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Web-based Suicide Prevention using the Concepts of Cognitive Behavioral Therapy

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【Summary】 The purpose of this study was to clarify the effect of information based on the theoretical concept of cognitive behavioral therapy (CBT) that was provided on a suicide-prevention website. We maintained a website from August 2008 to July 2010 that presented objective information about suicide and suicide prevention. CBT contents were added in August 2010, and the website was operational until July 2011. Data were collected from a website traffic analysis and an online questionnaire directed at the website users ($n = 274$). The decrease in suicidal ideation among users who read the CBT content was significantly larger than that of those who read the objective information. This result suggests that computerized CBT might function as a suicide-prevention resource to help Internet users.

1 —— Introduction

The percentage of Internet users, which was about 10% in 1998, reached about 80% in 2011 (Ministry of Internal Affairs and Communications, 2012), and many people now use the Internet on a daily basis. However, the psychological impact that the use of this media has on our lives remains unclear in many ways, and there are many issues to be examined concerning its use.

Websites that encourage suicide can be cited as one of the mental health problems that emerged as Internet use became more prevalent. In Japan, events began occurring around 2000 in which Internet users with suicidal ideation sympathized with each other and committed group suicide (hereinafter referred to as an "Internet suicide pact"), and such phenomena continue to occur intermittently at present. In 2008, cluster suicides occurred when viewers of a website that showed a method for generating hydrogen sulfide committed suicide one after another by using the method. The relationship between Internet use and suicide has become problematic not only in

Japan but also worldwide. According to an investigation of English websites that used 12 suicide-related search terms and four robot-type search engines, about a quarter of total hits were accounted for by sites about suicide prevention. Of these hits, however, 9% were sites that described suicide methods, and pro-suicide sites were among the first hits of a search (Biddle et al., 2008). Many experts have pointed out the suicide-inducing aspect of Internet use such as spreading an effective suicide method to increase the suicide completion rate (Prior, 2004) or inspiring imitation of suicide (Schmidtke et al., 2003).

In response to this situation, countermeasures against Internet-related suicide in Japan have focused on the prevention of Internet suicide pacts and cluster suicides resulting from the spread of information on suicide methods (e.g., suicide by using hydrogen sulfide). As a response to suicide pacts, the Fundamental Principles of Suicide Prevention Comprehensive Measures [*Jisatsu Sogo Taisaku Taiko*], approved by the Japanese cabinet in 2007, explicitly detailed a countermeasure against suicide announcements on the Internet as one of its prioritized programs. In addition, the revised Fundamental Principles (2008) incorporated the promotion of countermeasures against suicide-related information. The Plan for Accelerating Measures against Suicide, which was adopted in 2008, advocated promoting the development of technology for detecting illegal and harmful information on the Internet and an increase in filtering. Thus, measures taken so far have adopted an approach aimed at eliminating the information in question from the Internet, attributing responsibility for this to the Internet services providers, or making information on suicide invisible by filtering at access terminals.

While such countermeasures may be useful, there are indications that increasing the number of suicide-prevention sites is more realistic than deleting or making invisible suicide-inducing sites in order to facilitate suicide prevention on the Internet (Takahashi, 2006). This is not only because suicide-prevention sites reduce the frequency of access to information that can promote suicide but also because they are believed to generate positive suicide-prevention effects. With regard to suicide-prevention effects, studies indicate that self-support group activities such as conversations with others about suicide methods relieved growing suicidal urges (Fiedler, 2003), and exchanges with anonymous others who have suicidal ideation provided support to suicidal persons (Mehlum, 2000; Miller et al., 1998). Sueki et al. (2012) conducted an online questionnaire survey of members of an Internet suicide forum. Their findings showed active help-seeking behaviors in the forum and that participation in the forum did not aggravate suicidal ideation.

The modes of using the Internet can generally be classified into one-way and two-way uses, based on the direction of communication: the former type primarily consists of website browsing, and the latter primarily consists of e-mailing and posting on bulletin boards. All indications concerning the suicide-prevention aspect of the Internet so far concern two-way use. Little progress has been made in research on the effects of one-way use of the Internet such as through browsing

websites.

