Incidence and characteristics of self-harm during the 3-year period of COVID-19-related social distancing in the Republic of Korea

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ABSTRACT

Background Suicide is a leading cause of mortality worldwide, and self-harm is a key risk factor. Continuous monitoring of self-harm trends facilitates effective prevention. During the coronavirus disease pandemic, social distancing significantly influenced self-harm incidence. This study aimed to compare self-harm rates and patient characteristics in 3-year prepandemic and pandemic periods (2017–2019 and 2020–2022, respectively).

Methods We retrospectively analysed and subdivided the data over 6 years into 3-month intervals, obtained from the Emergency Department (ED)-based Injury In-depth Surveillance database, South Korea, to examine changes in the incidence of self-harm in patients visiting the ED from the prepandemic to pandemic period and compared the characteristics of patients who attempted self-harm and risk factors for in-hospital mortality.

Results Among 802 032 patients (age: 18–64 years), we identified 45 535 patients with self-harm injuries (overall rate: 5.68%), which significantly increased during the pandemic (4.6% (21 852) in 2017–2019 to 7.2% (n=23 683) in 2020–2022). Age-group-stratified comparisons showed increased self-harm incidence across all age groups, especially among women younger than 30 years, during the pandemic period. The proportion of self-harm attributed to psychological problems increased markedly. However, the two periods showed no significant difference in the in-hospital mortality.

Discussion and conclusion The incidence of self-harm significantly increased and remained consistently higher in patients visiting EDs throughout the pandemic period than during the 3 years prepandemic, even after the relaxation of social distancing measures. Young women primarily drove this increase, and psychological problems constituted a major risk factor.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Social distancing due to the COVID-19 pandemic affected people's mental health and led to changes in the patterns of self-harm. Previous studies on this topic were based on data from the early stages of the pandemic.

WHAT THIS STUDY ADDS

⇒ In South Korea, the 3-year period of social distancing increased the proportion of self-harm patients visiting emergency departments with injuries compared with that in the prepandemic period. The increased self-harm incidence remained high throughout the 3-year period, even as social distancing measures were gradually lifted, with a significant rise observed mainly among women and individuals with psychological problems. However, in-hospital mortality did not change, and the risk factors affecting mortality showed no significant difference.

HOW MIGHT THIS STUDY AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The elevated self-harm incidence following social distancing measures during the pandemic remained high for 3 years, highlighting the need for targeted interventions and policies to reduce this incidence among vulnerable groups.

BACKGROUND

Suicide is a leading cause of morbidity and mortality worldwide, with 700 000 suicide-related deaths reported every year.[1] Among the Organisation for Economic Co-operation and Development countries, South Korea had approximately twice the average suicide rate (24.1 deaths per 100 000 people) and was the leading country for suicide-related deaths in 2020.[2] Among the risk factors for suicide, an episode of self-harm is the most effective predictor of eventual suicide.[3] Self-harm is defined as non-fatal intentional self-injury or self-poisoning, regardless of the apparent motivation or suicidal intent.[4] In the preventive health approach to suicide, surveillance to ascertain the epidemiology of self-harm is important because it is sensitive to changes in social, environmental and economic conditions,[5] which have markedly changed with the advent of COVID-19.

At the onset of the COVID-19 pandemic, the primary focus was to prevent disease spread by implementing social distancing. Over time, the impact of social distancing on mental health received increasing attention.[6 7] Suicide and self-harm during pandemics have been well-investigated in various countries, and reports from the 2020 data indicated that COVID-19-associated social distancing increased their incidence and emergency department (ED) visits.[8–10] Additionally, other studies have demonstrated the significant impact of social isolation and stress caused by social distancing on self-harm and suicide during this period.[11–13] However, the pandemic-associated social distancing measures persisted, with varying degrees of intensity, throughout 2021 in most countries. In South

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Korea, social distancing policies began in March 2020 and continued until April 2022. The regulation of mandatory mask usage when outdoors was rescinded only in January 2023. Therefore, to accurately assess the impact of COVID-19-associated social distancing on suicide and self-harm, it may be necessary to extend the study period.

