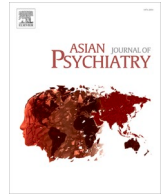




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# Psychiatric hospitalization in Korea, 2011–2020: the impact of the Mental Health Act revision of 2017 in consideration of the COVID-19 pandemic

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## ABSTRACT

**Objective:** This study was performed to examine the changes in psychiatric hospitalization in Korea after the mental health law revision of 2017 with consideration of the COVID-19 pandemic.

**Methods:** The data were obtained from National Health Insurance and Medical Aid statistical yearbooks of 2011–2020. The changes in the inpatient and outpatient utilization for schizophrenia from 2011 to 2020 were compared with those for other psychiatric disorders and the general population. With difference-in-differences analysis, the changes in utilization of inpatient and outpatient care for schizophrenia after the law revision of 2017 were analyzed with two comparison groups.

**Results:** While the number of inpatients and inpatient days for schizophrenia decreased between 2017 and 2019, the number of outpatients and outpatient visits for schizophrenia increased during the period. Inpatient care utilization in two comparison groups increased during the same period. Whereas the COVID-19 pandemic of 2020 led to a general decrease in health care use among the population including inpatient care for schizophrenia, the number of outpatients for schizophrenia increased slightly after the pandemic. Difference-in-differences analysis showed that the law revision was associated with the decrease in the use of inpatient care for schizophrenia after adjustment for the effect of the COVID-19 pandemic.

**Conclusions:** The mental health law revision in Korea led to a significant decrease in hospitalization for schizophrenia. However, the limited effect of revision on the Medical Aid beneficiaries suggests that the revision was not followed by the provision of the proper alternatives which can replace hospitalization of the most vulnerable population.

## 1. Introduction

In the latter half of the 20th century, deinstitutionalization was the predominant policy in psychiatric care in the developed world (Fakhoury and Priebe, 2002). However, against the trend of deinstitutionalization in developed countries, the psychiatric bed number in Korea has greatly increased during the past decades with an ever-increasing dependence of psychiatric care on hospitalization. The number of beds in psychiatric asylums in Korea increased by 500% between the early 1960s and mid-1990s (Cho et al., 2017), and that in psychiatric hospitals by 1100% between the early 1980s and 2010s (Organization of Economic Co-operation and development, 2014b). The expansion of capacity was accompanied by an inordinate lengthening of stays. The average length of stay of psychiatric patients in Korea was 116 days in 2011, four times the average in OECD countries (Organization of Economic Co-operation and development, 2014a). The length of stay for 45% of psychiatric asylum inmates in Korea was reported to be over 10

years in 2019 (Ministry of Health & Welfare, 2019).

The high dependence on hospitalization in psychiatric care in Korea is primarily based on governmental support for the expansion of psychiatric hospital beds, especially in the private sector (Jeon, 2002). However, the exceedingly long length of stay of psychiatric patients in Korea was related to the Mental Health Act, which legalized involuntary admission and its extension with only nominal restrictions (Kim, 2017). The Act has been abused for involuntary hospitalization for unjustifiable causes and its arbitrary prolongation which, along with the profit motive of psychiatric facilities, became a customary practice in Korea. Given the rising concern about this problem, the Constitutional Court in Korea declared that the law was incompatible with the Constitution in 2016 (Kim, 2017).

The Constitutional decision led to the revision of the Act in 2017. The revised law, the Mental Health and Welfare Act, primarily tightened the conditions for involuntary admission and the prolongation of stay. In the subsequent revisions of 2018, the Act further established grounds for

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deinstitutionalization by specifying conditions for community care. However, despite the general consensus about the need for the revision, the government and mental health professionals express different attitudes toward the revised law with the latter insisting that the revision added only administrative work without correcting fundamental problems. Furthermore, they offer different interpretations of the effect of the revision. Whereas the government emphasizes the decrease in involuntary admissions, mental health professionals insist that the apparent decrease is only due to the conversion of involuntary admissions to voluntary ones (Lee and Kim, 2018).

The differing perspectives on the mental health law revision and its effect stem from different views about priorities of psychiatric treatment and involuntary placement and varying interests involved with the revision. However, while preventing unjustifiable involuntary admissions can be considered a primary purpose of the revision, the ultimate purpose of the law revision is to return psychiatric patients to the community (Ministry of Health and Welfare, 2020). Therefore, its effect needs to be examined in terms of the overall utilization of psychiatric care.

