



Factors Related to Suicidal Ideation in Adolescents According to Types of Stress

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Abstract

Background: We aimed to identify the factors associated with suicidal ideation by classifying adolescents into three groups: no stress, interpersonal stress, as well as academic and career stress.

Method: Using the data from the 16th Korea Youth Risk Behavior Web-Based Survey (2020), 15,343 adolescents were included in the study, and their socio-demographic characteristics as well as physical and psychological factors were assessed. A complex sample logistic regression was performed to identify factors associated with suicide.

Results: The following factors were significantly associated with suicide: fatigue recovery by sleep, body mass index, physical activity, and depression in the no stress group; current school, academic grade, drinking, depression, loneliness, and anxiety in the interpersonal stress group; and gender, current school, academic grade, father's educational level, drinking, fatigue recovery by sleep, depression, loneliness, subjective health, smartphone overdependence, as well as anxiety in the academic and career stress group ($P < 0.05$).

Conclusion: To prevent suicide among adolescents, it is necessary to consider these factors when developing educational policies.

Keywords: Adolescents; Stress; Suicidal ideation; Regression

Introduction

Adolescence is generally divided into two stages: early adolescence (10–14 years) and late adolescence (15–19 years) (1). In Korea, late adolescence occurs during middle and high school. In the transition to adulthood, this period is more important than early adolescence in terms of maturity, development, and responsibility (2). Suicide is the leading cause of death among adolescents (3). In the United States, suicidal ideation

rate ranges from 19.8% to 24%, while actual suicide attempts lie in the range of 3.1% to 8.8% (4). Since 2017, the number of suicides among Korean adolescents aged 10 to 19 has steadily increased. Suicide rates per 100,000 adolescents were reported to be 4.7 in 2017, 5.8 in 2018, 5.9 in 2019, 6.5 in 2020, and 7.1 in 2021 (5). The first step toward suicide prevention is identifying the factors that influence suicidal ideation. Individual



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stressors are the most common cause of suicidal behavior in adolescents (6). Therefore, stress must be considered when developing an intervention strategy to prevent suicide.

During the COVID-19 pandemic, adolescents have been exposed to acute and chronic stress, worry about their families, and even the loss of family members, friends, and neighbors. Additionally, their school life patterns have changed drastically (6). Difficulties in interpersonal relationships, such as conflicts with colleagues or parents, are a major source of stress for adolescents (7). Furthermore, adolescents face academic stress, which refers to demands that are beyond their capacity to cope; failure to cope with such stress can cause serious psychological problems (8). Healthy adolescents who are exposed to high levels of stress are more likely to commit suicide (9).

Several factors that influence adolescent suicide have been identified. Previous studies that analyzed gender differences concluded that male adolescents are more likely than female adolescents to commit suicide (10). Previous suicide attempts are related to future suicide attempts and may eventually lead to suicide death (11). Furthermore, substance abuse, such as of alcohol and narcotics, was a risk factor for suicide (12), while emotional and cognitive factors, as well as stress, were risk factors (13).

Given that an individual's health behavior, as well as their cognitive and emotional states, can be risk factors for suicide, this study assessed factors such as alcohol use, smoking, sleep, body mass index (BMI), and physical activity in terms of health behaviors, as well as depression, subjective health, subjective physical appearance, and anxiety as cognitive and emotional factors. In addition, this study included economic difficulties caused by COVID-19. We aimed to identify the factors influencing suicide among adolescents by classifying the participants into three groups based on self-reported stress: no stress, interpersonal stress, and academic and career stress.

Methods

Research Design

In this cross-sectional study, secondary data was analyzed to identify factors associated with suicidal ideation among Korean adolescents based on the causes of stress.

Research Participants

The Korea Disease Control and Prevention Agency (KDCA) has conducted the annual Korea Youth Risk Behavior Web-based Survey (KYRBWS) to identify the health behaviors of Korean youth and to accordingly establish and evaluate government policies since 2005. The KYRBWS is a nationwide anonymous, self-reported online survey that is administered to students enrolled in 400 middle schools and 400 high schools and is a government-approved statistics survey (Statistics Korea, approval No. 117058). Data from this survey were used to assess the health of Korean youth and to develop policies. They are available for academic purposes and denote a representative sample of Korean youth.