Continuous monitoring of changes in the incidence and characteristics of self-harm is crucial for formulating policies and supporting preventive strategies for suicide and self-harm-related injuries. As the ED is often the first place where individuals with self-harm injuries seek help, the analysis of ED data is particularly valuable. Furthermore, the patterns and causes of self-harm vary by age group. Self-harm is more prevalent among children and adolescents,[14] while its incidence has recently increased among older adults.[15] These groups have been relatively well-researched, whereas self-harm in adults remains comparatively less studied.

Most prior studies on similar topics have primarily used data from only the first year of the pandemic. Therefore, this study aimed to investigate changes in the rate and characteristics of self-harm among adults during a 3-year (2020–2022) pandemic period compared with those during a 3-year (2017–2019) prepandemic baseline period.

METHODS

Study design and setting

This retrospective study used the ED-based Injury In-depth Surveillance (EDIIS) database, South Korea—a national prospective database of all patients with injuries admitted to 23 EDs in 13 out of 17 provinces in South Korea. The EDIIS database data were collected after institutional review board approval, and all patient personal information was anonymised. The database collects injury-related data to facilitate the development of national injury-prevention policies and is managed and financially supported by the Korea Disease Control and Prevention Agency. In South Korea, EDs are categorised into level 1, level 2 and level 3 by the Korean Ministry of Health and Welfare based on their resources and capacity, encompassing facilities, equipment and medical staff. As of 2020, there were 38 level 1 EDs (highest equipped), 129 level 2 EDs and 236 level 3 EDs in Korea.[16] All EDs participating in the EDIIS data collection were either level 1 or level 2.

Data source and collection

The EDIIS database comprises a wide range of data, including patient demographic information, injury-related details, prehospital emergency medical service records, clinical findings, diagnostic assessments, treatments administered in EDs, ED dispositions and postadmission patient outcomes. General physicians initially conduct primary surveillance and data collection, and most of this information is reviewed and corrected daily by emergency medicine physicians and trained research coordinators, who routinely input the surveillance data into an online system managed by the Korea Disease Control and Prevention Agency. ED personnel had completed mandatory training prior to their participation in the project. The project quality management committee reviewed the monthly data and provided regular feedback to ensure data quality. This study used EDIIS data from 1 January 2017 to 31 December 2022.

Participant selection

The main inclusion criterion was being an adult patient (age 18–65 years). The variable 'intention of injury' in the EDIIS registry comprises five categories: 'unintentional or accidental injury', 'self-harm or suicide injury', 'violent or homicidal injury', 'other uncategorised injury' and 'unknown injury', where 'uncategorised injury' refers to injuries that do not fall under any of the three aforementioned categories, and 'unknown injury' refers to injuries where the mechanism of injury could not be determined. As the 'intention of injury' variable is mandatorily checked for all patients, we could include all patients older than 18 years and younger than 65 years. The number of patients in each age group was tabulated.

Data analysis

We subdivided the 6-year period into 3 month intervals to examine changes in the incidence of self-harm injuries among all patients who presented to the ED. We conducted a comparative analysis of the characteristics of patients with self-harm injuries at a reference point (quarter 1, 2020) when the COVID-19 outbreak burgeoned into a pandemic and social distancing measures were implemented.

Self-harm characteristics included the following variables: demographic characteristics (eg, sex, age, insurance), prehospital information (ED visit time, ED visit method, injury location, history of suicidal attempts, self-harm method, preceding event) and clinical information (eg, mental status at ED presentation; ED disposition, including discharge to home, admission to the general ward or intensive care unit, death or others; postadmission result, such as normal discharge, discharge against medical advice, death or others; and in-hospital mortality). Insurance categories were divided into three types: general insurance, which is the standard health insurance that all citizens are required to have; Medicaid, which is for low-income individuals; and none, which includes injuries not covered by insurance. 'Preceding event' was defined as the most direct and significant cause of self-harm in each case. The total number of in-hospital mortalities included the number of deaths that occurred in EDs and those that occurred after hospitalisation.