This study was performed to examine the impact of the Mental Health Act revision on the health service use of psychiatric patients. As the revision mainly concerns involuntary admission and long-term hospitalization, patients with schizophrenia, who account for about half of all psychiatric admissions and two-thirds of long-term psychiatric admissions in Korea (Park et al., 2008), can be considered the most relevant population. Therefore, health service use for schizophrenia was examined in comparison with other psychiatric disorders and causes other than psychiatric disorders. This study is composed of two parts. First, the change in the utilization of inpatient and outpatient care for schizophrenia was assessed from 2011 to 2020 in comparison with other psychiatric disorders and causes other than psychiatric disorders. Second, using difference-in-differences analysis, the changes in utilization of inpatient and outpatient care for schizophrenia after the law revision of 2017 were analyzed with two comparison groups.

## 2. Methods

### 2.1. Study settings and data

This study was performed with population-based data from Korea. The number of outpatients, outpatient visits, inpatients, and inpatient days for schizophrenia, other psychiatric disorders, and causes other than psychiatric disorders from 2011 to 2020 were obtained for National Health Insurance and Medical Aid beneficiaries of all ages. The data were obtained from the National Health Insurance and Medical Aid statistical yearbooks respectively from 2011 to 2020 (National Health Insurance Service, 2021a, 2021b).

### 2.2. National Health Insurance and Medical Aid

The Korean population is composed of 97.1% National Health Insurance beneficiaries and 2.9% Medical Aid beneficiaries. Whereas the National Health Insurance beneficiaries pay a monthly premium and copayment of 20–60% (National Health Insurance Service, 2021c), the expense of Medical Aid beneficiaries is covered with no or a nominal amount of out-of-pocket payment. Regarding reimbursement, while fee-for-service has been the standard payment model in Korea, the payment of the Medical Aid beneficiaries for psychiatric care has been fixed-per-diem since the introduction of National Health Insurance in 1977 (Kim, 2017). Although the fee-for-service was introduced for outpatient psychiatric care of the Medical Aid beneficiaries in 2017, the payment for inpatient psychiatric care for the Medical Aid remains fixed-per-diem (Lim et al., 2018).

Comprising only 2.9% of the total population, Medical Aid beneficiaries use about 9.7% of total health care expenditures in Korea. Considering that the proportion of Medical Aid patients among the total

number of patients in Korea is 3.3% (National Health Insurance Service, 2021a, 2021b), the high expenditure for Medical Aid reflects the high frequency of utilization rather than the proportion of patients. However, this does not apply to psychiatric patients, especially schizophrenia inpatients.

The number of Medical Aid schizophrenia inpatients is about 61.1% of total schizophrenia inpatients, which is translated into 60.6% of the total expenditure for schizophrenia inpatient care (Lim et al., 2018; Health Insurance Review & Assessment Service, 2021). The high proportion of schizophrenia inpatients among Medical Aid beneficiaries can be due to long-term ailment-driven poverty. But, this figure is also closely linked to the payment method, specific for Medical Aid psychiatric patients, which favors long-term hospitalization, and to the susceptibility of Medical Aid beneficiaries to involuntary admission and its arbitrary lengthening (Kim, 2017). Considering the difference in characteristics between the National Health Insurance and Medical Aid psychiatric patients, the change in service use after the law revision was separately analyzed for the two populations.

### 2.3. Treatment and comparison groups

As the main change in the revised law concerns the requirements for involuntary hospitalization and its lengthening, the population which can be most affected was selected as the treatment group. As schizophrenia accounts for 45% of all psychiatric institutions, 87% of asylums, 38% of involuntary admissions (Ministry of Health & Welfare, 2019), and 66% of long-term admissions with the longest average length of stay (Park et al., 2008), people with schizophrenia were selected as the treatment group. Inpatient and outpatient use for schizophrenia was defined by the principal diagnosis of ICD codes of F20–F29 (Kühl et al., 2016; Malaspina et al., 2019). For comparison groups, people with other psychiatric disorders (ICD codes of F00–F99 except for F20–F29) and the general population (all causes other than psychiatric disorders: all ICD codes except for F00–F99) were selected. The first group was used to measure the effect of the revision on its target population in comparison with the population as they are also under the effects of the Mental Health Law. The second group was used to differentiate the effect of the revision from the effect of factors which can universally affect the hospitalization of the entire population.

