

## Effect of Name Change of Schizophrenia on Mass Media Between 1985 and 2013 in Japan: A Text Data Mining Analysis

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**Background:** Mass media such as newspapers and TV news affect mental health-related stigma. In Japan, the name of schizophrenia was changed in 2002 for the purposes of stigma reduction; however, little has been known about the effect of name change of schizophrenia on mass media. **Method:** Articles including old and new names of schizophrenia, depressive disorder, and diabetes mellitus (DM) in headlines and/or text were extracted from 23 169 092 articles in 4 major Japanese newspapers and 1 TV news program (1985–2013). The trajectory of the number of articles including each term was determined across years. Then, all text in news headlines was segmented as per part-of-speech level using text data mining. Segmented words were classified into 6 categories and in each category of extracted words by target term and period were also tested. **Results:** Total 51 789 and 1106 articles including target terms in newspaper articles and TV news segments were obtained, respectively. The number of articles including the target terms increased across years. Relative increase was observed in the articles published on schizophrenia since 2003 compared with those on DM and between 2000 and 2005 compared with those on depressive disorder. Word tendency used in headlines was equivalent before and after 2002 for the articles including each target term. Articles for schizophrenia contained more negative words than depressive disorder and DM (31.5%, 16.0%, and 8.2%, respectively). **Conclusions:** Name change of schizophrenia had a limited effect on the articles published and little effect on its contents.

**Key words:** stigma/terminology/stereotyping/prejudice/news

### Introduction

Mass media (such as newspaper articles and TV news segments) play a crucial role in mental health-related

stigma because mass media broadly provide information and impressions about mental illness to the public and patients.<sup>1–3</sup> Many studies have reported that approximately half of the articles representing mental illness appear in negative contexts, such as criminal and violent cases and provide inaccurate and stereotyped information.<sup>4–7</sup> Such articles are published at a higher rate than that for physical illness.<sup>8</sup> Of these, schizophrenia and psychosis are focused on stigmatization from mass media articles,<sup>9–12</sup> and had the highest rate of negative contexts compared with other psychiatric diseases.<sup>9,11</sup> As schizophrenia is thought to be one of the most stigmatized diseases compared with physical and psychiatric diseases, more appropriate information along with positive and recovery-oriented impressions through mass media are mandatory to promote early detection and care for young people suffering from schizophrenia and psychosis.<sup>13</sup>

Name change is one strategy for the reduction of stigma. In Japan, the name of schizophrenia was changed in 2002 for the purposes of stigma reduction, from “Seishin-Bunretsu-Byo” (mind-split disease) to “Togo-Shitcho-Sho” (integration disorder).<sup>14</sup> Because the old name of schizophrenia itself can provide a negative and pessimistic image linked with the Kraepelinian “dementia praecox,” the National Federation of Families with Mentally Ill in Japan requested the Japanese Society of Psychiatry and Neurology to replace with a less stigmatizing name.<sup>14,15</sup> The name change has been reported to reduce stigma toward schizophrenia in an increasing number of individuals who were informed that they suffer from schizophrenia. The change has also led to an increase in the number of patients and family members who accepted the disease name.<sup>14–16</sup> In terms of long-term effect, we previously reported that, through a survey performed 12 years after the name change, the new name

given to schizophrenia in Japan resulted in significantly less stigma than the old name, but still greater than depressive disorder and diabetes mellitus (DM).<sup>17</sup> Although more than half of young people recognized the old and new names of schizophrenia as different conditions, which partly contributes to reducing the stigma toward schizophrenia,<sup>17</sup> the effect of the name change could disappear if mass media continue to broadcast more negative contents related to the new name. Although there are limited findings reported in longitudinal investigations regarding whether mass media broadcast about mental illness and schizophrenia,<sup>10,11</sup> a report using newspapers in the United Kingdom demonstrated that articles for schizophrenia sustained a higher rate of negative impact between 1992 and 2008 than those for mental illness.<sup>11</sup> To the best of our knowledge, there has been no study exploring the difference of mass media articles before and after the name change of schizophrenia, as well as between schizophrenia and other mental illnesses, and between mental and physical illness such as DM.