This study employed a stratified colony sampling method to select 15,343 students from the total 54,948 students who participated in the 16th (2020) KYRBWS. Students who responded to the question "How much stress do you usually feel?" were included in this study. It was answered on a five-point scale: "I feel extremely stressed," "I feel very stressed," "I feel a little stressed," "I do not feel stressed much," and "I do not feel stressed at all." In total, 2,018 students responded, "I do not feel stressed at all." Of the 18,662 students who responded, "I feel very stressed" and "I feel a lot of stress," 4,050 reported interpersonal relationships (conflicts with parents, friends, seniors/juniors, or teachers) as the cause. Additionally, 9,275 students reported experiencing stress due to academic grades or career paths. The data collected did not include personal identifying information, such as names, addresses, social security numbers, or phone numbers and were downloaded according to the standards and guidelines of the KDCA.

Research Variables

The study variables were classified into socio-demographic characteristics as well as physical and psychological factors based on the items of the KYRBWS.

Socio-demographic characteristics. These included gender, current school (middle or high school), academic grade (upper, middle, or lower), economic level (upper, middle, or lower), economic difficulties due to COVID-19 (yes or no), living with family (yes or no), and educational level of their parents (\leq high school or \geq college).

Physical and psychological factors. Physical factors included smoking, drinking, fatigue recovery by sleep over the last seven days, BMI (14), and physical activity for more than 60 minutes per day for the last seven days.

Psychological factors included depression, suicidal ideation, loneliness, subjective health, subjective physical appearance, smartphone overdependence, and anxiety. Smartphone overdependence was measured by the National Information Society Agency (2017) (15), using the smartphone dependence scale that integrated the Internet (K-scale) and smartphone (S-scale) individual scales. It comprises 10 items rated on a four-point Likert scale, with a score ranging from 10 to 40 points. Adolescents who score 31 or more points are in the high-risk group, whereas those who score 23-30 points are in the potential risk group for smartphone addiction. This study determined smartphone overdependence at 23 points or higher. Furthermore, anxiety was assessed by the Generalized Anxiety Disorder-7 (GAD-7) developed by Spitzer et al. (16). The GAD-7 consists of seven items on a four-point Likert scale; it measures the frequency of anxiety symptoms over the past two weeks. The score ranges from 0 to 21, with higher scores indicating more severe anxiety.

Data Analysis

The data were analyzed using complex sample analysis as recommended by the Korea Centers for Disease Control and Prevention. The analysis

was conducted after assigning weights to the complex sample plan file generated by IBM SPSS 25.0 (IBM Corp., Armonk, NY, USA). The significance level was set at $p < 0.05$.

For complex samples, X^2 -tests and ANOVA (Analysis of Variance) were conducted to compare the weighted percentages or means of all variables across the three stress groups. Finally, a logistic regression analysis was conducted on variables that were significantly associated with suicidal ideation in the ANOVA.

Results

Socio-demographic Characteristics of Participants

As shown in Table 1, the composition of the stress groups differed in terms of gender, current school, academic grade, economic level, economic difficulties due to COVID-19, and father's educational level ($P < 0.05$).

The no stress group had a greater percentage of male students, while the interpersonal stress group had a greater percentage of female students. High school students reported more academic and career stress than those in middle school. Moreover, academic grades were highest in the no stress group and lowest in the interpersonal stress group. Average economic status was the highest in the no stress group and the interpersonal stress group reported the most economic difficulty due to COVID-19. Additionally, the average father's educational level was highest in the academic and career stress group.

Physical and Psychological Factors

As shown in Table 2, the stress groups differed in terms of smoking, drinking, fatigue recovery by sleep, BMI, physical activity, depression, suicidal ideation, loneliness, subjective health, subjective physical appearance, smartphone overdependence, and anxiety ($P < 0.05$). Smoking and drinking were most frequently observed in the interpersonal stress group, while the no stress group recovered from fatigue by sleeping well.

