

BMJ Open Suicide attempts among Korean adolescents before, during and after the COVID-19 pandemic: a cross-sectional study

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ABSTRACT

Objectives This study aimed to examine the prevalence of suicide attempts among Korean adolescents before, during and after the COVID-19 pandemic and explore cross-sectional associations with demographic, psychological, behavioural and academic characteristics.

Design Cross-sectional analysis of three nationally representative survey waves.

Setting The Korean Youth Risk Behavior Survey (KYRBS), an annual school-based nationwide survey in South Korea.

Participants Adolescents with available data on key variables who participated in the 2017 (n=61 861), 2020 (n=54 809) and 2023 (n=52 802) KYRBS.

Primary and secondary outcome measures The primary outcome was a suicide attempt in the past 12 months. Secondary measures included age, sex, perceived socioeconomic status, sadness, perceived stress, alcohol use, tobacco use, lifetime drug use and subjective academic performance. These variables were measured using standardised single-item questions in the KYRBS, whereas associations were examined using multivariable logistic regression models adjusting for all covariates.

Results Several characteristics demonstrated consistent associations with suicide attempts. In 2017, suicide attempts were most strongly associated with sadness (OR 6.47, 95% CI 5.68 to 7.37), drug use (OR 5.60, 95% CI 4.34 to 7.24) and stress (OR 1.74, 95% CI 1.63 to 1.85). During the pandemic (2020), sadness (OR 6.35, 95% CI 5.39 to 7.48), drug use (OR 4.56, 95% CI 3.38 to 6.14) and stress (OR 2.10, 95% CI 1.94 to 2.28) preserved the strong association. In 2023, the associations persisted for sadness (OR 5.06, 95% CI 4.48 to 5.71), drug use (OR 5.31, 95% CI 4.42 to 6.39) and tobacco use (OR 2.53, 95% CI 2.15 to 2.98). Socioeconomic status showed no significant association in 2017 (OR 0.98, 95% CI 0.93 to 1.04) but demonstrated modest associations in 2020 (OR 0.91, 95% CI 0.85 to 0.97) and 2023 (OR 0.89, 95% CI 0.84 to 0.94). Subjective academic performance showed inverse associations in 2017 (OR 0.92, 95% CI 0.88 to 0.96) and 2020 (OR 0.92, 95% CI 0.87 to 0.97) but not in 2023 (OR 0.96, 95% CI 0.92 to 1.00).

Conclusions Across three survey years, suicide attempts among Korean adolescents co-occurred with multiple emotional, behavioural and contextual characteristics. The magnitude of these associations varied before, during and after the pandemic, suggesting that broader social and educational conditions may shape patterns of distress

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study analysed three waves of nationally representative data from the Korean Youth Risk Behavior Survey, enabling comparisons before, during and after the COVID-19 pandemic.
- ⇒ Multivariable logistic regression models were used to estimate covariate-adjusted associations between psychosocial, behavioural and academic characteristics and suicide attempts.
- ⇒ The large sample size (n=169 472 across three waves) provides the most precise estimates and national generalisability.
- ⇒ All variables were self-reported, possibly introducing recall bias, measurement error and social desirability bias.
- ⇒ The cross-sectional design precludes causal inference, while unmeasured contextual factors, such as family environment or school-level characteristics, were not available.

linked with suicidal behaviour. Integrated approaches addressing overlapping emotional, behavioural and socioeconomic challenges may support youth suicide prevention efforts.

INTRODUCTION

Suicide has recently become one of the leading causes of death worldwide.¹ According to the WHO, nearly 80% of global suicide deaths occur in low- and middle-income countries, with most suicides occurring before the age of 50 years.² Suicide attempts are more frequent among adolescents and more frequently cause death compared with other age groups.¹ According to the National Center for Health Statistics in the USA, suicide mortality in the population aged 10–24 years increased by 56% from 2007 to 2017.³ Furthermore, the Korean suicide rate is substantially high, ranking first among Organisation for Economic Co-Operation and Development (OECD) countries.⁴

Additionally, suicide is the leading cause of death in Korean teens and adolescents aged 20–39 years.⁵

Thus, adolescent suicide is emerging as a major public health concern. Suicide in adolescence is not just a personal tragedy but a serious issue affecting families and society.⁶ Youth suicide rates are high in many countries, including Korea, which is linked to various factors such as mental health issues, the education system and a lack of social support.⁷ Under these circumstances, the youth suicide problem is no longer a problem of an individual but of the whole society, requiring a solution.