### 2.4. Statistical analysis

First, the change in inpatient and outpatient use for schizophrenia was assessed from 2011 to 2020 in comparison with other psychiatric disorders and causes other than psychiatric disorders. Second, using difference-in-differences analysis, the effect of the law revision in 2017 on inpatient and outpatient use for schizophrenia was estimated in comparison with psychiatric disorders and causes other than psychiatric disorders. The difference in the utilization of inpatient care (the number of inpatients and inpatient days) and outpatient care (the number of outpatients and outpatient visits) in 2011–2016 vs 2018–2020 was estimated with a regression model with those four variables as dependent variables respectively. Due to the large difference in the value of dependent variables between those for schizophrenia and the comparison groups, natural logs of the values were used for the analysis. Two dummies for the time (Before 2017 = 0 and After 2017 = 1), revision (schizophrenia = 1, and other psychiatric disorders or causes other than psychiatric disorders = 0), interaction term for time and revision, unemployment rate, and GDP were used as independent variables. In addition, in order to adjust for the effect of the COVID-19 pandemic, the dummy for the COVID-19 pandemic (Before 2020 = 0 and 2020 = 1) was included, and considering the different impact of the pandemic on health care use among different groups, an interaction term for revision and COVID-19 pandemic was included.

3. Results

Table 1 presents the number of inpatients and outpatients for schizophrenia, other psychiatric disorders and causes other than psychiatric disorders between 2011 and 2020. The number of inpatients for schizophrenia decreased by 7.92% with an increase of 17.16% in the number of outpatients during 2011 and 2020. This is in contrast with other psychiatric disorders and causes other than psychiatric disorders of which the number of inpatients increased by 25.96% and 10.71% respectively. Concerning the change after the revision in 2017, the number of inpatients for schizophrenia decreased by 2.03% during 2017 and 2018 and 3.04% during 2017 and 2019. The numbers of inpatients in two comparison groups increased during the same periods. When compared by the insurance status, the decrease in the number of inpatients for schizophrenia was greater among the National Health Insurance beneficiaries than the Medical Aid beneficiaries.

The inpatient days and outpatient visits for schizophrenia demonstrate a trend similar to the number of patients (Table 2). The total inpatient days for schizophrenia increased by 3.32% during 2011 and 2020, which was far lower than 65.12% and 19.17% in two comparison groups. The total inpatient days for schizophrenia decreased by 0.63% during 2017 and 2018 and 0.58% during 2017 and 2019. The total inpatient days in two comparison groups increased during the same periods. While the inpatient days for schizophrenia among National Health Insurance beneficiaries continued to decrease during 2017 and 2019, those of Medical Aid beneficiaries showed a slight increase during the same period.

Concerning the COVID-19 pandemic of 2020, health care utilization tended to decrease in general except for outpatient care use for schizophrenia and other psychiatric disorders. The number of inpatients for schizophrenia decreased by 8.05% during 2019 and 2020, and the number of inpatients in two comparison groups also decreased. While the number of outpatients also decreased for causes other than psychiatric disorders, those for schizophrenia and other psychiatric disorders increased by 0.25% and 3.38% respectively. The inpatient days and outpatient visits for schizophrenia decreased by 1.42% and 2.93% respectively during 2019 and 2020. The inpatient days and outpatient visits in two comparison groups decreased during the same period except for a 5.49% increase in outpatient visits for other psychiatric disorders.

Figs. 1 and 2 show the percent change in the number of patients and outpatient and inpatient utilization in three groups. The number of inpatients and inpatient days for schizophrenia showed a steady decrease since 2015 in contrast with two other groups. Although there was an increase in the outpatient utilization for schizophrenia, the increase was less conspicuous compared with the increase in the inpatient utilization. Whereas the COVID-19 pandemic in 2020 led to a general decrease in health care use among the population including inpatient care for schizophrenia, the number of outpatients for schizophrenia increased slightly after the pandemic. The number of outpatients and outpatient visits for psychiatric disorders other than schizophrenia showed a distinct increase after the pandemic.

Tables 3 and 4 show the results of difference-in-differences analyses. The negative beta-coefficients for Post\*Treatment in Table 3 show that the number of patients and utilization in both inpatient and outpatient care for schizophrenia decreased significantly after the revision in 2017 compared to other psychiatric disorders. When analyzed separately, the beta-coefficient for Post\*Treatment for the number of Medical Aid inpatients was not statistically significant, which indicated that the decrease in the number of inpatients for schizophrenia was significant among the National Health Insurance beneficiaries but not among the Medical Aid beneficiaries. However, the negative beta-coefficients for the number of outpatients, inpatient days, and outpatient visits were all statistically significant for both the National Health Insurance and Medical Aid beneficiaries. These results suggest that the effect of the revision was more pronounced among the National Health Insurance

Table 1 Number of inpatients and outpatients for schizophrenia, other psychiatric disorders, and the general population (causes other than psychiatric disorders), 2011–2020.

