



Research Article

Problems with complex college admissions policies and overloaded after-school private education on middle- and high-school students' mental health in South Korea

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Background

College admissions policies are complex and fast-changing in South Korea (hereinafter, Korea). The Korean Disease Control and Prevention Agency and the Ministry of Education have jointly conducted adolescent health behavior surveys every year since 2005. Mental health is included in the survey as an important category. We examined the effects of the current complicated college admissions process on the mental health and well-being of middle- and high-school students in Korea, to serve as a guide for future educational policy reforms.

Methods

We performed secondary statistical analyses on varied data collected between 2017-2021. The data are obtained from Korean Statistical Information Service, Korean Disease Control and Prevention Agency, Korean Ministry of Education, National Youth Policy Institute, and other related Korean government branches. We used the proportional allocation method, which took account of the size of the 17 cities and provinces in South Korea, as well as the population numbers in those regions. Our statistics are reliable owing to the robustness of the official source data and the large sample size.

Results

Notably, middle- and high-school students generally spend several hours in private classes (because public schools are insufficient to prepare for the college admissions process) and on their daily homework, leaving limited leisure time. Parents spend a significant portion of their household income on private education. Moreover, middle- and high-school students suffer greatly from severe mental health issues such as with suicide, depression, anxiety, and similar indicators. Middle- and high-school students are experiencing mental health problems that are not merely stress.

Conclusions

A secondary analysis of the collected data suggests that the complex college admission process and over-loaded mental health issues among Korean middle- and high-school students are quite serious. The results can further serve as a guide for policymakers to evaluate and plan youth health policies and health promotion projects for students in South Korea.

There are problems associated with the college admissions process in South Korea (hereinafter, Korea), which is considerably complex, changes frequently, and requires substantial preparation through private education. It is widely acknowledged that middle and high school students often experience mental health issues related to excessive academic stress.¹ Focusing on the complex college admissions policies and over-loaded after-school education, this study aimed to contribute to the literature to improve col-

lege admissions policies by enumerating the mental health issues experienced by Korean middle- and high-school students.

Similar to other East Asian countries represented by China and Japan, Koreans attach a high value to education.² This value has been emphasized recently because a degree from a good college is one of the few ways to rise in the social hierarchy.³ Thus, all citizens strive for acceptance into a good college, making Korea the machine of the exam re-

public. Koreans generally performed quite well in academic field. South Korean students consistently rank at the top of the Programme for International Student Assessment (PISA) in reading and science.⁴ However, high pressure and anxiety also arise due to the fierce competition in education. Korean policymakers have noted the gravity and sensitivity of the issue. Hence, they have been modifying college admissions policies to make the process more fair, equitable, and inclusive of public education.⁵ Ironically, such efforts have complicated the college admissions process.⁶ For example, students can pursue six different admission tracks, each requiring different application materials. Choosing one track long before the application season may be difficult for middle- and high-school students because they might not have identified their strengths and aptitudes from their academic records yet, or taken the College Scholastic Ability Test (CSAT), a national exam administered by the Ministry of Education only once at the end of high school. Thus, students tend to prepare for nearly all six tracks and pick one when the application season approaches. This results in a heavy workload that cannot be covered by the limited resources of public schools.

Additionally, to reduce private education's role in preparing students for the admissions process, the requirements for each track change often.⁷ However, these inconsistencies lead to additional preparation that necessitates private resources. Consequently, students inevitably and increasingly rely on private education.⁸

This paper describes how widespread private education in Korea is and how Korean students' mental health is compromised because of the educational demands of the school system. To improve understanding why the college admissions process makes students pursue extensive private education, we explain the current process first before evaluating the statistics of private education and mental health. We argue that an alternative and stable admissions requirement should be established to reduce students' workload and to facilitate the development of competent and healthy human resources for society.

WHY PRIVATE EDUCATION IS ESSENTIAL TO SECONDARY SCHOOL EDUCATION?