Table 1: Sociodemographic characteristics of the participants (N=15,343)

Characteristics		No stress	Interpersonal stress	Academic and career stress	$\chi^2(p)$
Gender	Male	1506(73.8)	1819(46.3)	3667(39.9)	765.72 (<.001)
	Female	512(26.2)	2231(53.8)	5608(60.1)	
Current school	Middle school	1151(53.7)	2341(54.7)	3370(33.1)	667.39 (<.001)
	High school	867(46.3)	1709(45.3)	5905(66.9)	
Academic grade	Upper	896(44.5)	1254(31.0)	3537(37.8)	156.57 (<.001)
	Middle	590(28.5)	1141(28.1)	2731(29.6)	
	Lower	532(27.0)	1655(40.8)	3007(32.5)	
Economic level	Upper	1092(54.9)	1388(35.6)	3522(38.8)	289.89 (<.001)
	Middle	787(38.7)	1914(46.5)	4449(47.8)	
	Lower	139(6.4)	748(17.9)	1304(13.3)	
Economic difficulties due to COVID-19	Yes	492(23.6)	1512(36.9)	3036(31.8)	107.27 (<.001)
	No	1526(76.4)	2538(63.1)	6239(68.2)	
Living with family	Yes	1912(95.2)	3824(95.8)	8767(95.7)	0.95 (.692)
	No	106(4.8)	226(4.2)	508(4.3)	
Father's educational level	≤High school	365(29.5)	750(30.2)	1664(26.6)	12.68 (.007)
	≥College	798(70.5)	1517(69.8)	4298(73.4)	
Mother's educational level	≤High school	385(31.1)	863(34.6)	2051(32.4)	5.27 (.115)
	≥College	809(68.9)	1493(65.4)	4113(67.6)	

BMI was the highest in the no stress group, followed by the academic and career stress group. Moreover, physical activity was reported as being high in the no-stress group. Depression was the highest in the interpersonal stress group, followed by the academic and career stress group. Suicidal ideation and loneliness were the highest in the interpersonal stress group, while the no stress group reported good subjective health. In terms of subjective physical appearance, the academic and career stress group had the highest responses for being overweight. Furthermore, smartphone overdependence was the highest in the interpersonal stress group; anxiety was the highest in the interpersonal stress group, followed by the academic and career stress group.

Factors Related to Suicidal Ideation among Adolescents

According to the X²-test, all variables except for living with family and mother's educational level, which did not demonstrate significant differences

between the groups, were used as independent variables, and suicidal ideation was used as the dependent variable in the logistic regression analysis.

As shown in Table 3, in the no stress group, fatigue recovery by sleep (much; OR = 0.072, 95% CI: 0.014–0.381), BMI (<18.5 kg/m²; OR = 0.094, 95% CI: 0.012–0.711), physical activity (≤3days/week; OR = 17.062, 95% CI: 1.305–223.150), and depression (no; OR = 0.245, 95% CI: 0.075–0.80) were significantly related to suicidal ideation (P < 0.05).

In the group with high interpersonal stress, current school (middle school; OR = 1.284, 95% CI: 1.005–1.641), academic grade (upper; OR = 1.398, 95% CI: 1.044–1.870), drinking (no; OR = 0.563, 95% CI: 0.431–0.735), depression (no; OR = 0.269, 95% CI: 0.206–0.353), loneliness (feeling less; OR = 0.452, 95% CI: 0.348–0.588), and anxiety (OR = 1.088, 95% CI: 1.060–1.117) were significantly related to suicidal ideation (P < 0.05).

