



Searching for Suicide Information on Web Search Engines in Chinese

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Introduction: Recently, suicide prevention has been an important public health issue. However, with the growing access to information in cyberspace, the harmful information is easily accessible online. To investigate the accessibility of potentially harmful suicide-related information on the internet, we discuss the following issue about searching suicide information on the internet to draw attention to it. **Methods:** We use five search engines (Google, Yahoo, Bing, Yam, and Sina) and four suicide-related search queries (suicide, how to suicide, suicide methods, and want to die) in traditional Chinese in April 2016. We classified the first thirty linkages of the search results on each search engine by a psychiatric doctor into suicide prevention, pro-suicide, neutral, unrelated to suicide, or error websites. **Results:** Among the total 352 unique websites generated, the suicide prevention websites were the most frequent among the search results (37.8%), followed by websites unrelated to suicide (25.9%) and neutral websites (23.0%). However, pro-suicide websites were still easily accessible (9.7%). Besides, compared with the USA and China, the search engine originating in Taiwan had the lowest accessibility to pro-suicide information. The results of ANOVA showed a significant difference between the groups, $F = 8.772$, $P < 0.001$. **Conclusions:** This study results suggest a need for further restrictions and regulations of pro-suicide information on the internet. Providing more supportive information online may be an effective plan for suicidal prevention.

Key words: Internet, search engines, suicide

INTRODUCTION

Suicide has ranked ninth among the top ten leading causes of death in Taiwan since 1999,¹ and suicide prevention has been an important public health issue during this time. Hence, active engagement in suicide prevention and supportive education are considered to be very important.

With the growing access to information in cyberspace, search engines have become a fast and convenient way to acquire information and knowledge. Websites provide information about suicide prevention, crisis intervention, and referral guidelines. However, harmful information, including detailed descriptions of suicide methods (instructions about how to commit suicide), is easily accessible online. According to a report by Dobson,² some internet websites might encourage suicide, especially highly graphic sites with copies of suicide notes, death certificates, and colorful photographs. In 2008, Recupero *et al.* conducted a search using the top five search engines in the USA with suicide-related search terms,

and despite the suicide neutral and antisuicide pages, which occurred most frequently, the pro-suicide results accounted for up to 11.7% of the results.³ Thus, we can easily find pro-suicide information and websites through internet searches.

However, suicide prevention has been an elusive goal. In 2005, a report suggested that restricting access to lethal methods is one way to reduce suicide rates.⁴ Since there were still no relevant laws or restrictions on searches about suicide in Taiwan; therefore, we examined the search engines for suicide-related information on the internet according to the following hypotheses: the accessibility of those potentially harmful suicide-related information is high through internet searches.

METHODS

To evaluate the types of information that are accessible through search engines to a suicidal person on the World

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Wide Web, we conducted this study of suicide-related keyword searches. We selected the websites according to the 100 most popular websites among Taiwanese users in 2015,⁵ and we only included the top five search engines [Figure 1]. On April 1, 2016, we designed a brief survey that included these five search engines (Google, Yahoo, Bing, Yam, and Sina) and four suicide-related keywords (suicide, how to suicide, suicide methods, and want to die) in traditional Chinese. We restricted the analysis to the first thirty results per search depend on the user's availability, and earlier research showed that most users restrict their access to results on these results.⁶

Websites were coded separately by two psychiatrists (Lee and Yeh). Inter-rater reliability was measured for the codes, using thirty (5%) randomly selected websites. Krippendorff's α was used to measure agreement between coders.⁷ Krippendorff's α was 1.0, which indicates a high level of agreement.⁷

If the page could not be loaded, the site received an ERR code (error for loading). If the website content was not related to suicide (it included jokes, movie cinemas, books, and comments about video games), the site was coded as NOT (not a suicide-related site including jokes, movie cinemas, books, and comments about video games). All other sites were coded PRO (pro-suicide or instructions for how to commit suicide), ANTI (antisuicide or suicide prevention), or NEU (neutral to suicide, unclear, or both pro- and antisuicide information). For example, government mental health sites, which provide contact information for crisis intervention or suicide prevention were classified as ANTI; the sites that provided detailed suicide methods or how-to-suicide instructions were classified as PRO; the sites that were neutral about suicide; or provided both pro- and antisuicide information were classified as NEU. We classified the search engines into three groups by nation (USA, Taiwan, and China).