In this study, we explored the trajectory of the number of articles including disease names in Japanese major newspapers and TV news segments between 1985 and 2013 using a data library. Furthermore, we segmented and extracted the words that would be more likely to be used in headlines in these articles using a text data mining method. This method provides a novel approach to illustrate the word tendency and linkage of specific terms in texts.<sup>18</sup> The hypothesis is that the articles in Japanese major newspapers and TV news segments would improve after the name change of schizophrenia in: (1) increasing the relative number of articles published and (2) increasing the relative number of positive contexts in which schizophrenia is described, when compared with all articles published as well as articles on depressive disorder or DM.

## Materials and Methods

### Data Source

We acquired article headlines from a data storage service for newspapers and television news (G-search Limited). The service can search article headlines and texts including a specific term from data sources in over 150 Japanese newspapers (including 4 nationwide

newspapers) and TV news sources since 1984. Of these, we used article data sources from 4 nationwide newspapers (Asahi, Mainichi, Sankei, and Yomiuri) issued as printed versions and 1 television station (Japan Broadcasting Corporation) from January 1, 1985 to December 31, 2013 (table 1). Each nationwide newspaper is independently edited and issued, and the number of issues in 4 newspapers covers approximately 50% of all newspaper circulation in Japan. Japan Broadcasting Corporation is a noncommercial broadcaster, and the audience rate for NHK news is approximately 15%. We searched all articles in which target terms were used in headline and/or text from 22 221 697 newspaper articles and 944 395 television news pieces and counted the numbers of articles for each year and target term. Furthermore, we obtained the text of the headlines on all articles using the target terms.

### Target Terms

In accordance with previous studies,<sup>11,17</sup> we used “Seishin-Bunretsu-Byo” (mind-split disease, the old name of schizophrenia in Japan), “Togo-Shitcho-Sho” (integration disorder, the new name of schizophrenia), and “utsu-byou” (depressive disorder) as target search terms. Moreover, we used “tounyou-byou” (DM) as a representative of chronic physical diseases to compare between psychiatric and physical disease names.<sup>17</sup>

### Text Mining

A text data mining method was used for headlines to illustrate word tendencies of the articles used in each search term. All text in headlines were segregated at morpheme level, the smallest grammatical unit in a language. For example, a sentence “Mass media such as newspapers and TV news considerably affect mental health-related stigma.” has 15 morphemes: “mass,” “media,” “such,” “as,” “newspapers,” “and,” “TV,” “news,” “considerable,” “-ly,” “affects,” “mental,” “health,” “-related,” “stigma.” The morphemes were segmented to part-of-speech level (eg, noun, verb, adjective, adverb, article) using IPADIC version 2.7.0—the public part-of-speech based dictionary defined by the Information-technology Promotion Agency, Japan.<sup>19</sup> Word segregation in text mining was conducted using RMeCab package version 0.9996 in R

**Table 1.** Data Sources

	Publisher	Source Available		Number of Articles		
		From	To	Total	Before 2001	After 2002
Newspapers	Asahi	January 1, 1985	December 31, 2013	7214291	3399393	3814898
	Mainichi	January 1, 1987	December 31, 2013	6037737	2451699	3586038
	Sankei	January 1, 1993	December 31, 2013	2643272	947637	1695635
	Yomiuri	January 1, 1987	December 31, 2013	6326397	2245070	4081327
TV news	NHK news	January 17, 1985	December 31, 2013	944395	385755	558640

version 3.1.0.<sup>20,21</sup> The process of word segregation for all articles was completed in 60 minutes. As most of the extracted words with significant meanings are nouns and verbs in Japanese newspapers and TV news headlines, all nouns and verbs were used in further analyses. Next, the number of each extracted word was counted by each target term and period (old or new name of schizophrenia, and before 2001 or after 2002 for depressive disorder and DM) to indicate the differences in word tendencies before and after the name change of schizophrenia.