The primary outcome was the comparison of characteristics and incidence of self-harm among injured patients according to the study period. Additional analyses were performed to determine whether there were any changes in risk factors for in-hospital mortality of self-harming patients from before to after the pandemic.

Statistical analysis

Continuous variables are expressed as the mean and SD with 95% CIs, and intergroup differences were evaluated using the Student's *t*-test or Mann–Whitney *U* test after testing for normality. Categorical variables are expressed as the frequency and proportion; Pearson's χ^2 analysis and Fisher's exact test were used for intergroup comparisons. P value <0.05 indicated statistical significance.

The incidence (95% CI) of self-harm in the 6 years from 2017 to 2022 was calculated for each quarter of every year. An interrupted time series analysis was conducted to evaluate changes in the quarterly trend. Forward stepwise regression analysis was performed, starting with an intercept-only model and sequentially adding predictors with p values <0.25 to assess risk factors for in-hospital mortality. This threshold was selected to retain potentially relevant variables for improved model accuracy. Adjusted ORs (95% CI) were calculated for the potential risk factors for in-hospital mortality. Risk factors were selected based on prior research and theoretical relevance. Regression analysis was conducted separately for each time period to capture

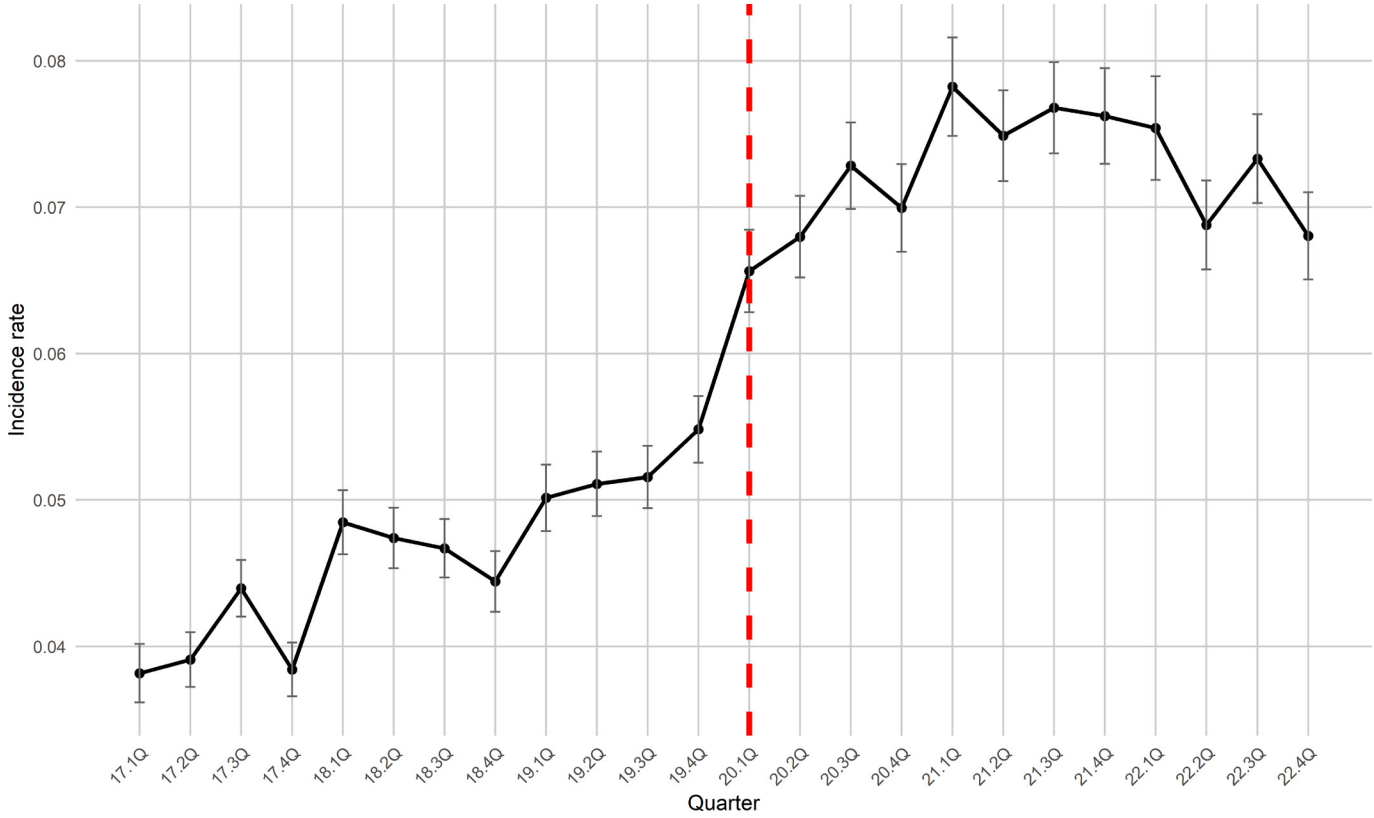

Figure 1 The incidence of self-harm among all injury patients who visited the emergency department.

temporal variations in risk factors. Statistical significance was defined with a two-sided p value<0.05. All statistical analyses were performed using R V.4.2.0 (2022-04-20; R Foundation, Vienna, Austria).

RESULTS

Incidence and trend of self-harm

A total of 8 02 032 patients with injury, aged 18–64 years, were registered in the EDIIS database during the 6-year study period, of whom 45 535 had experienced self-harm (overall incidence: 5.68%). When divided by the study subperiods, the self-harm incidence significantly increased during the pandemic (from 4.6% (n=21 852) in 2017–2019 to 7.2% (n=23 683) in 2020–2022), as shown by the per quarter increase since quarter 1, 2020 (figure 1). Age-group-stratified