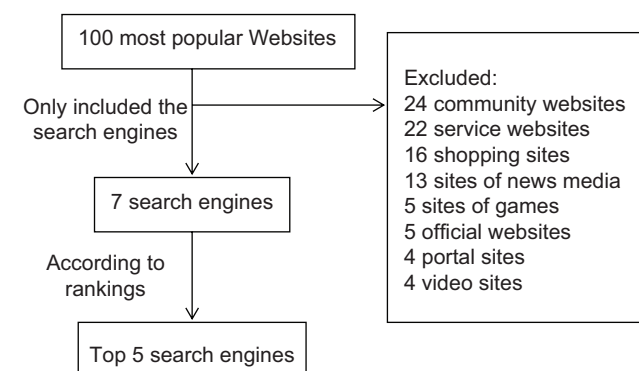


Figure 1: The flow chart of the inclusion and exclusion from the 100 most popular websites

All numerical and categorical data were entered into Microsoft Excel for verification and subsequently imported into the Service Solutions software version 22.0 for Windows (SPSS, IBM Corp., Armonk, NY, USA) for cross-tabulation and summarization of the data. For statistical analysis, ANOVA was used to compare the three groups, i.e., nations, followed by Tukey's honestly significant difference (HSD) *post hoc* test. Differences between the groups were considered significant if $P < 0.05$.

RESULTS

Among the 600 results that the search yielded, 352 were unique websites; there were a large number of repeated results. The most frequent websites among the 600 results were those that provided antisuicide or suicide prevention information (ANTI, 43.8%), followed by websites that appeared to be neutral about suicide or contained both pro- and antisuicide content (NEU, 23.5%). The pro-suicide websites and those with instructions for committing suicide (PRO, 9.7%) were fewer, but easily accessible [Table 1]. It must be emphasized that among the 58 pro-suicide web pages, 40 of them were links to community websites.

After removing the duplicate results, there were 352 unique websites. Among them, the websites coded ANTI were the most frequent (37.8%), followed by those coded NOT (25.9%) and NEU (23.0%). However, the pro-suicide websites (12.2%) were still easily accessible [Table 1].

Table 2 summarizes information related to the search engines, the total number of results per search for each of the search terms, and the number of PRO sites yielded per search on each search engine.

The features of the sites that comprised the original 600 results were also reviewed: 13.7% were linked to news articles about suicide; 4.2% provided detailed suicide methods or how to suicide recipes or instructions; 23.3% were pages in social networking sites including blogs, Facebook, bulletin board system, or internet forums; 20.8% provided phone numbers or other contact information for crisis-intervention

Table 1: Classifications of all 600 search results and the 352 unique uniform resource locators

Code	600 search results, <i>n</i> (%)	352 unique URLs, <i>n</i> (%)
ANTI	263 (43.8)	133 (37.8)
PRO	58 (9.7)	43 (12.2)
NEU	141 (23.5)	81 (23.0)
NOT	133 (22.2)	91 (25.9)
ERR	5 (0.8)	4 (1.1)

URLs = Uniform resource locator

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or suicide-prevention services; and 15.5% contained academic research reports or suicide-related statistics.

The search results, excluding the ERR and NOT sites, were classified into three groups (ANTI, PRO, and NEU) and compared by the nationality (USA, Taiwan, and China) of the search engines. The results of ANOVA showed a significant difference between the groups $F = 8.722$, $P < 0.001$. Tukey's HSD *post hoc* test showed significantly lower accessibility to the Taiwan PRO sites ($P = 0.001$ between Taiwan and the USA; $P < 0.001$ between Taiwan and China), whereas there was no significant difference between the USA and China ($P = 0.409$) [Table 3].

DISCUSSION

Table 2: Characteristics of the search engines, total number of results per search, and the number per search of PRO websites in each search engine

	Search engines				
	Google	Yahoo	Bing	Yam	Sina
Nations	USA	USA	USA	Taiwan	China
Established (year)	1998	1995	2009	1995	1998
Total number of results per search					
Suicide	20,200,000	12,400,000	12,400,000	80	2,270,000
How-to suicide	588,000	535,000	536,000	80	307,000
Suicide methods	10,600,000	5,120,000	5,170,000	80	2,200,000
Want to die	1,040,000	7,050,000	7,060,000	80	377,000
The number per search of PRO websites within the first 30 results					
Suicide	0	3	0	0	0
How-to suicide	3	3	2	0	3
Suicide methods	6	9	10	1	10
Want to die	0	4	1	1	1

Table 3: Mean comparison of the three countries' search engines and the results of ANOVA and Tukey's honestly significant difference *post hoc* test

Mean±SD			ANOVA	Comparison group	Post hoc (P)
Taiwan (n=91)	USA (n=275)	China (n=96)			
1.30±0.51	1.59±0.74	1.70±0.71	$F=8.722$ $P<0.001$	Taiwan versus the USA Taiwan versus China The USA versus China	0.001* <0.001* 0.409