To determine word tendencies for articles, including each target term, 2 authors (SK and SA.) further extracted the words from the target term itself and non-meaning words (such as numerals, units, conjunctions, proper nouns, or words often used as a specific headline in each newspaper or TV news segment; details in [supplementary materials](#)). Interrater reliability using 274 words for the initial extraction was robust (kappa coefficients = 0.97,  $P < .001$ ).

As the extracted meaning words were still numerous, 1% of all meaning words were randomly extracted and randomized by S.K. Furthermore, 2 independent raters (SY and YO) classified 1888 words, without any information provided regarding the words used in each target term, into 6 categories: (1) criminal or violent (legal term only, eg, “hanko” [penetration], “jiken” [case], “kiso” [prosecution], “jyokoku” [appeal to the Supreme Court], “sikei” [death penalty]); (2) suicide or self-harm (“jisatu” or “jishi” [suicide] and “jisyou” [self-harm]); (3) medical or psychological (technical term only, eg, “chiryō” [treatment], “sibou” [death], “nou” [brain], PTSD, “gan” [cancer]); (4) other negative (eg, “kyo-fu” [fear], “hitei” [deny], “sabetsu” [discrimination], “henken” [prejudgement], “karou” [overwork]); (5) other positive (eg, “kaifuku” [recovery], “kai-zen” [improvement], “naoru” [cure], “kansya” [thanks]); and (6) other neutral (all words expect for coded as [1]–[5]). The words categorized into (1)–(5) were not used for general and/or bi-directional meanings categorized into other categories. When words were applicable to both categories and the usage depended on the context, the words were categorized as (6). When the category of the word was mismatched for the categorization, the words were categorized by the third rater (KO), and then the category was determined after discussion by the 3 raters.

**Table 2.** Number of Newspaper and TV News Articles

Source	Period	Total	Schizophrenia			Depressive Disorder	Diabetes Mellitus
			Old Name	New Name	Both names		
Newspapers	Before 2001, <i>n</i> (/10000 total articles)	9043799	1391 (1.5)	0 (0.00)	6 (0.01)	2735 (3.0)	11365 (12.6)
	After 2002, <i>n</i> (/10000 total articles)	13177898	141 (0.10)	4357 (3.3)	230 (0.17)	10882 (8.3)	20682 (15.7)
	Total, <i>n</i> (/10000 total articles)	22221697	1532 (0.69)	4357 (2.0)	236 (0.11)	13617 (6.1)	32047 (14.4)
TV news	Before 2001, <i>n</i> (/10000 total articles)	385755	27 (0.70)	0 (0.00)	0 (0.00)	28 (0.73)	247 (6.4)
	After 2002, <i>n</i> (/10000 total articles)	558640	2 (0.04)	52 (0.93)	4 (0.07)	282 (5.1)	464 (8.3)
	Total, <i>n</i> (/10000 total articles)	944395	29 (0.31)	52 (0.55)	4 (0.04)	310 (3.3)	711 (7.5)

### Statistical Analysis

The trajectory of the number of articles including each term and relative number to total articles was determined across years. A chi-square test was conducted to investigate whether the numbers of articles, including target terms, would be different across years using the number of the articles not including any target term as a reference. For further analysis to compare the numbers, including those for depressive disorder and schizophrenia and for DM, and to compare between numbers, including depressive disorder and schizophrenia, the numbers for DM and depressive disorder were used as respective references. As the data source of newspapers in the first 5 search years and TV news sources had a relatively small total number of articles, standardized residuals were tested using the numbers of newspaper articles after 1991 and TV news segments every 2 years.