comparisons showed increased self-harm incidence during the pandemic period across all age groups, especially among individuals younger than 30 years (figure 2). In the interrupted time series analysis using the first quarter of 2020 as the intervention point, the quarterly incidence of self-harm showed a significant increasing trend prior to the intervention (β=0.00137, p<0.001), followed by a significant level increase (β=0.01705, p<0.001) and a subsequent shallow decreasing trend in the postintervention period (β = –0.00112, p=0.013) (table 1).

Comparison of characteristics associated with self-harm between the prepandemic and pandemic periods

Table 2 shows patients' demographic and prehospital characteristics between 2017–2019 and 2020–2022. During the social distancing period, the proportion of female patients significantly increased from 52.1% to 62.7%. The average age of patients decreased because of a significant increase in the proportion of patients aged up to 29 years. The proportion of self-harm incidents that occurred at home increased significantly. There was no significant difference in the time of ED visit or day of the week; however, the proportion of patients who used emergency medical services decreased.

Regarding self-harm methods, there was a significant increase in stab injuries, increasing from 23% to 27.1%. Additionally, the proportion of self-harm patients with a history of at least one prior suicidal attempt increased from 17.5% to 23.6%. Self-harm attributed to psychological problems increased markedly from 32.9% to 46.1%, and self-harm attributed to issues related to schools or jobs increased significantly.

There was no significant difference in the in-hospital mortality between the two periods. However, during the social distancing period of the pandemic, a higher proportion of patients were discharged, rather than hospitalised, after receiving ED care (table 3). Using forward stepwise regression to identify risk factors among the characteristics that contributed to in-hospital mortality, we found that, during both periods, older age; self-harm occurring at home; self-harm methods, such as falling, suffocation or drowning; and the absence of a history of suicidal attempts were consistently associated with a higher likelihood of in-hospital mortality (online supplemental table 1).

