COVID-19 patients in Korea (The Statistics Korea, 2020).

Monthly statistics confirm that the number of suicide deaths increased in July and August, and the total number of suicides in 2020 was 13,018, with 8,967 males and 4,051 females. The average monthly suicide death in 2020 was about 747 for males and about 338 for females, According to this figure, July was significantly

higher than the monthly average, and the male suicide

death rate was particularly high.

Table 3: Deaths due to Specific Cause of Death (Intentional Self-harm) by Month and Sex in 2020

2019	Total	01	02	03	04	05	06	07	08	09	10	11	12
Total	13,018	1,084	977	1,131	1,118	1,138	1,128	1,211	1,160	1,011	1,113	1,043	902
Male	8,967	768	701	771	758	785	757	837	794	679	772	702	643
Female	316	276	276	360	360	353	371	374	366	332	341	341	261

In the context of the pandemic, the number of suicides in 2020 is 781, a decrease of about 5.66% compared to 2019. As a noteworthy, it can be seen that the decrease in the number of suicide deaths in 2020 compared to 2019 is a different result from the initial expectation that the number of suicides will increase due to the decrease in face-to-face contact due to the COVID-19 outbreak.

3.2. Celebrities’ Suicides before and after COVID-19

During the two years before and after COVID-19, two suicides of K-POP singers and one suicide of politicians, that is, a total of three celebrities’ suicides occurred in Korea. In October 14, 2019, a member of the girl group F(x) and former actress-singer, Ms. S committed suicide and in November 24, 2019, singer from the girl group Kara, Ms. G committed suicide, and it is known that the cause of the suicide was due to malicious comments that usually annoyed the two of them. To be more specific, idol star Ms. S suffered from depression caused by malicious comments on the Internet and tried to commit suicide in 2016, but failed at that time. Another K-pop star, Ms. G, also attempted suicide in May 2019, and she was known for being very close to Ms. S. Whatever the cause, the successive suicides of two artists must have

shocked citizens, especially women (The Korea Times, 2019). Meanwhile, following year, on July 9, 2020, the mayor of Seoul city, Mr. Park died by suicide. As multiple media outlets reported Mayor Park’s suicide immediately, national public attention poured into it (The Korea Times, 2020). The suicide of mayor Park, who served as mayor of Seoul three times and gained a reputation as a former politician, lawyer, and social activist, also had a great political and social impact on Korean society. The suicide case of a famous politician was a topic of daily coverage in the Korean and foreign media for a few weeks after the incident. In particular, as political interpretations of his suicide continued, his name has remained exposed in the media and among citizens.

3.3. Increase of Search Volume for Two Search Terms in Google Trends

According to Fig. 1 the result of Google Trends search, from October 13 to October 19, 2019 after Ms. S’s suicide was revealed, the search volume for the search term “jasal” in Korean’ was 100, and the search volume for another search term, “Sul* jasal” in Korean was the highest at 49.

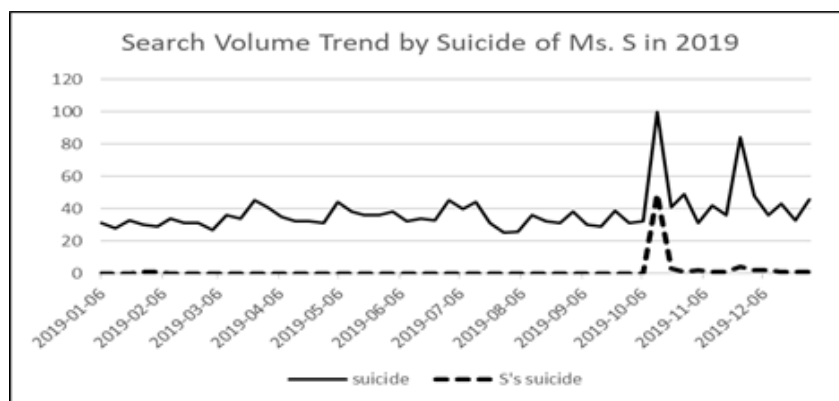


Fig. 1: Search Volume Trend by Suicide of Ms. S

Meanwhile, according to Fig. 2 from November 24 to November 30, 2019 after Ms. G’s suicide was revealed, the search volume for the search term “jasal” in Korean was 84, and the search volume for another search term,

“Goo** jasal” in Korean, was 31. It was the second highest number compared to suicide searches of Ms. S in 2019.