The psychosocial characteristics associated with adolescent suicidal behaviour are diverse and often interrelated.⁸ Previous studies suggested several correlates between suicidal thoughts and behaviours, mental health issues (such as depressive and anxiety symptoms), academic stress, experiences of interpersonal conflict and social isolation (eg, lack of close friendships or bullying).^{9–11} Family-level challenges, including financial strain and limited social support, were also linked to higher distress and self-harm risk.¹² Rather than operating as discrete causal risk factors, these psychosocial and environmental characteristics frequently co-occur with suicidal behaviours and may reflect broader emotional, social and contextual vulnerabilities among adolescents.

Recently, many studies have suggested that psychosocial characteristics and suicidal behaviours may not operate within a simple one-directional cause-and-effect framework. Instead, those two conditions showed bidirectional associations. For example, several longitudinal studies indicated that earlier suicidal ideation could be followed by increased depressive symptoms, while depressive symptoms themselves are associated with later suicidal thoughts and behaviours.^{13–14} Beyond these reciprocal patterns, emerging evidence also suggests that depression, stress, substance use and suicidal behaviours may arise from shared underlying vulnerabilities (such as difficulties in emotion regulation or heightened sensitivity to stress) rather than representing separate causal mechanisms.^{15–17} From this perspective, suicidal behaviour and its psychosocial correlates may co-occur as interconnected manifestations of broader emotional and behavioural dysregulation, an important consideration when interpreting cross-sectional associations.

The coronavirus disease 2019 (COVID-19) pandemic substantially influenced the lives of many people worldwide. The related social isolation and economic hardship greatly affected the individuals' mental health, increasing depression and anxiety globally.^{18–21} COVID-19 increased the unemployment rates, reduced household incomes and caused economic hardship, particularly affecting the economically vulnerable populations.^{22–23} Furthermore, students experienced significant changes in the quality of education and learning environment due to the sudden transition to online learning.²⁴ As students could not continue their learning smoothly, the direct interaction with school decreased, accompanied by reduced motivation and concentration for learning.²⁵ Additionally,

adolescents also experienced extreme isolation and stress, which they might not have experienced before, due to school closure, social distancing and restrictions on outside activities, substantially increasing the rate of adolescent mental disorders, such as depression and anxiety disorders.^{26–27} These mental issues are closely related to suicide attempts, with several studies showing varying rates of suicide attempts among adolescents during COVID-19.²⁸

Accordingly, this study examined adolescent suicide attempts before, during and after the COVID-19 pandemic and explored associated demographic, psychological, substance use and academic characteristics, providing evidence that may aid future prevention, early identification and support strategies.

METHODS

Study participants

This study used web-based survey data from the Korean Youth Risk Behaviour Survey (KYRBS), which was conducted by the Korea Disease Control and Prevention Agency (KDCA), in 2017, 2020 and 2023.²⁹ The KYRBS is a government-approved annual survey established under the National Health Promotion Act in 2005 to monitor health risk behaviours among Korean adolescents. A total of 62 276, 54 948 and 52 880 adolescents participated in the survey in 2017, 2020 and 2023, respectively.

A targeted sample of 400 middle and 400 high schools across the country was selected, collecting data from one class of students in each school. During this anonymous online self-reported survey, students accessed the Integrated Survey Service site and completed the survey under the teachers' supervision at their school. The survey comprised 90 questions on 16 domains, including smoking, alcohol, physical activity, diet, obesity and weight control, mental health, impairment and safety awareness, oral health, personal hygiene and medications. These data are publicly available.