DISCUSSION AND CONCLUSION

This study used the EDIIS data of injured patients examined in EDs to compare self-harm patients during the 3 years of COVID-19-associated social distancing with those in the 3-year prepandemic period. Unlike most studies that focused on the pandemic's first year,[17 18] this study provides a comprehensive comparison over 3 years of social distancing measures with a 3-year period preceding the pandemic.

The number of self-harm patients increased during the study period, accompanied by changes in their demographic and

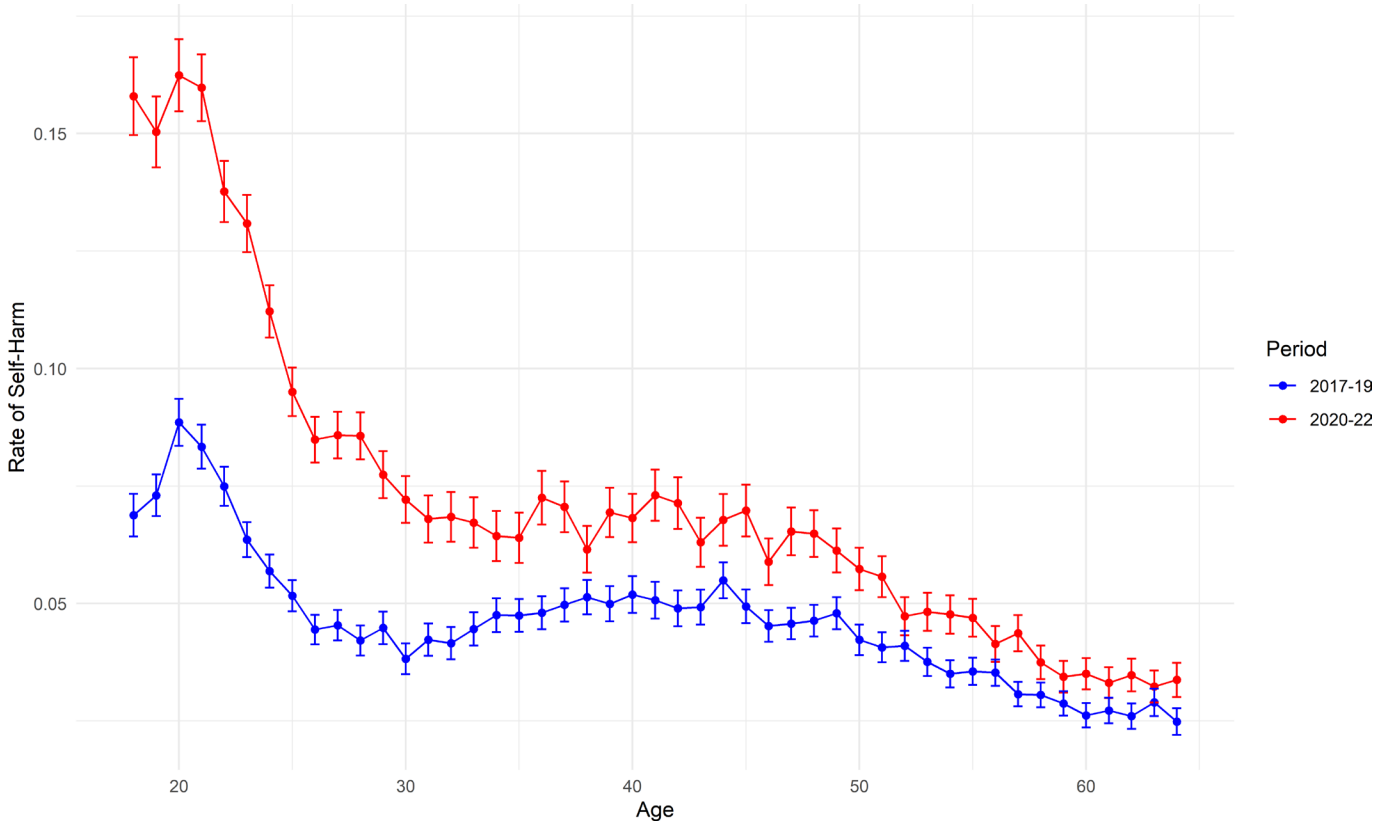

Figure 2 Comparison of self-harm incidence by age between 2017–19 and 2020–22.