	Year										Percent change				
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	11-20	17-18	17-19	19-20	
<b>Schizophrenia</b>															
Total	Inpatients	66208	67843	67439	67438	68161	67486	68380	66989	66304	60966	-7.92	-2.03	-3.04	-8.05
	Outpatients	179326	187119	188193	190883	196102	199333	202783	206795	209569	210096	17.16	1.98	3.35	0.25
National Health Insurance	Inpatients	28902	30134	29874	29789	29885	29134	28752	27537	27121	23968	-17.07	-4.23	-5.67	-11.63
	Outpatients	116328	123020	124731	126968	129679	131611	133444	135501	136603	136689	17.50	1.54	2.37	0.06
Medical Aid	Inpatients	37306	37709	37565	37649	38276	38352	39628	39452	39183	36998	-0.83	-0.44	-1.12	-5.58
	Outpatients	62998	64099	63462	63915	66423	67722	69339	71294	72966	73407	16.52	2.82	5.23	0.60
<b>Other psychiatric disorders</b>															
Total	Inpatients	194418	210993	217486	227974	238800	258140	263685	273490	269745	244884	25.96	3.72	2.30	-9.22
	Outpatients	2186611	2334425	2360459	2413425	2519484	2682890	2821128	3054342	3275914	3386687	54.88	8.27	16.12	3.38
National Health Insurance	Inpatients	139167	152596	158582	167118	176313	192557	197887	206408	203812	182803	31.36	4.31	2.99	-10.31
	Outpatients	1970770	2107328	2134299	2179678	2272036	2414234	2544464	2758358	2962490	3063558	55.45	8.41	16.43	3.41
Medical Aid	Inpatients	55251	58397	58904	60856	62487	65583	65798	67082	65933	62081	12.36	1.95	0.21	-5.84
	Outpatients	215841	227097	226160	233747	247448	268656	276664	295984	313424	323129	49.71	6.98	13.29	3.10
<b>Causes other than psychiatric disorders</b>															
Total	Inpatients	6101560	6403351	6379974	6594644	6744356	7544616	7351293	7471971	7562200	6754809	10.71	1.64	2.87	-10.68
	Outpatients	44386935	44743105	44927142	45423818	45888112	45898984	45915371	46025271	45929640	44642554	0.58	0.24	0.03	-2.80
National Health Insurance	Inpatients	5774306	6042836	6065871	6241154	6426829	7188911	6988669	7102976	7188239	6400772	10.85	1.49	2.71	-10.95
	Outpatients	42983998	43396134	43702980	44224848	44362114	44667357	44723248	44838541	44792628	43525121	1.26	0.26	0.16	-2.83
Medical Aid	Inpatients	327254	360515	314103	353490	317527	355705	352624	368995	373961	354037	8.18	4.64	6.05	-5.33
	Outpatients	1402937	1346971	1224162	1198970	1225998	1231627	1192123	1186730	1137012	1117433	-20.35	-0.45	-4.62	-1.72

**Table 2**  
Total inpatient days and outpatient visits for schizophrenia, other psychiatric disorders, and the general population (causes other than psychiatric disorders), 2011–2020.