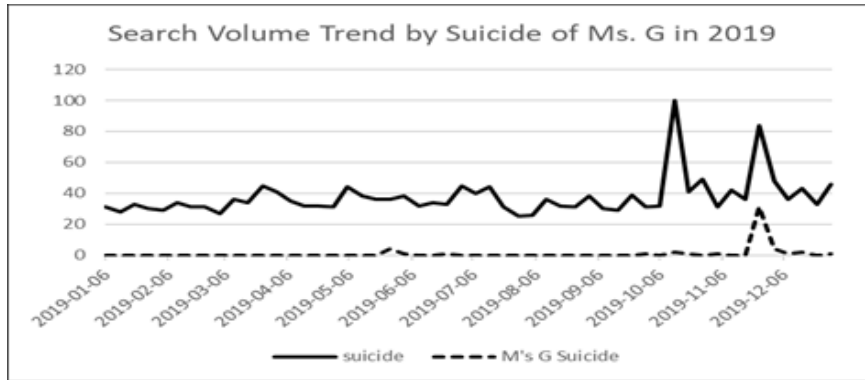


Fig. 2: Search Volume Trend by Suicide of Ms. G

In Fig. 3 from July 5 to 11, 2020, when mayor Park's suicide was known, the search volume for “jasal” in Korean was 100, and the search volume for “Park**jasal” in Korean recorded 26. As a result of analyzing these three cases, it was confirmed that celebrity suicide

increased the number of suicide searches in Google Trends. If so, it is necessary to examine how the actual number of suicide deaths occurred during the two months after the increase in the number of suicide searches.

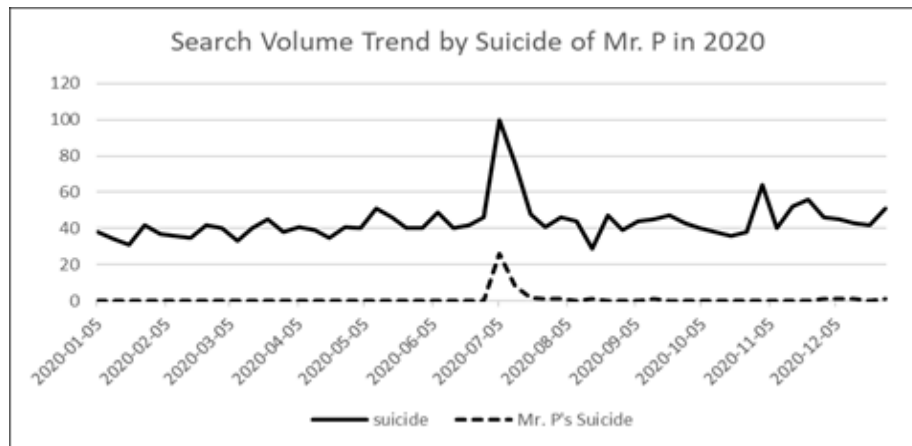


Fig. 3: Search Volume Trend by Suicide of Mr. P

4. Discussion

4.1. Increase of Actual Suicide Deaths along with Increase of Search Volume of Suicide before and after COVID-19

The Google Trends analysis in this study showed that in 2019 and 2020, searches for suicides and celebrity suicides increased significantly in the months in which 3 celebrities committed suicide, and the statistical analysis showed clearly that the number of suicide deaths actually

increased during the two months after the three suicides. Also, in the early days of the COVID-19 crisis, medical experts around the world warned that social isolation would increase the suicide rate of people with mental illness and ordered preventive measures to health authorities, but the average suicide rate in 2020 of Korea actually decreased compared in 2019.

Table 4: Comparison of Celebrities' Suicides Analysis Results

Case	Gender	Suicide search volume by Google two search terms	Number of suicide deaths in the month
Ms. S (2019)	F	100/49	1,248
Ms. G (2019)	F	84/31	1,098
Mr. P (2020)	M	100/26	1,211

According to the analysis results so far, it was confirmed that COVID-19 did not directly affect the number of suicide deaths due to celebrity suicides, and in fact, it could be confirmed that there is a correlation between

search volume related to the term suicide and the number of suicide deaths. In that regard, it is noteworthy that the results of Google Trends' search volume analysis predict

an increase in the number of suicides in the near future. Table 4 summarizes these analysis results.