To fill this gap, the present study examined the effects of viewing website content by constructing a browse-only website designed to prevent suicide. In examining the effects of viewing the site, we focused on the intensity of viewers' inclination to death (hereinafter referred to as "suicidal ideation") because continuity between suicidal ideation and completed suicide has been reported (Kessler et al., 1999). The website content was based on ideas from cognitive behavior therapy, which has been used in reading therapy aimed at preventing suicide (Ellis et al., 1996) and is therefore considered applicable to our website.

2 —— Method

Procedure

In order to examine the effects of site content designed for suicide prevention, this study created and maintained a website (with placebo content) to provide objective information on suicide and suicide sites. The site was constructed by using the blog service run by Hatena (http://www.hatena.ne.jp/). The site began operating in June 2008 and was developed to contain the placebo contents shown in Table 1 by the end of July 2008. A link to a questionnaire site equipped with such functions as measures to prevent double answers was shown at the end of each page of the site, and a questionnaire survey was conducted at the linked site. The site was run with only placebo contents for two years from August 2008 to July 2010 (placebo period).

In August 2010, we added intervention content designed for suicide prevention ("To those who want to die" and "Cognitive behavior therapy for those who want to die"). The site was run with both placebo and intervention content for one year from August 2010 to July 2011 (intervention period). In both periods, content such as news about suicide prevention was uploaded to the site occasionally in order to optimize search engines for the site and ensure it would be found by viewers. Content that was irrelevant to this study was not linked from the top page, nor was each page containing such content linked to the questionnaire page.

Content of the site

Placebo content: This was composed of nine topics: "Why do people commit suicide?" "What is a suicide?" "Characteristics of those who commit suicide," "Suicide and mental disorder," "What if someone tells you he/she wants to commit suicide?" "The Internet and suicide prevention," "Studies on suicide sites," "Suicide sites and clinical psychology," and "Interview with suicide site administrators" (see Table 1). All of the pages for these topics were fundamentally designed to communicate objective information focusing on the findings of studies on these topics without reflecting any subjective views such as value judgments concerning suicide.

Intervention content: This content can be classified into information developed to reduce temporarily elevated suicidal ideation ("To those who want to die") and information developed to promote understanding of suicidal ideation on the basis of the cognitive behavioral therapy model ("Cognitive behavioral therapy for those who want to die"). With application to suicidal ideation in mind, we created the former content by referring to reading therapy (Ellis et al., 1996) and relaxation (Ellis et al., 1996) designed for suicide prevention and the latter content by referring to fundamental knowledge of cognitive behavioral therapy (Curwen et al., 2000) (see Table 1).

We designed and created text for the site with the following considerations. The table of contents was placed on the top page to enable viewers to grasp an overview of the site. The font size of the site was set to be larger than normal, to enhance legibility. Paragraph spacing was set to "at least double space." The amount of text per page was limited to about 3,000 characters to avoid overly long pages. To assure viewers of the credibility of the information, the source was indicated at the end of every article, and the first author's real name and affiliation were included.

Table 1   Contents on the Website

Contents		Number of Characters
Placebo Contents	Why do people commit suicide?	11343
	What is a suicide?	9942
	Characteristics of those who commit suicide	8162
	Suicide and mental disorder	5367
	What if someone tells you he/she wants to commit suicide?	11269
	The Internet and suicide prevention	6736
	Studies on suicide sites	17330
	Suicide sites and clinical psychology	6135
	Interview with suicide site administrators	31986
To those who want to die	Top page	2118
	Let your impulse to die go away by thinking about suicide and the meaning to live.	1033
	Look for someone you can consult with.	1442
	For putting off your impulse to commit suicide	1266
	Search both sides of your own emotion.	1190
	Think of your reasons to live	1329
	Think about merits and demerits of suicide	2633
	Think of ways to change your mood positively (1)	1608
	Think of ways to change your mood positively (2): breath control	2597
	Think of ways to change your mood positively (3): muscle relaxation	2816
Cognitive behavioral therapy for those who want to die	Cognitive behavioral therapy for those who want to die	1144
	Outline of cognitive behavioral therapy	1680
	What is a bias in the way of thinking? (1)	2299
	What is a bias in the way of thinking? (2)	1919
	Know the characteristics of your way of thinking. (1)	2504
	Know the characteristics of your way of thinking. (2)	2431
	Think about your way of thinking.	2385
	Trying out how a new way of thinking functions.	2052