		Year										Percent change			
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	11-20	17-18	17-19	19-20
Schizophrenia															
Total	Inpatient days	12816984	13367041	13465305	13550063	13754958	13832581	13510648	13425727	13432768	13242521	3.32	-0.63	-0.58	-1.42
	Outpatient visits	2000089	2074104	2091696	2122443	2166849	2234743	2338811	2437171	2469779	2397423	19.87	4.21	5.60	-2.93
National Health Insurance	Inpatient days	3756978	4050775	4083900	4112927	4197490	4102085	3962706	3826497	3766673	3589308	-4.46	-3.44	-4.95	-4.71
	Outpatient visits	1275109	1319769	1331804	1342748	1349637	1377153	1392948	1405608	1414522	1371652	7.57	0.91	1.55	-3.03
Medical Aid	Inpatient days	9060006	9316266	9381405	9437136	9557468	9730496	9547942	9599230	9666095	9653213	6.55	0.54	1.24	-0.13
	Outpatient visits	724980	754335	759892	779695	817212	857590	945863	1031563	1055257	1025771	41.49	9.06	11.57	-2.79
Other psychiatric disorders															
Total	Inpatient days	24187374	27467398	30145196	32941877	35026103	37615551	39441197	40884372	40484725	39937217	65.12	3.66	2.65	-1.35
	Outpatient visits	13481781	14499628	14839504	15321619	16044221	17333869	18747776	20853692	22882196	24137931	79.04	11.23	22.05	5.49
National Health Insurance	Inpatient days	14516374	17085182	19275604	21546226	23279043	25258358	26904439	28184265	27915119	27371236	88.55	4.76	3.76	-1.95
	Outpatient visits	11897149	12822968	13109803	13493185	14094554	15154011	16286554	18085348	19886154	21032341	76.78	11.04	22.1	5.76
Medical Aid	Inpatient days	9671000	10382216	10869592	11395651	11747060	12357193	12536758	12700107	12569606	12565981	29.93	1.30	0.26	-0.03
	Outpatient visits	1584632	1676660	1729701	1828434	1949667	2179858	2461222	2768344	2996042	3105590	95.98	12.48	21.73	3.66
Causes other than psychiatric disorders															
Total	Inpatient days	104438504	110722447	114447526	120651414	122749429	128336398	129109586	131149552	131947782	124461701	19.17	1.58	2.20	-5.67
	Outpatient visits	750233866	766853550	769506498	785238287	781055823	814229844	814036402	831446972	845777089	731206359	-2.54	2.14	3.90	-13.55
National Health Insurance	Inpatient days	87664827	93608047	96862888	102306127	104163344	108635587	109378714	110956263	111645271	104469083	19.17	1.44	2.07	-6.43
	Outpatient visits	702904421	720688471	724898587	740579751	736405809	765984436	765956707	782943275	796132769	684264907	-2.65	2.22	3.94	-14.05
Medical Aid	Inpatient days	16773677	17114400	17584638	18345287	18586085	19700811	19730872	20193289	20302511	19992618	19.19	2.34	2.90	-1.53
	Outpatient visits	47329445	46165079	44607911	44658536	44650014	48245408	48079695	48503697	49644320	46941452	-0.82	0.88	3.25	-5.44

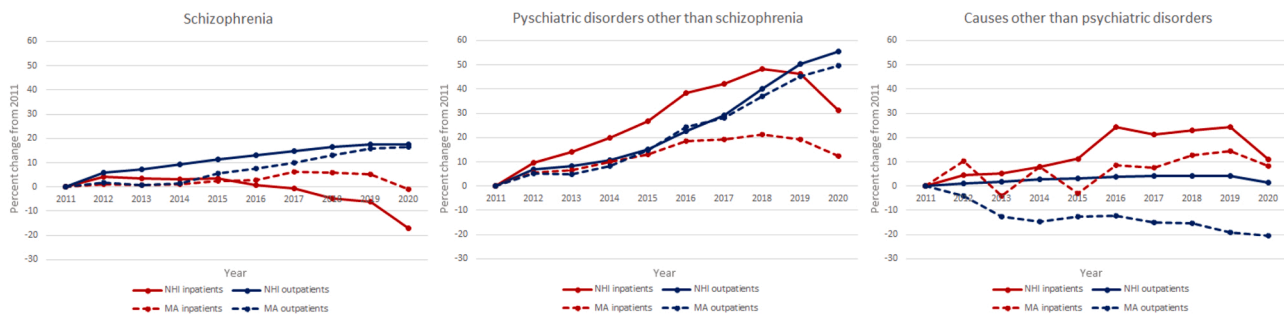


Fig. 1. Percent change in the number of inpatients and outpatients for National Health Insurance (NHI) and Medical Aid (MA) from 2011.