Table 2: Physical and psychological characteristics of the participants (N=15,343)

<i>Characteristics</i>		<i>No stress</i>	<i>Interpersonal stress</i>	<i>Academic and career stress</i>	$\chi^2/F(p)$
Smoking	Yes	568(27.9)	1707(42.1)	3347(36.5)	171.07
	No	1450(72.1)	2343(57.9)	5928(63.5)	(<.001)
Drinking	Yes	181(9.0)	691(17.5)	879(9.5)	114.61
	No	1837(91.0)	3359(82.5)	8396(90.5)	(<.001)
Fatigue recovery by sleep	Much	1214(58.9)	823(20.1)	1494(15.9)	1461.57
	A little	804(41.1)	3227(79.9)	7781(84.1)	(<.001)
Body Mass Index (kg/m ²)	<18.5	380(20.2)	880(23.3)	1671(18.6)	40.78
	18.5-22.9	902(47.6)	1852(48.3)	4480(50.9)	(<.001)
	≥23	625(32.2)	1092(28.4)	2721(30.5)	
Physical activity (days/week)	≤3	1148(66.4)	2721(72.2)	6912(78.9)	146.75
	≥4	578(33.6)	1063(27.8)	1919(21.1)	(<.001)
Depression	Yes	114(5.8)	2160(53.4)	3888(42.2)	1509.01
	No	1904(94.2)	1890(46.6)	5387(57.8)	(<.001)
Suicidal ideation	Yes	46(2.3)	1276(31.4)	1834(20.0)	837.45
	No	1972(97.7)	2774(68.6)	7441(80.0)	(<.001)
Loneliness	Feeling less	1972(97.7)	2447(60.5)	6966(75.1)	1171.53
	Feeling much	46(2.3)	1603(39.5)	2309(24.9)	(<.001)
Subjective health	Good	1817(89.8)	2297(56.8)	5396(57.5)	892.20
	Normal	149(7.7)	1218(29.9)	2720(29.9)	(<.001)
	Bad	52(2.6)	535(13.3)	1159(12.6)	
Subjective physical appearance	Underweight	499(25.6)	1031(26.0)	2172(23.5)	112.18
	Normal	895(43.6)	1287(32.1)	3221(34.5)	(<.001)
	Overweight	624(30.9)	1732(41.9)	3882(42.0)	
Smartphone overdependence	Yes	176(8.8)	1482(36.6)	2997(32.7)	623.10
	No	1842(91.2)	2568(63.4)	6278(67.3)	(<.001)
Anxiety		7.60(.04)	14.15(.09)	13.68(.06)	3767.15 (<.001)

In the group with high academic and career stress, gender (male; OR = 0.763, 95% CI: 0.620–0.938), current school (middle school; OR = 1.451, 95% CI: 1.220–1.724), academic grade (middle; OR = 0.798, 95% CI: 0.645–0.987), father's educational level (≤ high school; OR = 0.810, 95% CI: 0.672–0.976), drinking (no; OR = 0.732, 95% CI: 0.610–0.978), fatigue recovery by sleep (much; OR = 0.679, 95% CI: 0.598–0.988),

depression (no; OR = 0.306, 95% CI: 0.526–0.365), loneliness (feeling less; OR = 0.566, 95% CI 0.477–0.671), subjective health (good: OR = 0.604, 95% CI 0.483–0.757; normal: OR = 0.679, 95% CI 0.526–0.878), smartphone dependence (no; OR = 0.835, 95% CI: 0.710–0.983), and anxiety (OR = 1.099, 95% CI: 1.080–1.119) were significantly related to suicidal ideation ($P < 0.05$).

Table 3: Factors related to suicidal ideation among the participants (N=15,343)