The rate of articles that contained each target term in their headlines were compared among the target terms and periods using a chi-square test. In this analysis, because headlines often use abbreviated words in Japanese newspapers and TV news sources, the numbers for “utsu” (depression) and “utsu-byou” (depressive disorder) in depressive disorder, and those of “tounyou” (glycosuria) and “tounyou-byou” (diabetes mellitus) in DM were included. Next, the top 20 words were fully listed to show the major words used in each target term and period. Finally, the number in each category of extracted words by target term and period were also tested using a chi-square test.

All analyses were conducted using SPSS Statistics 22 (IBM Corp) and significance levels were set at  $P < .05$ .

### Results

#### Number of Articles Including Target Terms Between 1985 and 2013

For newspapers, 51789 articles were obtained in the initial search using the target terms, out of a total of 22221697 eligible articles ([table 2](#)). Total articles used in this study and the articles including the target terms increased across years ([supplementary table S1](#)). Of these, DM yielded the greatest number of articles

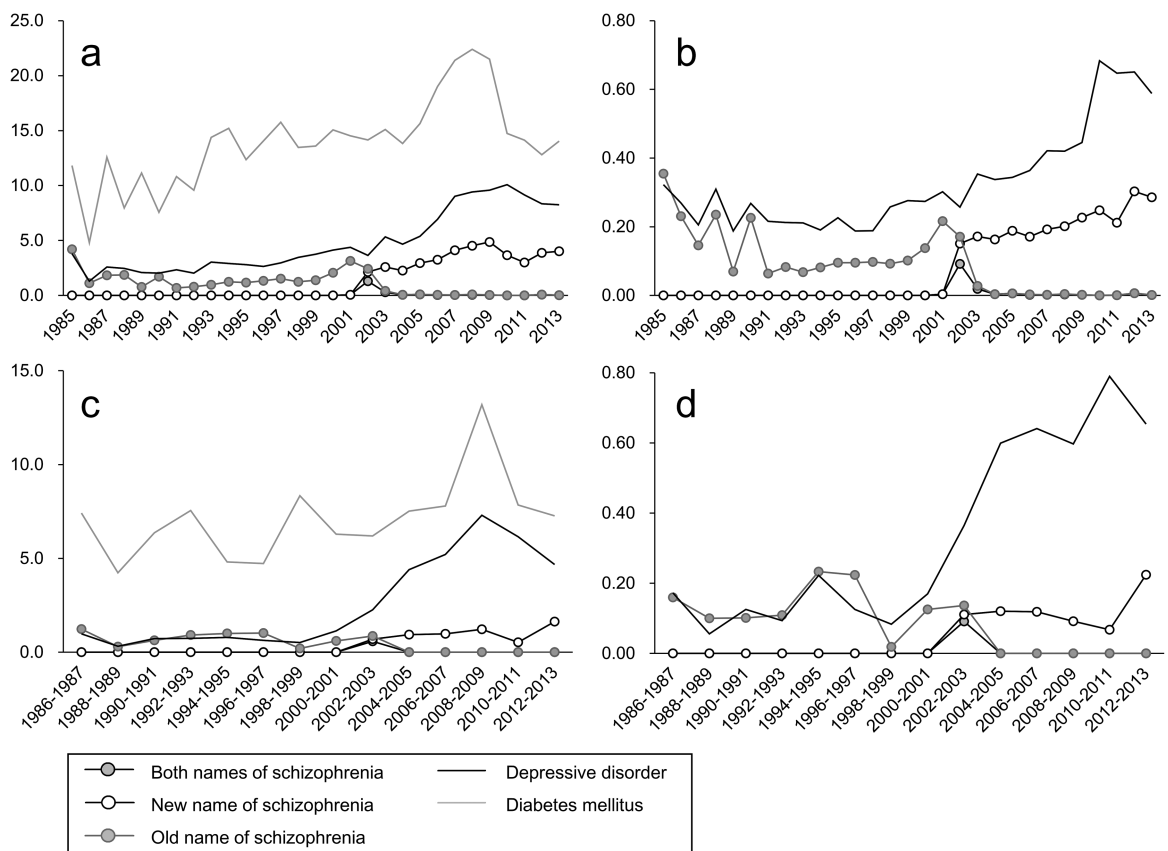
included across years, followed by depressive disorder and schizophrenia (figure 1a and supplementary table S1). The number of articles including the target terms increased across years compared with the articles not including any target term ( $\chi^2 = 5.9 \times 10^3$ ,  $df = 66$ ,  $P < .001$ ). Articles including schizophrenia in each year since 2001 had a significant relative increase compared with 1991, and continued increasing until 2009. For depressive disorder, the number of articles relatively increased from 2003, with this trend lasting until 2010. In contrast, the relative increase in the number of articles, including DM, was evident since 1993, especially between 2006 and 2009.