For the present analysis, we excluded respondents with missing information regarding age: 415 students in 2017, 139 students in 2020 and 78 students in 2023. Because the proportion of missing cases was extremely small (0.7%, 0.3% and 0.1%, respectively), a complete-case analysis was applied. The final analytic samples included 61 861 adolescents in 2017, 54 809 adolescents in 2020 and 52 802 adolescents in 2023.

Measurement tools

Suicide attempt was assessed with the question, "During the past 12 months, have you attempted suicide?" Respondents who reported no suicide attempt in the past 12 months were coded as 0, while those who reported at least one attempt were coded as 1.

Age and sex (male/female) were recorded as basic demographic variables. Sex was coded as 0 for male and 1 for female. Socioeconomic status (SES) was assessed using a single item: "What is the economic status of your

household?”, which captured the respondent’s perceived rather than objective economic standing. Responses ranged from 1 (high) to 5 (low) and were reverse-coded in the analysis, with higher values indicating higher perceived SES.

Sadness was assessed using the question, “During the past 12 months, have you felt so sad or hopeless for two consecutive weeks that you stopped doing some usual activities?” Responses were coded as 1 for yes and 0 for no. Perceived stress was measured by responses to the question: “How stressed do you feel on a typical day?” with 1 meaning extremely stressed, 2 denoting very stressed, 3 representing slightly stressed, 4 meaning not very stressed and 5 representing not stressed at all. This scale was reverse-coded: higher scores indicated higher stress.

Alcohol use in the past 30 days was assessed with the item, “In the past 30 days, on how many days did you have at least one drink?” Responses were coded as 1 for drinking on any day and 0 for never drinking. Tobacco use in the past 30 days was assessed with the question, “In the past 30 days, on how many days did you smoke even one cigarette (including regular cigarettes and e-cigarettes)?” Responses were coded as 1 for smoking on any day and 0 for never smoking.

Lifetime drug use was assessed with the question, “Have you ever intentionally or habitually taken drugs such as tranquillisers, stimulants, sleeping pills, appetite suppressants, or narcotic analgesics, or inhaled substances such as glue, marijuana, cocaine or butane gas for non-medical purposes? Medications prescribed by a physician for treatment purposes are excluded.” Responses were coded as 1 for yes and 0 for no.

Subjective academic performance was measured with the question, “In the last 12 months, how have you been doing academically?”, with response options ranging from 1 for high to 5 for low. For analysis, the scale was reverse-coded: higher values indicated better perceived academic performance.

All items included in the analysis were measured using conceptually equivalent questions across the 2017, 2020 and 2023 KYRBS surveys. Minor wording refinements occurred in the substance-use items (eg, expanded examples of drug types in 2023), but the underlying constructs and response formats remained consistent. For tobacco use, the 2017 survey asked about cigarette smoking without distinguishing electronic cigarettes, whereas the 2020 and 2023 surveys assessed both conventional and electronic cigarette use. In our analysis, any smoking in the past 30 days was coded uniformly as tobacco use (1) across all waves. All coding and recoding procedures (eg, reverse-coding of SES, stress and academic performance) were applied consistently across years to ensure comparability of results.

Statistical analysis

Participant characteristics for each survey year (2017, 2020 and 2023) were summarised separately for the total sample and adolescents with and without suicide attempts.

Continuous variables are presented as means and SD, whereas categorical variables are provided as frequencies and percentages. Missing data were minimal, and cases with missing age were excluded as described above.

For each survey year, a multivariable logistic regression model was estimated with suicide attempt (0=no, 1=yes) as the dependent variable. All covariates, such as demographic (age, sex and SES), psychological (sadness and perceived stress), substance use (alcohol, tobacco and drug use) and academic performance, were entered simultaneously to obtain associations adjusted for all covariates and address potential confounding.