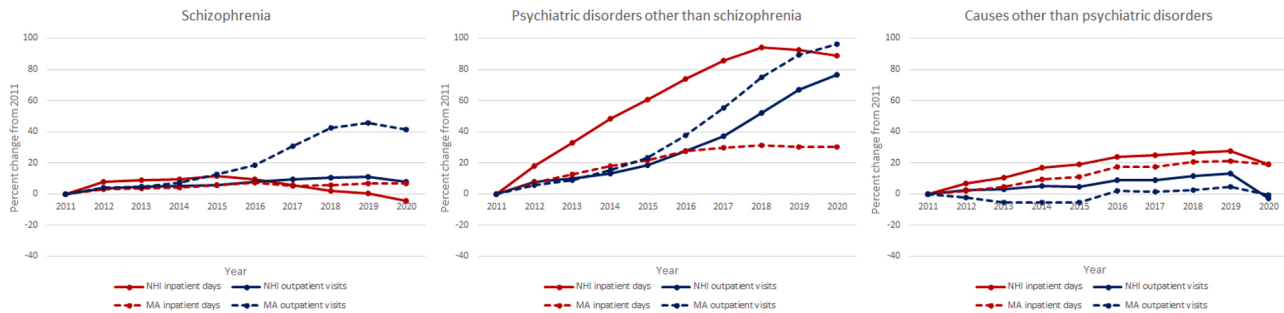


Fig. 2. Percent change in the total number of inpatient days and outpatient visits for National Health Insurance (NHI) and Medical Aid (MA) from 2011.

beneficiaries. The difference-in-differences analysis with causes other than psychiatric disorders in Table 4 shows that the number of inpatients and inpatient days for schizophrenia decreased compared with the general population while the number of outpatients and outpatient visits for schizophrenia increased compared with the general population. However, the effect was not significant for the number of Medical Aid inpatients with schizophrenia.

#### 4. Discussion

This study examined the impact of the Mental Health Act revision on psychiatric health service use for schizophrenia. Both the number of inpatients and length of stay for schizophrenia decreased after the revision while outpatient utilization increased after the revision during 2017 and 2019. The decrease in inpatient care for schizophrenia after the revision is in contrast with the increase for other psychiatric disorders and causes other than psychiatric disorders. While the COVID-19 pandemic in 2019 led to a decrease in health care utilization in general, the number of outpatients for schizophrenia and other psychiatric disorders increased slightly. The difference-in-differences analyses suggest that the use of inpatient care for schizophrenia decreased after the revision compared with the two comparison groups, and the effect of revision was more pronounced among the National Health Insurance beneficiaries. This effect was significant even after adjustment for the effect of the COVID-19 pandemic.

This study shows that the revision of the Mental Health Act led to a significant decrease in the inpatient care use by its most relevant population, people with schizophrenia, and an increase in their outpatient care use. These results demonstrate that the law revision, despite the arguments concerning the effect of the revision, brought about some desired effects. Not only decreasing the inpatient care use, the revision also led to an increase in outpatient care use for schizophrenia, which can be considered a transfer from inpatient care demand.

The greater decrease in the inpatient care use for schizophrenia among the National Health Insurance beneficiaries compared with the Medical Aid beneficiaries and the results of difference-in-differences analyses indicate that the revision had limited effect on the Medical

Aid beneficiaries with schizophrenia. This can be partly due to the high chronicity of the Medical Aid patients with schizophrenia. While accounting for 57.8% of inpatients for schizophrenia, the Medical Aid beneficiaries were responsible for 71.8% of hospital stays due to schizophrenia, which reflected the high chronicity of schizophrenia among the Medical Aid patients. However, considering that they are most susceptible to long-term hospitalization and are highly dependent on social support for their subsistence, our finding suggests that the revision, despite some visible effect among the National Health Insurance beneficiaries, was not followed by the social support which could return the patients to the community.

The study finding is in line with the decrease in compulsory admissions after the revision of the previous study which reported that the proportion of compulsory admissions was 31.5% in 2018, lower than 64.3% in 2016 (Yoon et al., 2019). A considerable portion of compulsory admission is supposed to be converted to voluntary admission with a 28.4% decrease in the former and a 26.9% increase in the latter. However, the overall decrease in admission among people with schizophrenia demonstrates that the law led to a meaningful decrease in admission among the most relevant population and not a simple conversion to another form of admission.

The decrease in the number of psychiatric admissions and involuntary admissions after the revision is consistent with many developed countries in North America and Europe (Fakhoury and Priebe, 2007; Rothbard and Kuno, 2000; Freeman et al., 1985). However, while the decrease in psychiatric beds was evident in most countries which adopted deinstitutionalization and was generally accompanied by a decrease in involuntary hospitalization and the entire psychiatric hospitalization, the reduction in beds did not translate into a decrease in admissions in some countries. For example, whereas the number of psychiatric beds in the UK decreased drastically through the 1970s and 1990s (Freeman et al., 1985; Rothbard and Kuno, 2000), the number of psychiatric admissions and the number and proportion of involuntary admissions continued to increase since the 1980s in the UK (Keown et al., 2018; Wall et al., 1999). Germany, despite declining bed numbers since the 1970s, showed an increase in psychiatric admissions and a stable proportion of compulsory detention since the 1990s, which was

**Table 3**  
Difference-in-differences analysis (treatment group: people with schizophrenia; comparison group: people with other psychiatric disorders).