Within target-term comparison, the increase in the number of articles published including schizophrenia was greater from 2003 when compared with those of DM (figure 1b and supplementary table S1), and was greater when compared with depressive disorder in 1996–1997, 2000–2005, and 2009. The increase in the number of articles including depressive disorder was smaller in 1993–2000 but greater from 2003, compared with those of DM. Between 2010 and 2011, a larger number of articles on depressive disorder were published, when compared with those on schizophrenia.

For TV news segments, 1106 articles were extracted in the initial search using the target terms, out of a total of 944395 eligible articles (table 2). Similar to the tendency in newspapers, DM had the greatest number of presented TV segments included across years ( $\chi^2 = 235$ ,  $df = 39$ ,  $P < .001$ ; figure 1c and supplementary table S2). However, the relative increase in segments on schizophrenia and DM remained stable across years. In contrast, the numbers of segments on depressive disorder had a significant relative increase between 2004–2005, even when compared with those on DM and schizophrenia (figure 1d and supplementary table S2).

#### Difference in Number of Articles After the Name Change

The first newspaper article arguing in favor of name change of schizophrenia was in 1995, and was followed by 4 articles in 2000. In 2002, 38.9% (148/380) and 40.0% (4/10) of articles in newspapers and TV news sources, respectively, included both the Japanese names of schizophrenia. After 2002, 97.0% of articles in newspapers (4587/4728, table 2) and 96.6% in TV news segments (56/58) only used the new name of schizophrenia. Only 3



**Fig. 1.** Article rates between 1985 and 2013. Article rates in newspapers including the old name of schizophrenia (gray line with gray circle dots), new name (black line with black circles), both names (black line with gray circle dots), depressive disorder (black line), and diabetes mellitus (gray line) were illustrated via: (a) 10 000 total articles and (b) by the number of articles including DM. Article rates in TV news segments for every 2-year period are also illustrated in figures 1c and 1d, respectively.



newspaper articles and no TV news sources used the old name exclusively after 2004.

#### *Difference in the Frequency of Words Used in Headlines After the Name Change*

The new names for schizophrenia ( $Z = 4.7, P < .001$ ) and depressive disorder ( $Z = 6.3, P < .001$ ) had increased rate of usage in headlines after 2002 compared to before 2001, while DM showed little change (table 3). There was no difference in the rates between depressive disorders and schizophrenia ( $Z = 1.6, P = .12$ ).

Text data mining segregated 11.0 morpheme level words per single newspaper article (573 331/52 025, supplementary table S3). The top 20 words used in the articles seem to be characterized only by target terms rather than by periods (table 3 and supplementary table S4 in Japanese). In the articles for schizophrenia, “seishin” (mind/mental) was the most frequently used word, and 12 out of the top 20 words were categorized into crime or violence. For depressive disorder, “jisatsu” (suicide) was used the most, and 8 out of the top 20 words were categorized into medicine or psychology. For DM, “kenko” (health) or “iryō” (medical care/treatment) were the most-used words, and 12 out of the top 20 words were categorized into medicine or psychology.