4.2. Importance of Reactive Prevention based on Monitoring the Use of Search Term Suicide on Social Platform

As the frequency of searches for the term suicide may actually affect suicidal behavior, it is necessary not only to observe the increase in the search volume of negative words, but also to intervene with those who are likely to do so for postvention.

According to the multiple articles, the search experience through social media can help vulnerable groups in suicide attempts, regardless of the responsibility of the media, which is the WHO's main body for suicide prevention. Indeed, recent evidence suggests that media coverage of suicides may increase suicides due to imitation as celebrity suicides and suicide methods are described (NBCNews.com, 2020; Niederkrotenthaler, et al., 2020). Another media, online platform where users can share information with each other, there is a risky structure that can imitate or spread other people's attitudes and perceptions related to suicide. In this dimension, Google Trends is no exception, and a surge in suicide-related search terms after a celebrity's suicide can lead to an increase in suicide rates, so it is necessary to continuously monitor suicide search volume using Google Trends and users' reactions in them.

5. Conclusion

Suicide causes serious losses not only for individuals but also for the nation, so prevention is of utmost importance and to this end, most countries have established suicide prevention policies to maintain a healthy society. In general, suicide prevention policies include suicide prevention policies for primary prevention (e.g., promotional campaigns), suicide intervention policies for secondary prevention (e.g., gatekeeper training programs), and post-intervention policies for tertiary prevention (e.g., survivor support groups).

Thus far, this paper has analyzed the Korean case using Google Trends as an analysis tool to emphasize the importance of post-intervention targeting the public for the purpose of mitigating the spread of suicide after celebrity suicide. The analysis results and implications are summarized below. First, it was confirmed that the number of suicide deaths exceeded the average number of suicide deaths in each of the two months after three Korean celebrities committed suicide in the past two years. This explains the need for countermeasures against celebrity suicides as the latter negatively affects the mentally vulnerable. Second, the suicide rate of two female singers during the period increased the female suicide rate, and the suicide of male politicians increased

the male suicide rate. Specifically, suicide deaths among women surged in the two months following the suicide of two female singers in 2019, and suicide deaths by men surged in the two months following the suicide of a male politician in 2020. This means that male and female celebrities' suicides have a negative impact on those who have suicidal intentions by gender, respectively. Third, the number of suicide deaths has also increased as Google searches for celebrity suicides and suicides have increased. This can be seen as meaning that if the number of search terms for 'suicide' on Google increases after a celebrity commits suicide, suicide of the mentally vulnerable will follow. Therefore, health authorities should do more to prevent suicide attempts while monitoring Google search volume during this period. Fourth, it is presumed that the suicide deaths that occurred after the three celebrity suicides covered in this paper were caused by accepting the celebrity's suicide as one's own life rather than being influenced by social and environmental conditions such as COVID-19.

From the analysis results so far, it was confirmed that the suicide of celebrities causes the Werther effect, and it was also identified that the results of Google's suicide tendency analysis could be used as evidence for the need for suicide prevention. Accordingly, this paper emphasizes the need for health authorities to implement immediate suicide prevention measures after celebrity suicide, such as continuously monitoring the number of suicide frequency searches on Google Trends and intensively managing high-risk groups using gatekeepers. This study is meaningful in that it presented the results of a Google trend search as an information source for suicide-inducing after the suicide of a celebrity and revealed the importance of real-time monitoring.

However, this paper has limitations in two respects. One is that although it found the specificity that the increase in the number of Google search volume and the number of suicide deaths is proportional to the suicide of specific persons, there is a limit to explaining the causal relationship between the variables. The other is that for a more accurate analysis, a few simple search term was used instead of using various search terms. Therefore, it is expected that follow-up studies using quantitative methodologies and various search terms that can overcome the limitations of this study will be conducted.

6. Ethical Considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/ or falsification, double publication and/ or submission, redundancy, etc.) have been completely observed by the authors.

7. Acknowledgements

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8. Conflict of interest

The authors declare that there is no conflict of interests.

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