	Total															
	National Health Insurance				Medical Aid				National Health Insurance				Medical Aid			
	Natural log (number of inpatients) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (number of inpatients) Coefficient (SE)	Natural log (outpatient visits) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (number of inpatients) Coefficient (SE)	Natural log (outpatient visits) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)				
(Constant)	11.625 (0.267)**	14.036 (0.202)***	15.998 (0.398)**	15.754 (0.247)**	11.265 (0.320)**	13.909 (0.201)***	15.267 (0.504)**	15.753 (0.237)**	10.536 (0.152)**	11.699 (0.217)***	15.474 (0.206)**	13.236 (0.288)**				
Post	0.072 (0.062)	0.163 (0.047)**	0.045 (0.092)	0.235 (0.057)**	0.091 (0.074)	0.156 (0.047)**	0.056 (0.117)**	0.237 (0.057)**	0.021 (0.035)	0.162 (0.05)**	0.001 (0.048)	0.282 (0.067)**				
Treatment	-1.199 (0.050)***	-2.541 (0.023)***	-0.831 (0.045)**	-1.973 (0.028)**	-1.709 (0.036)***	-2.854 (0.023)***	-1.588 (0.058)**	-2.308 (0.028)**	-0.464 (0.017)***	-1.293 (0.025)***	-0.159 (0.023)**	-0.843 (0.033)**				
Post*Treatment	-0.206 (0.061)**	-0.18 (0.046)**	-0.277 (0.091)*	-0.213 (0.056)**	-0.307 (0.073)**	-0.191 (0.046)**	-0.412 (0.115)**	-0.291 (0.056)**	-0.061 (0.035)	-0.148 (0.05)*	-0.112 (0.047)*	-0.172 (0.066)*				
COVID-19	-0.087 (0.070)	0.072 (0.053)	0.023 (0.105)	0.103 (0.065)	-0.091 (0.084)	0.081 (0.053)	0.037 (0.133)	0.112 (0.065)	-0.062 (0.040)	0.043 (0.057)	0.015 (0.054)	0.068 (0.076)				
COVID-19*Treatment	0.014 (0.091)	-0.059 (0.069)	0.004 (0.136)	-0.122 (0.085)	-0.016 (0.109)	-0.065 (0.069)	-0.032 (0.173)	-0.131 (0.085)	0.008 (0.052)	-0.042 (0.074)	0.008 (0.070)	-0.092 (0.099)				
Unemployment rate	0.032 (0.095)	0.063 (0.072)	0.019 (0.141)	0.078 (0.088)	0.013 (0.113)	0.044 (0.071)	-0.009 (0.179)	0.050 (0.088)	0.034 (0.054)	0.126 (0.077)	0.022 (0.073)	0.159 (0.102)				
GDP per capita	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)*	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)				

\* p < 0.05,  
\*\* p < 0.01,  
\*\*\* p < 0.001

**Table 4**  
Difference-in-differences analysis (treatment group: people with schizophrenia; comparison group: general population).