prehospital characteristics. The incidence began to rise in the first quarter of 2020, coinciding with the introduction of COVID-19 social distancing measures, and peaked in the fourth quarter of 2020. A gradual decline trend was observed thereafter; however, the rate of decrease was modest, and the incidence remained elevated for a prolonged period despite the easing of social distancing policies. This suggests that the increase in self-harm incidence did not immediately revert following the relaxation of social distancing measures, indicating that the effects of such restrictions may persist and normalise gradually over an extended period.

Studies conducted globally[9 10] reported varying trends: a decrease in self-harm leading to ED visits in the UK and European countries[19–22] and an increase in the USA, South Korea and China during the first year of the pandemic.[8 23–25] In the UK and European countries, the decrease in self-harm incidence was primarily attributed to a reduction in hospital visits due to lockdowns, which led to an overall decline in the number of self-harm cases reported. However, these studies were limited by an insufficient number of cases.

Table 1 Results of the interrupted time series analysis

Variable	Coefficient (β)	SE	t-value	P value
Intercept	0.0373	0.0022	17.34	<0.001*
Time (before 2020 Q1)	0.00137	0.00029	4.68	<0.001*
Level change (2020 Q1)	0.01705	0.00287	5.94	<0.001*
Trend change (after 2020 Q1)	−0.00112	0.00041	−2.72	0.013*

Adjusted R^2 = 0.939, residual SE =0.00350 on 20 df, F-statistic=119.4, p<0.001.
*Statistical significance.
Q, quarter.

In contrast, in South Korea and China, the increase in self-harm incidence was attributed to lockdown-induced psychological stress, which resulted in anxiety and depression. However, these studies are limited by insufficient comparison periods. The present study, which examined the self-harm rate over 3 years, found that the self-harm rate remained high, regardless of the intensity of social distancing measures.

This increase was predominantly observed among women younger than 30 years and reflects a trend previously identified in other studies in South Korea.[8 26] Among prehospital characteristics, we found a significant increase in psychological problems as preceding events of self-harm in this study, suggesting that the lockdowns may have contributed to increased incidence of anxiety and depression, potentially affecting mental health.[27] Considering that young women may be more susceptible to psychological problems such as anxiety and depression,[15 28] the higher incidence observed in this subgroup in our study could be related to these factors. However, further research focusing specifically on this group is needed to draw more definitive conclusions.

The use of stabbing as a method of self-harm significantly increased during the pandemic compared with that during the prepandemic period, and this finding aligns with those of previous reports.[8 29] Furthermore, individuals with a history of self-harm were more likely to engage in self-harm during the pandemic than those without such a history. This finding aligns with the increase in psychological problems as a risk factor for self-harm. It suggests that the lack of adequate psychiatric support during the pandemic contributed to an increase in self-harm cases in this subgroup. The finding that psychiatric problems are a major factor in the increased incidence of self-harm is closely related to the consistently high self-harm rates observed over the 3 years,