Before model estimation, the dataset was screened for implausible or out-of-range values (eg, age or grade inconsistencies), identifying no such issues. Multicollinearity was evaluated using variance inflation factors (VIF), which ranged from 1.009 to 1.224, indicating no collinearity concerns. Logistic regression assumptions were examined and met. As a sensitivity analysis, continuous predictors (age, SES, perceived stress and academic performance) were recoded into categorical groups. The resulting estimates remained consistent with those from the primary models. All analyses accounted for the complex sampling design of the KYRBS and were conducted using the Complex Samples module in IBM SPSS Statistics, Version 26.0. Statistical significance was defined as two-sided $\alpha=0.05$.

Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting or dissemination of this study.

Ethics approval

This study used publicly available, de-identified secondary data from the Korean Youth Risk Behavior Survey (KYRBS). Hence, ethical approval was not required.

RESULTS

Participants' characteristics

Table 1 presents the sociodemographic, psychological, behavioural and academic characteristics of the participants. Across all survey years combined, the mean age was 15.05 ± 1.75 years, and 49.1% of the sample were female. The proportion of adolescents reporting a suicide attempt was 2.5% in 2017, 2.0% in 2020 and 3.2% in 2023. Adolescents with suicide attempts were usually younger and had a higher proportion of females compared with those without attempts. They reported lower perceived SES. Psychological characteristics differed markedly between groups: 77.2% of adolescents with suicide attempts reported sadness and had a higher mean stress level. Behavioural indicators also showed clear differences: alcohol use, tobacco use and lifetime drug use were all more common among adolescents with suicide attempts. Additionally, adolescents with suicide attempts reported lower subjective academic performance than those without attempts.

Table 1 Participants' sociodemographic, psychological, behavioural and academic characteristics

Variables	Total (n=169 472) M±SD, n (%)	No suicide attempt (n=165 128) M±SD, n (%)	Suicide attempt (n=4344) M±SD, n (%)
Year			
2017	61 861 (100%)	60 301 (97.5%)	1560 (2.5%)
2020	54 809 (100%)	53 704 (98.0%)	1105 (2.0%)
2023	52 802 (100%)	51 123 (96.8%)	1679 (3.2%)
Demographic factors			
Age (years)	15.05±1.75	15.06±1.75	14.90±1.75
Sex (female)	83 130 (49.1%)	80 396 (48.7%)	2734 (62.9%)
SES	3.36±0.90	3.36±0.89	3.17±1.07
Psychological factors			
Sadness (yes)	43 021 (25.4%)	39 666 (24.0%)	3355 (77.2%)
Stress	3.22±0.95	3.20±0.94	4.02±0.96
Substance use factors			
Alcohol use (past 30 days, yes)	21 041 (12.4%)	19 809 (12.0%)	1232 (28.4%)
Tobacco use (past 30 days, yes)	8952 (5.3%)	8160 (4.9%)	792 (18.2%)
Drug use (history, yes)	1738 (1.0%)	1337 (0.8%)	401 (9.2%)
Academic factors			
Subjective academic performance	3.09±1.17	3.09±1.17	2.79±1.26

M, mean; SD, standard deviation; SES, socioeconomic status.

Logistic regression results: pre-pandemic period (2017)

Table 2 presents the adjusted logistic regression results for the 2017 KYRBS sample (n=61 861). Reporting sadness was strongly associated with higher odds of a suicide attempt (OR 6.47, 95% CI 5.68 to 7.37, $p<0.001$). A history of drug use and tobacco use in the past 30 days showed a significant association (OR 5.60, 95% CI 4.34 to 7.24, $p<0.001$ for drug use; OR 1.95, 95% CI 1.64 to 2.32, $p<0.001$ for tobacco use). Higher perceived stress was positively associated with suicide attempts (OR 1.74, 95% CI 1.63 to 1.85, $p<0.001$), with alcohol use showing a similar pattern (OR 1.54, 95% CI 1.34 to 1.76, $p<0.001$). Female sex was associated with higher odds of a suicide attempt compared with males (OR 1.33, 95% CI 1.19 to 1.48, $p<0.001$), as well as the younger age (OR 0.84, 95% CI 0.82 to 0.87, $p<0.001$). In contrast, higher subjective academic performance was associated with lower odds of a suicide attempt (OR 0.92, 95% CI 0.88 to 0.96, $p<0.001$). SES was not significantly associated with suicide attempts (OR 0.98, 95% CI 0.93 to 1.04, $p=0.561$).