Similar to the top 20 words used in the articles, the results of categorization using 1% resampling yielded words that were different among diseases but that did not differ before and after the name change (or 2002) (table 4). A chi-square test indicated that there was no difference in word categorization for schizophrenia before and after the name change ( $\chi^2 = 2.1, df = 5, P = .84$ ), and no difference between 2001 and after 2002 for depressive disorder ( $\chi^2 = 8.9, df = 5, P = .11$ ) or DM ( $\chi^2 = 3.1, df = 5, P = .68$ ). Word categorization significantly differed among diseases ( $\chi^2 = 334, df = 10, P < .001$ ). The articles for schizophrenia had the most frequent use of criminal or violent words and the least use of positive words. The articles for depressive disorder had the greatest use of suicide or self-harm words but the least use of medical or psychological words. Overall negative words (criminal or violent, suicide or self-harm, and other negative words) were the most likely to be used in articles for schizophrenia when compared with those for depressive disorder and DM (31.5%, 16.0%, and 8.2%, respectively).

#### **Discussion**

This study found that the number of articles including disease names have increased since 1985 and those that make reference to schizophrenia and depressive disorder have also increased since 2003, when compared with those including DM. The relative increase of articles including schizophrenia compared with depressive disorder was evident between 2000 and 2005, concomitant with the change in the name of schizophrenia in Japan in

2002. After the name change, only a few articles used the old name of schizophrenia, while most used both names around 2002. However, the articles including schizophrenia were more likely to be used with criminal or violent words, irrespective of the name change.

To the best of our knowledge, this is the first study to analyze the trajectory of articles including physical and psychiatric disease names from more than 23 million articles in major Japanese newspapers and TV news segments and investigate word tendencies in the articles using a text data mining method—a novel approach to easily and more objectively illustrate global tendencies from a huge text data set. The results exhibited a limited effect of name change of schizophrenia on the number of articles and there was little difference in its contents after the name change, which is in line with previous studies exploring article types.<sup>10,11</sup>

Several limitations should be taken into consideration. First, as we were unable to distinguish the degree of importance and attention paid to each article in newspapers and TV news segments, the actual impact of these news items on readers could not be considered. Analysis using the placing and size of articles within newspapers and TV news segments could clarify the actual impact of the name change of schizophrenia on readers and viewers. Second, since the text mining approach segmented words irrespective of anteroposterior relationship in various contexts, a possible difference should be considered between the present findings and the actual meaning of articles, such as the possibility of metaphoric use. Related to this is the fact that we only used the headline of each article, which could result in findings differing from the actual meanings of the news items themselves. Third, the Internet could change the role and meaning of mass media articles, since most of the articles can be seen via websites, and young people mostly see and discuss issues on the web that could alter the effect of mass media on stigma.

With respect to the primary hypothesis, there was a significant increase in the number of articles for schizophrenia between 1985 and 2013. However, the articles including depressive disorder and DM in this study also increased when compared with other articles. These results suggest that public interest and awareness for medical information has grown over the past 3 decades. Considering the significant increased number of articles published on schizophrenia compared with those on depressive disorder around the time of the name change, the effect of the name change can be seen to have been limited to within several years.

Articles on schizophrenia and depressive symptoms have increased since 2003 compared with those for DM. Furthermore, the terms used to describe schizophrenia and depressive disorder themselves have been used in headlines. One of the reasons for this may be that a promotion campaign for depression and mental illness occurred