Characteristics		No stress		Interpersonal stress		Academic and career stress	
		OR	95% CI	OR	95% CI	OR	95% CI
Gender (female)	Male	0.293	0.059-1.452	0.863	0.654-1.139	0.763	0.620-0.938
Current school (high school)	Middle school	1.539	0.376-6.302	1.284	1.005-1.641	1.451	1.220-1.724
Academic grade (lower)	Upper	1.342	0.477-3.779	1.398	1.044-1.870	0.899	0.741-1.091
	Middle	0.630	0.120-3.321	0.983	0.726-1.332	0.798	0.645-0.987
Economic level (lower)	Upper	1.142	0.317-4.106	0.765	0.524-1.117	0.879	0.678-1.140
	Middle	0.702	0.137-3.609	0.866	0.610-1.231	0.801	0.630-1.019
Economic difficulties due to COVID-19 (yes)	No	0.90	0.692-5.215	1.095	0.843-1.422	1.128	0.946-1.344
Father's education (\geq college)	\leq High school	1.530	0.255-90178	0.845	0.652-1.095	0.810	0.672-0.976
Smoking (yes)	No	0.526	0.040-6.966	0.724	0.512-1.023	0.80	0.611-1.048
Drinking (yes)	No	1.530	0.255-9.178	0.563	0.431-0.735	0.732	0.610-0.978
Fatigue recovery by sleep (a little)	Much	0.072	0.014-0.381	0.976	0.70-1.360	0.679	0.598-0.988
Body Mass Index (\geq 23kg/m ²)	<18.5kg/m ²	0.09	0.012-0.711	0.795	0.467-1.352	0.812	0.584-1.128
	18.5–22.9kg/m ²	0.213	0.033-1.375	0.750	0.530-1.062	0.852	0.679-1.069
Physical activity (\geq 4days/week)	\leq 3days/week	17.062	1.305-223.150	1.131	0.865-1.480	0.917	0.754-1.115
Depression (yes)	No	0.245	0.075-0.80	0.269	0.206-0.353	0.306	0.526-0.365
Loneliness (feeling much)	Feeling less	0.360	0.0512-5.34	0.452	0.348-0.588	0.566	0.477-0.671
Subjective health (bad)	Good	0.550	0.083-3.650	0.927	0.656-1.310	0.604	0.483-0.757
	Normal	0.476	0.052-4.358	1.078	0.755-1.541	0.679	0.526-0.878
Subjective physical appearance (overweight)	Underweight	2.702	0.493-14.804	0.939	0.598-1.475	1.302	0.987-1.718
	Normal	1.093	0.268-4.453	0.862	0.614-1.212	0.949	0.676-1.175
Smartphone overdependence (yes)	No	1.529	0.404-5.783	1.237	0.973-1.572	0.835	0.710-0.983
Anxiety		1.134	0.963-1.335	1.088	1.060-1.117	1.099	1.080-1.119

Discussion

The rate of suicidal ideation due to stress was 31.4% in the interpersonal stress group and 20.2% in the academic and career stress group, which is much higher than the suicide rate among Korean adolescents in the 20th Youth Health Behavior Survey (10.9%) (17). This indicates that adolescents who experience stress are at a higher risk of committing suicide. The present findings are consistent with a study (18) that reported that suicidal impulses among adolescents are significantly related to stressors in the context of COVID-19. Therefore, it is necessary to identify the causes of stress among adolescents in more detail and detect suicidal thoughts early on to provide timely help.

Female students experienced higher levels of interpersonal, academic, and career stress than male students. An analysis of 538 adolescents in Canada found that females had significantly higher interpersonal stress than males (19), which is consistent with the present findings; however, there was no significant difference between males and females in terms of academic stress. Family relations improved for youth because of the COVID-19 pandemic and subsequent implementation of social distancing and remote classes, while school life and career/employment development deteriorated (17).

Furthermore, suicidal ideation among middle school students was 1.284 times higher for those experiencing interpersonal stress, and 1.451 times higher for those with academic and career stress

compared with high school students, which is consistent with a previous study (20). According to an international comparison of the quality of life among children and adolescents, Koreans reported a significantly lower quality of life than those in 28 out of the 30 OECD (Organization for Economic Cooperation and Development) countries (21). A previous study found high levels of stress in both academic and family relations (21), which may explain the increase in suicidal ideation among Korean adolescents. Middle school students are particularly challenged by unfamiliar environments and systems, consequently experiencing increased self-centered thinking, conflicts with others, reduced self-esteem, weakened learning motivation, and pressure due to career uncertainty (22). Students who are unable to cope with difficult situations may experience interpersonal or academic stress and develop suicidal ideation. Since problem-solving skills and social support can reduce suicidal impulses (6), middle school teachers and parents must provide support and offer programs to develop problem-solving skills through simulation learning to help students cope with challenges.