Logistic regression results: during the pandemic period (2020)

Table 3 presents the adjusted logistic regression results for the 2020 KYRBS sample (n=54 809). Reporting sadness was strongly associated with higher odds of a suicide attempt (OR 6.35, 95% CI 5.39 to 7.48, $p<0.001$). Higher perceived stress also showed a substantial association (OR 2.10, 95% CI 1.94 to 2.28, $p<0.001$). A history of drug use demonstrated one of the strongest associations (OR 4.56, 95% CI 3.38 to 6.14, $p<0.001$), followed by tobacco

use in the past 30 days (OR 2.29, 95% CI 1.87 to 2.80, $p<0.001$) and alcohol use (OR 1.76, 95% CI 1.48 to 2.08, $p<0.001$). Female sex was associated with higher odds of suicide attempts compared with males (OR 1.50, 95% CI 1.31 to 1.71, $p<0.001$). Similarly, younger age showed higher odds of suicide attempts (OR 0.88, 95% CI 0.84 to 0.91, $p<0.001$). Lower SES was modestly associated with increased odds of a suicide attempt (OR 0.91, 95% CI 0.85 to 0.97, $p=0.004$). In contrast, higher subjective academic performance was associated with lower odds of suicide attempts (OR 0.92, 95% CI 0.87 to 0.97, $p=0.002$).

Logistic regression results: post-pandemic period (2023)

Table 4 presents the adjusted logistic regression results for the 2023 KYRBS sample (n=52 802). Reporting sadness was strongly associated with higher odds of a suicide attempt (OR 5.06, 95% CI 4.48 to 5.71, $p<0.001$). A history of drug use also showed a significant association (OR 5.31, 95% CI 4.42 to 6.39, $p<0.001$), as well as tobacco use in the past 30 days (OR 2.53, 95% CI 2.15 to 2.98, $p<0.001$). Higher perceived stress was positively associated with suicide attempts (OR 1.61, 95% CI 1.51 to 1.71, $p<0.001$), and alcohol use showed a similar pattern (OR 1.74, 95% CI 1.51 to 2.01, $p<0.001$). Among demographic factors, female sex was associated with higher odds of a suicide attempt compared with males (OR 1.26, 95% CI 1.13 to 1.40, $p<0.001$), as well as younger age (OR 0.83, 95% CI 0.81 to 0.86, $p<0.001$). Lower SES was also associated with higher odds of suicide attempts (OR 0.89, 95% CI 0.84 to 0.94, $p<0.001$). Subjective academic

Table 2 Logistic regression results for suicide attempts in the 2017 KYRBS sample (n=61 861)

Independent variables	OR	95% CI	P value
Demographic factors			
Age (years)	0.842	0.816 to 0.870	<0.001
Sex (female)	1.325	1.185 to 1.481	<0.001
SES	0.983	0.929 to 1.041	0.561
Psychological factors			
Sadness (yes)	6.472	5.682 to 7.371	<0.001
Stress	1.736	1.629 to 1.851	<0.001
Substance use factors			
Alcohol use (past 30 days, yes)	1.538	1.342 to 1.762	<0.001
Tobacco use (past 30 days, yes)	1.952	1.640 to 2.324	<0.001
Drug use (history, yes)	5.602	4.337 to 7.237	<0.001
Academic factors			
Subjective academic performance	0.917	0.877 to 0.959	<0.001

OR, odds ratio; SES, socioeconomic status.