*A significant statistical difference with $P<0.05$. SD = Standard deviation

The main finding of interest in this study is that the proportion of the pro-suicide sites was 9.7% (Google: 7.5%), which was much higher than the 1% found in an Australian study.⁸ However, the mixed sites (22%) in that study, which provided both prevented and pro-suicide information, might also have some harmful information. Besides, our results were lower than the 11.7% in an American study³ and 42% in a Turkish study.⁹ It seems to be a serious problem worldwide, and it still has a long way to go. We also found that the foreign-based companies, including those from the USA and China, had higher rates of pro-suicide results than the local companies. This finding should call our attention to whether the foreign-based companies were sufficiently able to regulate the search results that might have provided potentially harmful information in the local language. Other possible reasons include the provider's knowledge and awareness of suicide-related information, the lack of laws and regulations, or cultural differences.

Given the development of cyberspace, web search engines have been the primary method of acquiring information and knowledge, especially for persons who are disconnected or lonely. According to Joiner's interpersonal theory of suicide, perceived burdensomeness and a low sense of belongingness are the two components of suicidal ideation.¹⁰ For those who are alienated from others, the internet might be the last remaining support system. Therefore, the accessibility of pro-suicide websites might have some implications for promoting the lethal behaviors of those who wish to commit suicide.³

Updated knowledge of current cyber conditions should help clinical physicians better understand the potentially harmful information; their patients might access online. The search's results showed that the websites that provided contact information for suicide prevention or crisis intervention and suicide prevention organizations were easily accessed. In addition, the telephone numbers of the crisis lines operating around the clock such as 1995 and 0800-788-995 were available in the 20.8% of all the search results. Furthermore, 13.8% of the 600 results were suicide-prevention organization websites including Psychiatric Departments of Hospitals, National Suicide Prevention Centers, and other sites that provided crisis intervention services. Despite numerous positive and therapeutic aspects, the pro-suicide websites were easily accessible in each of the search engines although they did not comprise the majority of the study's search results using the suicide-related keywords.

The community websites can provide large quantities of resources for information and knowledge and open up new opportunities for expression and participation. Our finding that most of the pro-suicide pages were community websites or blogs should be kept in mind. On these unsupervised websites, every user can become a proponent of an opinion about anything including suicide. They can publish their own ideas

on the web and share their experiences of suicide and even provide detailed suicide methods. This potentially harmful information was easily accessible through popular internet search engines. Thus, the moderators of each community website should have a major role in suicide prevention.

School-aged individuals are frequent internet users. Most school-aged children who have reported suicidal ideation or attempts have never received treatment.¹¹ Instead, they might look for a support system, such as the internet for help, and contact peer-support networks.¹² Because of this, the information on the internet and the interaction within the community websites could be crucial for suicide prevention. Moreover, one study reported that the interactions on community websites clearly had a positive impact on suicide prevention through the early detection of suicide risk.¹³ According to the interpersonal theory of suicide and evidence-based studies, interpersonal linkages play a role in suicide risk and the prevention of suicide attempts.¹⁴⁻¹⁷

In our study, 13.7% of the 600 search results were pages of internet news. A study in Taiwan found that media reports of suicides were followed by marked increased suicide attempts during the 3-week period after the report.¹⁸ The suicide method reported by the media such as charcoal burning¹⁹ or helium²⁰ may have contributed to the rise in suicides. According to another study, suicide was most commonly reported in the four major newspapers of Taiwan as a front-page headline with sensational photographs and text.²¹ Therefore, effective restrictions and regulations of the media and the internet news should be a key method for suicide prevention.

It is important to note the limitations of our study. It remains unclear which search terms the suicidal individuals are actually used.²² Besides, most of the websites that were included in the study were from Taiwan and Hong Kong because the search terms were in traditional Chinese. The sites with simplified Chinese, which is used in China and Singapore, were not included in our study. Hence, these results cannot be generalized to other languages or nations. Furthermore, the search results can also depend on the computer user's search histories,²³ it is hard to evaluate and might generate a bias on the results. In addition, internet searches are conducted on web search engines as well as other types of systems including community (e.g., Facebook) and media (e.g., YouTube) websites.¹³ Those sites are also important to know about, given their dissemination of pro-suicide information, which were not included in our research.

CONCLUSION

Through the use of internet search engines, one can find a high percentage of pro-suicide information, which may

lead to increased suicide risk in the population. Our results provide further evidence for the need for more restrictions and regulation of pro-suicide information on the internet. Therefore, policymakers and moderators of websites might have powerful roles regarding this issue. Finally, providing more supportive information online should be an effective plan for suicidal prevention.

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Conflicts of interest

There are no conflicts of interest.

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