In the group with high academic and career stress, the father's educational background was associated with suicidal ideation, contrary to a prior report stating that there is no difference between parents' educational background and adolescents' suicidal thoughts (23). A study that examined parental pressure as a contributing factor for stress among adolescents reported that upper- and middle-level students face high achievement pressure from their fathers, while lower-level students receive high achievement pressure from their mothers (24). Moreover, there is evidence that adolescents' suicidal thoughts are lower when they talk to their parents or have more intimate and open relationships (25). Therefore, it is necessary to identify the characteristics of the parental-child relationship as well as develop family-centered suicide prevention programs.

In this study, adolescents who experienced stress tended to think more about suicide while drinking alcohol. This was consistent with previous studies (23, 26), which reported that alcohol con-

sumption led to increased suicidal thoughts among adolescents. Furthermore, the subjective sleep satisfaction rate was significantly lower in the academic and career stress group. In a study comparing the quality of life among children and adolescents in 30 OECD countries (21), adequate sleep time was crucial to improving subjective quality of life. Additionally, Korean middle and high school students have difficulty securing sleep time to recover from fatigue, since they combine private education, such as after-school self-study, academy, with regular classes. Therefore, families, schools, and communities should focus on students' mental health and assist them to ensure proper sleep time and improve the quality of their sleep.

Adolescents with depression who experienced academic and career stress or interpersonal stress revealed greater suicidal ideation. According to a network analysis of 5,888 high school students in the Netherlands, adolescents with depression exhibit feelings of loneliness, sadness, and self-deprecation regardless of suicidal tendencies. Suicidal thoughts and stress are most often influenced by depression (20, 27), and children with depression can benefit from guidance and support from parents and teachers who sympathize with them, regardless of their stress level.

In this study, adolescents who experienced stress and felt lonely displayed an increase in suicidal ideation. Difficulties in relationships, such as conflicts with parents and peers, are risk factors for suicidal thoughts (8, 28, 29), and support systems, such as social support (6, 29), can reduce the loneliness experienced by adolescents. Therefore, it is necessary to understand the nature of adolescents' relationships, to establish parent-child communication programs along with peer counseling programs and emotional support systems to provide appropriate support to these students.

Furthermore, we found that adolescents who experience academic and career stress have higher suicidal ideation than those who experience interpersonal stress. Peer conflicts, such as parental conflicts and bullying, decrease self-esteem by increasing instability (20, 30). Rather than taking

the stress of adolescent academic pressure and competition for granted, it is critical to implement stress relief and self-esteem improvement programs.

This study has a few limitations. As it was a cross-sectional study, the causal relationship between factors affecting suicidal ideation due to stress could not be established; therefore, further research is required. Additionally, the degree to which different stressors affected suicidal ideation was determined using standardized measures, but the level of stress was classified based on responses to a single question. Hence, future studies using reliable and valid tools to assess stress are required.

Conclusion

Stress experienced by adolescents had a significantly negative effect on suicidal ideation, and different factors influenced suicidal ideation depending on the type of stress experienced.

Adolescents with high interpersonal stress as well as academic and career stress reported approximately 10 times higher suicidal ideation than those with no stress. It is necessary to establish emotional support systems that can reduce interpersonal and academic stress from middle school. As COVID-19 pandemic measures can increase loneliness and/or anxiety among adolescents, efforts to reduce suicidal thoughts through remote counseling and programs that can reduce interpersonal, academic, and career stress are urgently needed. Moreover, families and communities must focus on the stress faced by adolescents, and a systematic long-term education policy should be developed focusing primarily on adolescents' mental health.

Journalism ethics considerations

Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely addressed by the authors, with none present.

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Conflict of interest

The authors declare that they have no conflict of interests.

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