Table 3 Logistic regression results for suicide attempts in the 2020 KYRBS sample (n=54 809)

Independent variables	OR	95% CI	P value
Demographic factors			
Age (years)	0.876	0.844 to 0.909	<0.001
Sex (female)	1.495	1.308 to 1.709	<0.001
SES	0.905	0.846 to 0.969	0.004
Psychological factors			
Sadness (yes)	6.349	5.390 to 7.479	<0.001
Stress	2.102	1.939 to 2.278	<0.001
Substance use factors			
Alcohol use (past 30 days, yes)	1.756	1.483 to 2.080	<0.001
Tobacco use (past 30 days, yes)	2.288	1.869 to 2.801	<0.001
Drug use (history, yes)	4.555	3.378 to 6.143	<0.001
Academic factors			
Subjective academic performance	0.917	0.868 to 0.969	0.002

OR, odds ratio; SES, socioeconomic status.

Table 4 Logistic regression results for suicide attempts in the 2023 KYRBS sample (n=52 802)

Independent variables	OR	95% CI	P value
Demographic factors			
Age (years)	0.833	0.807 to 0.860	<0.001
Sex (female)	1.260	1.132 to 1.402	<0.001
SES	0.888	0.841 to 0.938	<0.001
Psychological factors			
Sadness (yes)	5.061	4.484 to 5.714	<0.001
Stress	1.606	1.509 to 1.711	<0.001
Substance use factors			
Alcohol use (past 30 days, yes)	1.738	1.506 to 2.006	<0.001
Tobacco use (past 30 days, yes)	2.531	2.147 to 2.983	<0.001
Drug use (history, yes)	5.312	4.415 to 6.393	<0.001
Academic factors			
Subjective academic performance	0.958	0.916 to 1.002	0.061

OR, odds ratio; SES, socioeconomic status.

performance was not significantly associated with suicide attempts in 2023 (OR 0.96, 95% CI 0.92 to 1.00, p=0.061).

DISCUSSION

Across three nationally representative surveys conducted before, during and after the COVID-19 pandemic, several psychosocial and behavioural characteristics were consistently associated with adolescent suicide attempts. Sadness showed the strongest associations in the three surveys, followed by stress, tobacco use, alcohol use and lifetime drug use. Subjective academic performance showed inverse associations in 2017 and 2020, although this pattern was less evident in 2023. Perceived SES demonstrated no association with suicide attempts before the pandemic but modest associations during and after the pandemic.

Therefore, multiple distress-related, behavioural and contextual characteristics co-occur with suicide attempts among Korean adolescents. Additionally, the association patterns vary across social contexts, including the pandemic period.

The strong associations observed for sadness and stress align with prior studies showing that emotional distress frequently co-occurs with suicidal thoughts and behaviours among adolescents.^{30 31} Several studies indicated reciprocal or bidirectional associations, rather than a single causal one, between sadness, stress and suicidal

behaviours.^{13 14 17} These characteristics may also reflect shared underlying vulnerabilities, including emotion dysregulation or heightened sensitivity to stress, which manifest concurrently across multiple psychological and behavioural domains.^{15 17} From this perspective, the present findings are consistent with a broader literature suggesting that adolescent suicide attempts often arise within a constellation of co-occurring emotional and behavioural difficulties.^{15 32 33}

Substance-use behaviours (alcohol, tobacco and particularly drug use) also showed strong associations with suicide attempts. These findings are consistent with previous work indicating that substance use and suicidal behaviours often co-occur within broader patterns of emotional distress and behavioural dysregulation.^{13 15 34 35} Although the overall prevalence of drug use among Korean adolescents remains relatively low,³⁶ the observed associations underscore the importance of continued monitoring of substance use as part of suicide prevention strategies. Thus, the emergence of tobacco use as a significant correlate in 2023 further suggests that evolving behavioural patterns among youth, particularly increasing e-cigarette use, should be integrated into future prevention efforts.