**Table 3.** Top 20 Words Used in Article Headlines by Disease Names

Target term <sup>b</sup> Ranking, <i>n</i> <sup>c</sup>	Schizophrenia			Depressive Disorder			Diabetes Mellitus		
	Total ( <i>n</i> = 6361)	Old Name ( <i>n</i> = 1768)	New Name ( <i>n</i> = 4593)	Total ( <i>n</i> = 13617)	Before 2001 ( <i>n</i> = 2735)	After 2002 ( <i>n</i> = 10882)	Total ( <i>n</i> = 32047)	Before 2001 ( <i>n</i> = 11365)	After 2002 ( <i>n</i> = 20682)
72823	19708	53115	149749	28346	121403	341759	118475	223284	
540 (8.5%)	103 (5.1%)	437 (9.0%)	2312 (17.0%)	354 (12.9%)	1,958 (18.0%)	4,132 (12.9%)	1,424 (12.5%)	2,708 (13.1%)	
1	Mental, 1214	Mental, 800	Suicide, 2409	Suicide, 385	Suicide, 2024	Health, 2967	Health, 1098	Medical care, 1911	
2	Distinct court, 893	Distinct court, 692	Mental, 986	Mental, 255	Distinct court, 821	Medical care, 2824	Medical care, 913	Health, 1869	
3	Judgement, 782	Judgement, 611	Heart, 959	Heart, 223	Heart, 736	Hospital, 2209	Treatment, 554	Hospital, 1690	
4	Disability, 740	Disability, 537	Distinct court, 938	Overwork, 175	Mental, 731	Patient, 1670	Patient, 521	Patient, 1149	
5	Defendant, 726	Defendant, 498	Judgement, 636	Medical care, 257	Judgement, 550	Treatment, 1536	Hospital, 519	Treatment, 982	
6	Case (affair), 691	Killing, 455	Medical care, 590	Stress, 147	Consultation, 461	Lives, 1248	Lives, 379	Lives, 869	
7	Killing, 520	Judgement, 171	Disability, 552	Health, 142	Hospital, 456	Prevention, 1173	Medicine, 377	Prevention, 804	
8	Imprisonment, 504	Stabbing, 157	Hospital, 548	Disability, 133	Medical care, 433	Information, 1009	Prevention, 369	Information, 697	
9	Homicide, 502	Appraisal, 146	Consultation, 543	Lives, 123	Killing, 423	Medicine, 897	Transplant, 316	New type, 604	
10	Responsibility, 397	Responsibility, 138	Overwork, 503	Distinct court, 117	Disability, 419	Transplant, 857	Decease, 315	Habit, 576	
11	Public trial, 392	Capability, 119	Authorization, 493	Hospital, 92	Authorization, 406	Research, 805	Information, 312	Death, 549	
12	Justice, 382	Public trial, 115	Responsibility, 259	Killing, 469	Action, 394	Habit, 771	Lifestyle-related diseases, 278	Transplant, 541	
13	Capability, 361	Succession, 115	Medical care, 255	Health, 438	Authorization, 87	Death, 757	Research, 268	Research, 537	
14	Hospital, 357	Hospital, 103	Hospital, 254	Action, 408	Judgement, 86	Medical doctor, 718	Gene, 235	Medicine, 520	
15	Medical care, 354	Suspicion, 100	Capability, 242	Prevention, 403	Consultation, 82	Disease, 647	Medical doctor, 233	Medical doctor, 485	
16	Appraisal, 341	Medical care, 99	Fatal stabbing, 233	Imprisonment, 392	Patient, 78	New type, 609	Obesity, 226	Metabolic, 443	
17	Stabbing, 298	Patient, 93	Accept, 208	Bereaved person, 384	Treatment, 78	Obesity, 591	Old age, 222	Disease, 438	
18	Heart, 293	Prosecution, 93	Heart, 203	Patient, 382	Medicine, 77	Examination, 583	Food, 219	Food, 432	
19	Suspicion, 286	Heart, 90	Appraisal, 195	Workman's compensation, 380	Notice (guide), 74	Exercise, 567	Examination, 218	Blood draw, 424	
20	Patient, 283	<i>x</i> <sup>d</sup> , 84	Innocence, 194	Lawsuit, 367	Workman's compensation, 72	Lecture, 565	Nursing care, 210	Exercise, 381	

*Note:* <sup>a</sup>Total meaning words extracted in the headlines using a text data mining.