	Total															
	National Health Insurance				Medical Aid				National Health Insurance				Medical Aid			
	Natural log (number of inpatients) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (number of inpatients) Coefficient (SE)	Natural log (outpatient visits) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)	Natural log (number of inpatients) Coefficient (SE)	Natural log (outpatient visits) Coefficient (SE)	Natural log (inpatient days) Coefficient (SE)	Natural log (number of outpatients) Coefficient (SE)				
(Constant)	15.217 (0.211)**	17.302 (0.092)***	17.913 (0.168)**	20.053 (0.102)**	15.197 (0.233)**	17.230 (0.104)***	17.721 (0.181)**	20.078 (0.082)**	12.571 (0.218)**	14.185 (0.223)***	16.134 (0.132)**	17.215 (0.205)**				
Post	0.051 (0.049)	-0.038 (0.021)	-0.001 (0.039)	0.007 (0.024)	0.053 (0.054)	-0.047 (0.024)	-0.013 (0.042)	0.016 (0.019)	0.079 (0.051)	-0.039 (0.052)	0.023 (0.031)	0.017 (0.048)				
Treatment	-4.586 (0.024)***	-5.471 (0.011)***	-2.159 (0.019)**	-5.908 (0.012)**	-5.356 (0.027)**	-5.859 (0.012)***	-3.193 (0.021)**	-6.308 (0.009)**	-2.189 (0.025)**	-2.976 (0.025)***	-0.648 (0.015)**	-4.074 (0.023)**				
Post*Treatment	-0.140 (0.048)	0.073 (0.021)**	-0.123 (0.038)**	0.073 (0.023)*	-0.210 (0.053)**	0.061 (0.024)*	-0.185 (0.041)**	-0.019 (0.019)	-0.057 (0.050)	0.197 (0.051)**	-0.095 (0.030)*	0.223 (0.047)**				
COVID-19	-0.107 (0.056)	-0.024 (0.024)	-0.034 (0.044)	-0.134 (0.027)**	-0.104 (0.062)	-0.017 (0.027)	-0.031 (0.048)	-0.134 (0.022)**	-0.058 (0.058)	-0.075 (0.059)	-0.007 (0.035)	-0.068 (0.054)				
COVID-19*Treatment	0.018 (0.072)	0.039 (0.032)	0.041 (0.058)	0.115 (0.035)**	-0.021 (0.080)	0.034 (0.035)	0.007 (0.062)	0.115 (0.028)**	-0.013 (0.075)	0.056 (0.076)	0.015 (0.045)	0.027 (0.070)				
Unemployment rate	0.056 (0.075)	0.019 (0.033)	0.014 (0.060)	0.037 (0.036)	0.034 (0.083)	0.004 (0.037)	-0.019 (0.064)	0.011 (0.029)	0.049 (0.077)	0.095 (0.079)	0.047 (0.047)	0.120 (0.073)				
GDP per capita	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)**	0.000 (0.000)*	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)				

\* p < 0.05,  
\*\* p < 0.01,  
\*\*\* p < 0.001

attributed to the shortened length of stay (Salize et al., 2007).

These varying consequences of deinstitutionalization demonstrate that psychiatric bed reduction, decrease in psychiatric hospitalization, and decrease in involuntary hospitalization do not necessarily involve one another and can occur on different bases. For example, bed supply can be controlled by government policy or market conditions, but compulsory admission is based on legislation which stipulates the terms for it. Furthermore, even the effects of change in legislation were so variable that some countries saw an unexpected increase in compulsory hospitalization after the change in the law. However, considering that bed reduction was a commonly preceding element of deinstitutionalization in many countries, the mental health act revision in Korea can be considered an attempt at deinstitutionalization by changing the requirements for compulsory admission rather than decreasing bed capacity first. Whether this attempt would lead to a reduction of beds in the private sector would depend on the will of government and the general population, which would not let the revised law be bypassed by makeshift measures, and, most of all, the implementation of the complementary part of hospital beds: preparation for receiving patients into the community.

This study has limitations. First, given that the revision was effective since the end of May in 2017, a more accurate assessment of the effect of the revision would have been possible if the utilization was measured by the month. However, considering that the revision became effective in the middle of the year, the assessment by year can also be appropriate for measuring the effect without partiality. Second, concerning the difference-in-differences analysis, the treatment and comparison groups, ideally, should differ only in treatment with other conditions similar. Given the characteristics of the treatment in this study, which are universally applied to patients with schizophrenia across the nation, it is not possible to come up with an ideal control group, the population with schizophrenia who are not under the influence of the revision. Given the situation where the control group, while being homogeneous with the treatment group and not under the influence of the revision, is absent, alternative groups could serve to measure the effect of the treatment. In that respect, the comparison groups in this study can be considered appropriate to examine whether there was a significant change in health care utilization for schizophrenia after the revision as the comparison groups are under less or no influence of the law revision.

Both in terms of its duration, number and compulsory nature, psychiatric admission in Korea needs to be wholly revised. The revision of the Mental Health Act to the Mental Health and Welfare Act can be considered the first step to correct the situation. This study shows that the revision led to a significant decrease in psychiatric admission of the most relevant population, people with schizophrenia. However, the limited effect of revision on the Medical Aid beneficiaries suggests that the revision was not followed by the provision of the proper alternatives which can replace hospitalization of the most vulnerable population. While further efforts should be put into decreasing unnecessary admissions, more resources should be devoted to the care of the deinstitutionalized patients in the community, which should be a priority of the health policy in Korea.

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#### Competing interests

The author declares that she has no competing interests.

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