The association between subjective SES and suicide attempts was limited in 2017 but more apparent during and after the pandemic. This pattern may reflect how pandemic-related disruptions unevenly affected families.³⁷ Adolescents of low SES were more likely to experience financial strain, reduced access to educational resources and stress related to remote learning.^{38–40} Although the present cross-sectional data cannot determine the directionality, the stronger associations observed during and after the pandemic suggest that contextual or structural stressors experienced by socioeconomically disadvantaged families might have been more salient during this period.⁴¹

Subjective academic performance demonstrated inverse associations with suicide attempts before and during the pandemic. Adolescents' perceptions of their academic competence are closely linked to emotional well-being, self-efficacy and stress.^{42–44} However, substantial changes in instructional modes, evaluation policies and academic routines during the early pandemic might have altered how adolescents interpreted or reported their academic performance.^{45 46} These contextual shifts may help explain the weaker associations observed in 2023.

Although the cross-sectional design precludes causal inference, comparing associations across survey years offers insight into how correlates of suicide attempts may shift under different social conditions. For example, the relatively weaker association between sadness and suicide attempts in 2023 may reflect partial emotional recovery, as social activities resumed or increased attention to youth mental health after the pandemic.^{47 48} Likewise, the stronger associations with SES during and after COVID-19 may reflect heightened socioeconomic disparities

regarding stress exposure, educational access or access to support services during this period.^{49 50} Although these interpretations remain tentative, they illustrate how broader contextual factors, including public health disruptions, shifts in schooling and changes in family economic security, may shape the constellation of characteristics accompanying adolescent suicidal behaviours.⁵¹

From a policy perspective, our results highlight the need for comprehensive and sustained national strategies to prevent suicide among adolescents. Persistent associations with sadness, drug use and stress across multiple years underscore the importance of continuous emotional support programmes, routine mental health screening and early intervention systems for substance use within school and community settings. The strengthening association between SES and suicide attempts after the COVID-19 pandemic indicates that structural inequalities are becoming increasingly salient determinants of adolescent mental health. Therefore, policies aimed at reducing economic stressors and improving access to mental health services for socioeconomically disadvantaged students are essential. Additionally, the diminishing relevance of subjective academic performance points to the limited explanatory power of academic burden alone. Instead, broader psychological and contextual factors should be prioritised in prevention planning.

STRENGTHS AND LIMITATIONS

A major strength of this study is the use of three large, nationally representative samples spanning the before, during and after COVID pandemic periods. The consistent measurement structure of the KYRBS allows for comparisons across years.

Several limitations warrant careful interpretation. First, the study is based on cross-sectional data, precluding the determination of temporal ordering or causal relationships. The associations described may reflect bidirectional or shared underlying processes. Second, all variables, including suicide attempts, sadness, stress, substance use and academic performance, were measured using single-item self-report questions. These measures may not fully capture the complexity of the underlying constructs and are subject to recall and social desirability bias. Third, despite including many relevant indicators, the KYRBS lacks information on additional correlates such as family history of mental illness, exposure to violence or clinical diagnoses. Finally, future longitudinal studies are needed to clarify how emotional, behavioural and contextual factors evolve over time and how they relate to suicidal behaviours in adolescence.

CONCLUSION

Adolescent suicide attempts in Korea were consistently associated with emotional distress, substance use, subjective academic performance and key demographic factors across the three survey years. The magnitude and pattern

of these associations differed before, during and after the COVID-19 pandemic, reflecting shifts in the social and educational contexts in which adolescents live. These findings highlight the need for comprehensive and context-sensitive approaches to youth mental health support and suicide prevention efforts.

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Contributors SIK and JSK contributed equally and are joint first authors. SIK conducted the primary data analysis, led the literature review and drafted the initial manuscript. JSK contributed importantly to the analytical process and critically revised and refined the manuscript. SMK contributed to the study design, offered clinical insight and reviewed interpretations of psychological variables. DHH supervised the overall study and provided critical revision of the manuscript. DHH is the guarantor. All authors reviewed and approved the final manuscript.

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Data availability statement Data are available in a public, open access repository. The Korean Youth Risk Behavior Survey (KYRBS) data can be accessed at <https://www.kdca.go.kr/yhs>.

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