<sup>b</sup>The number and rate of the articles using each target term itself in headline. In depressive disorder, the numbers of “utsu” (depression) and “utsu-byou” (depressive disorder), and in diabetes mellitus, those of “tounyou” (glycosuria) and “tounyou-byou” (diabetes mellitus) were counted.

<sup>c</sup>The word in English and the number of the articles using the word on headlines. [supplementary table S4](#) shows the terms in Japanese language.

<sup>d</sup>This term could be associated with a specific case and is represented by “*x*.”

**Table 4.** Tendency of Word Category Used in Article Headlines by Disease Names

	Schizophrenia			Depressive Disorder			Diabetes Mellitus			Difference Among Diseases <sup>a</sup>
	Total	Old Name	New Name	Total	Before 2001	After 2002	Total	Before 2001	After 2002	
Criminal or violent	24.5%	26.8%	23.6%	7.9%	8.5%	5.5%	3.0%	3.3%	2.6%	Sch > Dep > DM
Suicide or self-harm	0.2%	0.0%	0.3%	2.2%	2.4%	1.6%	0.1%	0.0%	0.1%	Dep > Sch > DM
Medical or psychological	15.0%	16.3%	14.5%	14.1%	13.0%	18.1%	23.9%	24.3%	23.3%	DM > Sch > Dep
Other negative	6.8%	7.3%	6.6%	5.8%	6.3%	3.8%	5.1%	4.9%	5.4%	Sch > DM
Other positive	1.8%	2.4%	1.6%	3.6%	4.1%	1.6%	4.8%	4.7%	4.8%	DM > Sch
Other neutral	51.7%	47.2%	53.5%	66.4%	65.7%	69.2%	63.2%	62.8%	63.8%	Dep, DM > Sch

Note: Sch, schizophrenia; Dep, depressive disorder; DM, diabetes mellitus.

<sup>a</sup>Significance among the articles using disease names during total search period was shown using standardized residuals of chi-square test ( $P < .05$ ).

around 2000, partially due to the economic recession and a rapid increase in the number of suicides occurring since 1998.<sup>22</sup> Similar findings were seen in the increased number of articles for DM published between 2006 and 2009 and in “metabolic” as the 16th most frequently used word, which may be due to great public concern about the revision of the annual medical checkup ie, especially focused on metabolic syndrome.<sup>22</sup> Overall, the articles related to the specific disease could change in a short or long term by multiple factors, including governmental policy, health promotion campaigns, and public health awareness and event-related interests, which might relate to the change in socioeconomic status and educational achievement.

Contrary to the second hypothesis, word tendencies in headlines for disease names slightly differed across the name change of schizophrenia, irrespective of successful media control for the use of terms according to the name change in newspapers and TV news segments. The contents for schizophrenia still frequently focus on criminal and violent cases and rarely invoke positive terms after the name change. This is similar to results indicating that schizophrenia is still predominantly used in negative news stories in UK newspapers, when compared with other mental illnesses,<sup>11</sup> and with metaphorical usage in US newspapers.<sup>10</sup> Articles for criminal, violent, and suicidal cases involving people with mental illness are too focused on disease names, but pay little attention to socio-economic background, family adversity, and alcohol and substance problems, which are shared risk factors.<sup>23,24</sup>

Mass media have a great influence on mental health-related stigma.<sup>1-3</sup> The name change of schizophrenia is a successful event for the increase in media exposure and switch to using only the new name in articles. This may contribute to reducing stigma lasting in the long term, since less than half of young people identified the old and new names for schizophrenia as the same condition.<sup>17</sup> However, article contents in mass media may

change slightly over 30 years, which may be associated with still existing stigma toward schizophrenia compared with depressive disorders and DM, and may result in a reduced effect for the name change.<sup>17</sup> To continue the effect, articles for schizophrenia should be more focused on medical information and recovery-orientated messages. Articles for criminal and violent cases featuring schizophrenia should be more focused on the environmental background.

### Supplementary Material

Supplementary material is available at <http://schizophreniabulletin.oxfordjournals.org>.

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