Ethical considerations in site development

An introduction was created on the top page to explain to first-time users the intention for opening the site and reminders for using it. In particular, it was emphasized that the site mainly covers suicide, can cause some changes in the mood of a viewer, and does not introduce a viewer to counseling or consulting organizations. In the intervention content, a statement was added that those who planned to commit suicide, were drinking alcohol or taking drugs, or had a mental disorder associated with suicide such as depression, schizophrenia, or a substance-related disorder should immediately contact a nearby support professional.

Two undergraduate students majoring in psychology confirmed that no part of the text violated the six principles in "things to avoid" given in *Preventing Suicide: A Resource for Media Professionals* (WHO, 2006). Information on helping organizations was provided, which is recommended in that publication as a suicide-prevention action. The information was provided by way of links to contacts, which were made available to a viewer of any page. The first author's e-mail address was also disclosed to enable users to contact us directly, and we were prepared to report to the cyber crime support service of each prefectural police department if a suicide announcement was found.

Participants

The number of page views (PV)[1] during the survey period was 290,722, and 274 participants responded to the questionnaire.

Questionnaire

Face sheet: Questions were asked about age (under 20, 20−29, 30−39, 40−49, 50−59, over 60), gender (male/female), behavior before viewing the site (looking for an effective suicide method/looking for a participant in an Internet suicide pact/looking for a suicide site such as a bulletin board service or chat room/other, multiple answers allowed), and the number of articles (pages) viewed (1, 2−3, 4−5, or more). Regarding the types of content viewed, respondents were asked to choose all pages viewed from among 12 alternatives (the 9 placebo topics, 2 intervention topics, and "other").

Effect of the site: In order to measure the effects of viewing the site, respondents were asked to evaluate their suicidal ideation before viewing the site and at the time of responding to the questionnaire ("Please tell us how strong your suicidal desire was before viewing this site and how strong it is now.").[2] The evaluation of suicidal ideation before viewing the site was based on retrospective reports. Responses were recorded using a 6-point scale ranging from 0 ("Not at all") to 5 ("Very strong"). The score for a change in suicidal ideation was calculated by subtracting the rating before viewing the site from the rating after viewing the site.

Data Analysis

Google Analytics was used to analyze the operational status of the site, and SPSS 19.0 was used for statistical analyses. First, the 70 respondents who reported that they had viewed either the page titled "To those who want to die" or the page titled "Cognitive behavior therapy for those who want to die" were assigned to an intervention group, and the remaining 204 respondents were assigned to a control group. The associations between age, gender, behavior before viewing the site, and the number of pages viewed were examined by using a χ^2 test to confirm that there was no bias between intervention and control groups. Finally, change in suicidal ideation after viewing the site was compared between intervention and control groups by using a *t* test.

3 —— Results

Operational status of the survey website

During the placebo period, the total number of PVs for the website was 183,983, and the number of unique users of the site was 30,544. The average PVs per user was 3.01, and the average time on the site per user was 3 minutes 3 seconds. The bounce rate[3] of the site was 62.94%, and the number of participants was 167. During the intervention period, the total number of PVs for the site was 106,739, and the number of unique users of the site was 34,706. The average PVs per user were 3.08, and the average time on site per user was 2 minutes 31 seconds. The bounce rate of the site was 62.77%, and the number of participants was 107.

Age and gender of users

Of all participants (*n* = 274), 114 (41.6%) were male, and 160 (58.4%) were female. Fifty-three (19.3%) were under 20 years old, 86 (31.4%) were 20 to 29, 66 (24.1%) were 30 to 39, 50 (18.2%) were 40 to 49, and 19 (6.9%) were 50 or older.