Table 2 Prehospital characteristics of self-harm patients

	Overall, n=45 535	2017–2019, n=21 852	2020–2022, n=23 683	P value
Sex, male, n (%)	18 420 (40.5)	9598 (43.9)	8822 (37.3)	<0.001
Age, years, mean (SD)	37 (13.44)	38 (13.32)	35 (13.43)	<0.001
Insurance, n (%)				<0.001
General	37 338 (82.0)	17 541 (80.3)	19 797 (83.6)	
Medicaid	4266 (9.4)	2055 (9.4)	2211 (9.3)	
None	3801 (8.3)	2182 (10.0)	1619 (6.8)	
Other	130 (0.3)	74 (0.3)	56 (0.2)	
Age group (years), n (%)				<0.001
18–19	3003 (6.6)	1258 (5.8)	1745 (7.4)	
20–29	15 208 (33.4)	6312 (28.9)	8896 (37.6)	
30–39	8622 (18.9)	4419 (20.2)	4203 (17.7)	
40–49	8843 (19.4)	4712 (21.6)	4131 (17.4)	
50–59	7363 (16.2)	3925 (18.0)	3438 (14.5)	
60–64	2496 (5.5)	1226 (5.6)	1270 (5.4)	
Place, home, n (%)	37 722 (82.8)	17 619 (80.6)	20 103 (84.9)	<0.001
Visit time (hours)				0.453
00:00–08:00	400 (1.2)	198 (1.2)	202 (1.2)	
08:00–18:00	18 027 (53.6)	8746 (54.0)	9281 (53.4)	
18:00–24:00	15 177 (45.2)	7267 (44.8)	7910 (45.5)	
Visit date, weekend, n (%)	13 428 (29.5)	6418 (29.4)	7010 (29.6)	0.6
ED visit method, EMS (%)	33 769 (74.2)	16 130 (75.1)	17 369 (73.3)	<0.001
Self-harm method, n (%)				<0.001
Contusion	1505 (3.3)	901 (4.1)	604 (2.6)	
Drowning or suffocation	2937 (6.4)	1559 (7.1)	1378 (5.8)	
Fall	2367 (5.2)	1101 (5.0)	1266 (5.3)	
Other	498 (1.1)	267 (1.2)	231 (1.0)	
Poisoning	26 784 (58.8)	12 991 (59.4)	13 793 (58.2)	
Stabbing	11 444 (25.1)	5033 (23.0)	6411 (27.1)	
History of suicidal attempts, n (%)				<0.001
≥1	9423 (20.7)	3834 (17.5)	5589 (23.6)	
None	17 306 (38.0)	8294 (38.0)	9012 (38.1)	
Unknown	18 806 (41.3)	9724 (44.5)	9082 (38.3)	
Preceding event, n (%)				<0.001
Abuse	208 (0.5)	63 (0.4)	145 (0.6)	
Conflict with family or friend	9906 (26.0)	3725 (25.8)	6181 (26.1)	
Death of family or friend	441 (1.2)	143 (1.0)	298 (1.3)	
Economic problem	2001 (5.2)	820 (5.7)	1181 (5.0)	
Health problem	1514 (4.0)	671 (4.6)	843 (3.6)	
Psychological problem	15 672 (41.1)	4754 (32.9)	10 918 (46.1)	
School-related or job-related problem	1670 (4.4)	566 (3.9)	1104 (4.7)	
Unspecified	3010 (7.9)	1929 (13.4)	1081 (4.6)	
Unknown	3701 (9.7)	1770 (12.3)	1931 (8.2)	

ED, emergency department; EMS, emergency medical service.

even after the relaxation of social distancing measures. Issues such as depression and anxiety, which are classified as psychiatric problems, are difficult to resolve without proper intervention, even if causes, such as social distancing, are removed.[30] This can lead to repeated self-harm and ultimately result in a completed suicide attempt. Therefore, to address the increased number of self-harm patients, it is essential to focus on managing patients with psychiatric problems, whose numbers have grown in the period of social distancing during the pandemic.