Behavior before viewing the site

With regard to behavior before viewing the site, 110 (40.1%) had been looking for an effective suicide method, 21 (7.7%) had been looking for a participant in an Internet suicide pact, 79 (28.9%) had been looking for a suicide site such as a bulletin board service or chat room, and 146 (53.3%) had been doing something else.

The number of pages viewed

As to the number of pages viewed, 63 (23.0%) viewed only 1 page, 78 (28.5%) viewed 2–3 pages, 41 (15.0%) viewed 4–5 pages, and 92 (33.6%) viewed 6 or more pages.

Comparison between intervention and control groups

The associations with age, gender, behavior before viewing the site, and the number of pages viewed were examined by using a χ^2 test to confirm that there was no bias between intervention and control groups. No significant association between any of these variables was found. (χ^2 (4) = 6.80, *n.s.*; χ^2 (1) = 0.36, *n.s.*; χ^2 (1) = 0.67, *n.s.*; χ^2 (1) = 0.51, *n.s.*; χ^2 (1) = 2.39, *n.s.*; χ^2 (1) = 0.41, *n.s.*; χ^2 (3) = 1.30, *n.s.*, respectively).

The effect of intervention content

The average rating of suicidal ideation in the intervention group changed from 4.01 (*SD* = 1.46) to 3.73 (*SD* = 1.43), and that of the control group changed from 3.57 (*SD* = 1.78) to 3.46 (*SD* = 1.73) after viewing the site. Two respondents in the intervention group and four respondents in the control group reported that viewing the site intensified their suicidal ideation.

In order to examine the effects of viewing intervention content, a *t* test was performed by taking site viewing as an independent variable and change in the suicidal ideation score after viewing the site as a dependent variable. Results showed that the decrease in suicidal ideation in the intervention group was significantly larger than that of the control group (*t* (272) = 2.74, *p* < .01).

4 ── Discussion

Bias/tendency of participants

The website created in this study was specifically designed to use meta tags[4] to indicate in search results by robot-type search engines that the site provides suicide-prevention information. Nonetheless, the viewers of the site included 110 persons (40.1%) looking for an effective suicide method and 21 persons (7.7%) looking for a participant in an Internet suicide pact. Thus, the participants included a large number of suicidal individuals. One psychological factor that characterizes those who attempt suicide is emotion that causes violent vacillation between life and death (Shneidman, 1993). The viewers of this site are considered to have vacillated between the death-oriented emotion that motivated them to look for an effective suicide method or a participant in an Internet suicide pact and the life-oriented emotion that motivated them to look for a site that provides suicide-prevention information.

We classified these participants into two groups in order to examine the effects of the intervention content: 70 persons who answered that they had viewed the page titled "To those who want to die" or "Cognitive behavioral therapy for those who want to die" were assigned to the intervention group, and the other 204 participants were assigned to the control group. No association was found with age, gender, behavior before viewing the site, or the number of pages viewed. The intervention and control groups were homogeneous except in terms of the types of articles

viewed, and it was appropriate to examine the effect of the intervention content by comparing both groups.

Effect of site viewing

The results show that viewing a website providing cognitive behavioral strategies to decrease suicidal ideation had a significantly greater effect in reducing suicidal ideation than viewing website content providing objective information about suicide. Such an intervention method is a potential support resource for Internet users who have suicidal ideation.

Although suicidal ideation scores showed a statistically significant decrease, they were still high after respondents viewed the site. Further examination is needed to determine whether this decrement has any clinical significance. Why, then, did participants report high suicidal ideation after viewing the site? For almost 70% of the survey respondents, the number of pages viewed was 5 or fewer, the average number of PVs per user was about 3 pages, and the average time on the site was about 3 minutes. The degree of intervention that these data suggest is insufficient, and more consideration and effort are required to intervene effectively.

Characteristics of individuals with elevated suicidal ideation such as psychological constriction (Shneidman, 1993) may play a role in how they respond to the site, and the characteristics of the Internet as a tool might have influenced the above tendency of the site users as well. The increased ability to control situations is cited as one characteristic of the Internet that influences users with suicidal ideation when they seek help (Sueki, 2009). Considering this characteristic, users who viewed several pages of the site might have stopped viewing it if they found that it was not what they expected it to be. Although therapeutic interventions for depression and other disorders have been devised recently by using websites, just as in this study, the percentage of participants viewing a small number of pages on these sites is very high (Spek et al., 2007). Development of content that increases the number of pages viewed and the length of time viewers spend on these sites is needed.

How can we justify having provided such insufficient content through the Internet? First, several studies on the help-seeking behaviors of individuals with a history of suicidal ideation or suicide attempts show that the percentage who use help resources in mental health is not high (Barnes et al., 2001; De Leo et al., 2005; Owens et al., 2005; Wu et al., 2010). In addition, those who consult with professionals may not have mentioned suicide. According to Hawton et al. (1982), individuals who attempted suicide often had not brought up the subject even if they had visited a family doctor, psychiatrist, or social worker within one month of the suicide attempt. That is, the percentage of persons who consulted with professionals about suicide is thought to be even lower than the numbers reported in research. Because the Internet has become a tool that can provide support to suicidal persons who are not connected with support professionals (Richard et al., 2000),

continuing to run our website is warranted even if its content needs to be improved. Second, increasing suicide-prevention sites is more realistic than deleting suicide-inducing sites to facilitate suicide prevention on the Internet (Takahashi, 2006). Although there are still many suicide-inducing websites among the first search hits by a search engine (Biddle et al., 2008), the number of suicide-prevention sites should be increased so that many of them will appear among top search results. The website based on cognitive behavioral therapy used in this study may provide a reference for such attempts.

Limitations and future research

Finally, prospects for web-based suicide prevention will be discussed after pointing out four limitations this study. The first concerns the sampling procedure. This study targeted viewers of a particular website. In addition, the number of responses was small relative to the number of PVs, which was about 300,000, and the response rate was low. The low usability of the site is believed to have had an impact in this regard: all pages of the site were composed of text without any pictures or figures, the questionnaire was hard to locate, and there was little offered to motivate viewers to respond to it. The second limitation concerns study design. Although the results of the survey did not reveal any difference between intervention and control groups in terms of age, gender, behavior before viewing the site, and the number of articles (pages) viewed, respondents were not randomly assigned to those groups. There may have been differences between them with regard to the information they sought. A more rigorous examination using a randomized controlled trial will be required in the future. The third concerns the method used to measure suicidal ideation. The intensity of suicidal ideation was measured by one item in this study. In addition, retrospective reports were used to evaluate the intensity of suicidal ideation before using the site. Future studies should devise ways to measure the intensity of suicidal ideation before viewing the site by using a scale with confirmed reliability and validity. The fourth limitation is related to the types of indices used to evaluate direct suicide-prevention effects on persons inclined to commit suicide. Although this study measured suicidal ideation to evaluate the effect of site viewing, a comprehensive investigation using other variables associated with suicidal behaviors is needed.

Despite the above limitations, the results show that providing information on a website using the framework of cognitive behavioral therapy is a valuable contribution to the efforts to prevent suicide. In light of findings that the effects of computerized cognitive behavioral therapy can be enhanced by using interventions through telephone and e-mail in addition to implementing computer-based programs (Spek et al., 2007), further developing a browse-only website into a community that enables two-way communication involving professionals and volunteers is desirable.

《Foot notes》

1）The number of page views refers to the number of times users viewed a web page.

2）The term "suicidal ideation" (jisatsu nenryo) was not used in the questionnaire because use of the term "suicidal desire" (jisatsu ganbo), which is routinely used on suicide websites, would make it easier for the respondents to answer the questions.

3）The bounce rate is the percentage of visitors who leave a site after viewing the first page they access without viewing its other pages.

4）A meta tag is an HTML tag designed to contain meta-information about the content on a web page recognized by a browser or search robot.

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