There was no change in the in-hospital mortality rates between the pre-pandemic and pandemic-related social distancing periods. These findings are supported by the lack of changes in the risk factors of in-hospital mortality between the 3 years before the COVID-19 pandemic and the 3 years of social distancing during the pandemic (online supplemental table 1). According to data from Statistics Korea, the annual suicide rate in South Korea remained stable at approximately 26 deaths per 100 000 population during the study period,[31] which is consistent with our finding of no change in in-hospital mortality rates. Nevertheless, the national suicide rate remains among the highest globally, underscoring the need for close monitoring of the changing characteristics of self-harm identified in this study, particularly in relation to key risk factors. Another noteworthy finding is that individuals without a prior history of self-harm exhibited a higher in-hospital mortality rate compared with those with a documented history. Further

Table 3 In-hospital characteristics of self-harm patients

Characteristics	Overall, n=45 535	2017–2019, n=21 852	2020–2022, n=23 683	P value
Mental status, n (%)				<0.001
Alert	30 848 (67.7)	14 384 (65.8)	16 464 (69.5)	
Pain response	4274 (9.4)	2217 (10.1)	2057 (8.7)	
No response	2785 (6.1)	1462 (6.7)	1323 (5.6)	
Verbal response	7628 (16.8)	3789 (17.3)	3839 (16.2)	
ED result, n (%)				<0.001
Admission	14 067 (30.9)	7093 (32.5)	6974 (29.4)	
Discharge to home	26 807 (58.9)	12 236 (56.0)	14 571 (61.5)	
ED death	1749 (3.8)	899 (4.1)	850 (3.6)	
Other	2912 (6.4)	1624 (7.4)	1288 (5.4)	
Result after admission, n (%)				0.358
Death	401 (4.3)	113 (4.7)	288 (4.1)	
Discharge against medical advice	1510 (16.1)	387 (15.9)	1123 (16.1)	
Normal discharge	6389 (68.0)	1627 (67.0)	4762 (68.3)	
Other	1102 (11.7)	303 (12.5)	799 (11.5)	
Mortality, mean (SD)	0.047 (0.21)	0.046 (0.21)	0.048 (0.21)	0.382

ED, emergency department.

research is needed to explore the underlying mechanisms behind this observation.

Limitations

This study has several limitations. First, we retrospectively analysed patient surveillance data from participating hospitals, which confers a potential sampling bias. Furthermore, it is important to note that most of these hospitals are located in urban rather than rural areas. The generalisability of the findings may be limited due to the urban concentration of participating EDs. However, this bias is likely minimal because the participating hospitals were situated in 13 of the 17 provinces in South Korea. Second, the registry only included patients who visited the EDs, which could have resulted in selection bias because completed suicides and cases of self-harm that did not require emergency care were excluded. Third, this study did not account for various sociocultural factors which might influence self-harm and suicide. Fourth, this study did not account for broader sociocultural factors that may have influenced self-harm trends during the pandemic, which could potentially confound the observed association with social distancing measures. Finally, potential changes in the characteristics of hospital emergency rooms (ERs) between the two study periods were not considered in this study. Such changes could have influenced ER patient mortality and, consequently, the interpretation of our results.

In conclusion, the number of self-harm patients visiting EDs increased significantly and remained consistently higher throughout the 3-year pandemic-related social distancing period than that observed 3 years before the pandemic, even after the relaxation of social distancing measures. Young women primarily drove this increase in the incidence of self-harm, with psychological problems identified as a major risk factor for self-harm.

Contributors Conception and design of the investigation: KYJ carried out the analyses, wrote the original draft of the manuscript and is the guarantor for this work. Data acquisition: WCC. Data analysis and preparing tables and figures: WCC. Writing the paper: WCC. Revision and final approval of manuscript: all authors.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study was approved by the Institutional Review Board of Chung-Ang University Gwangmyeong Hospital (IRB number: CAUGH 2405-160-066), which waived the requirement for informed consent because of the retrospective study design. The study protocol satisfied the requirements specified in the Ministerial Decree of Health and Welfare issued by the National Bioethics Committee.

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Data availability statement Data are available upon reasonable request.

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