THE COMPLEXITY OF THE COLLEGE ADMISSIONS POLICIES IN KOREA

Private education is widespread in Korea because of the complex college admissions process for which public schools are not equipped with the resources needed to support students.⁹ Inadvertently, students rely on private education makes public education seem unreliable and insufficient. It is now a common notion that the Korean public education system has "collapsed".¹⁰

The complexity of college entrance procedures is illustrated by the 2022 process.¹¹ Generally, the admissions process is broadly divided into regular and occasional admissions. Regular admissions are grounded in the results of the CSAT. For this track, students must submit their CSAT scores, high school records, and in certain cases, college-administered examination scores. Additionally, Eng-

lish, and Korean history grades are considered. Alternatively, the college can select students based on their CSAT scores alone (i.e., CSAT standardized scores, percentiles, or letter grades [e.g., A, B, C, D]).¹¹

The occasional admissions process is further divided into five tracks, as shown in [Box 1](#).

Box 1. Source: Ministry of Education.

1. *Academic screening of student records*, including high school records and an interview.
2. *Comprehensive screening of student records*, which entails academic performance, extracurricular activities, awards, certifications, creative experiences, reading lists, and behavioral development in high school; the applicant's self-introductory essays, which must respond to three common questions designated by the Korean Council for College Education, and one question chosen by the prospective college; teacher's recommendation letters; and an interview.
3. *The essay writing track*, which is essay focused.
4. *The special admissions track*, including screening special abilities in art, music, physical talent, or high performance in language, mathematics, science, and software.
5. *Special admissions track*, including students from abroad, students of low socioeconomic status, those from rural areas, those with special needs, and vocational high school graduates.

The top-ranking universities frequently oversee this comprehensive admissions process involving records, which is organized by universities' admissions officers.

FREQUENT CHANGES IN EDUCATIONAL POLICY

Given the intense competition among students and the social importance placed on college admissions, the Korean government has been trying to create a fair and acceptable system to the public.¹² However, in trying to achieve these goals, frequent changes in admissions requirements have added confusion and increased students' workload.¹³ For example, since 2005, college admissions followed a "triangle system," consisting of CSAT scores, school (academic) records, and essay writing. Since students must work on all three requirements, the term "triangle of death" was coined. Due to the overwhelming pressure from the three requirements, CSAT was abolished by the next government.

The government then actively expanded the "admissions management system" to address the "triangle of death" problem and considered factors other than those it already encompassed. However, this only increased the burden by

incorporating other sectors, such as extracurricular activities, creative experiences, and club activities.¹⁴ Furthermore, to solve the problem of private education, the Educational Broadcasting System (EBS), the only public education broadcasting system in Korea, requested that the CSAT's weight in college admissions should be increased to more than 70% while advocating for an easy SAT.

In response, in 2014, the CSAT was divided into modules A and B, and students could select which module they wished to complete.⁶ Additionally, as a student evaluation method, policymakers decided to introduce the "achievement evaluation system" (i.e., an absolute evaluation in stages) and the "high school credit system." A plan was also made to replace the existing CSAT English test with the National Test of English Proficiency (NEAT) in 2015.⁶

However, after the new president took office in 2013, the "CSAT by level" was abolished in 2016, the "achievement evaluation system" was postponed, and the "high school credit system" was not mentioned again until the end of 2016.⁶ The NEAT's CSAT English replacement plan was also eliminated. The EBS section of the CSAT, as an easy CSAT, has been maintained, and the admissions management system has been expanded and renamed the Student Record Comprehensive Screening.

Korean history has been incorporated as a mandatory CSAT subject since 2017 as an "absolute evaluation" method.⁶ In addition, since 2018, English was also incorporated as an absolute evaluation subject. Each college is increasing the proportion of regular admissions to more than 70%, and CSAT-based admissions are gradually decreasing.

As the admissions system has constantly changed, there has been a lack of predictability on how students should prepare. Students are required to do massive amounts of work that cannot be completed without the help of private education. It is in this context, that we examine the extensive private classes Korean students take and evaluate it as association with a compromised mental health of middle- and high-school students.

METHODS

STUDY DESIGN AND DATA SOURCES

To assess the volume of private education and its severe impact on mental health problems among middle- and high-school students, we performed a secondary analysis based on official data collected regularly from various Korean government agencies. For the private health education system, we built our analysis on private education expenditure surveys administered to middle- and high-school students. The Korean Statistical Information Office and the Ministry of Education jointly carried out the surveys. We investigated participating students' weekly hours spent in private classes, participation rate, monthly household expenditure per participating student, and total household spending on private education. We obtained leisure time data from the Ministry of Gender Equality and Family, the Korean Statistical Information Office, and the National Youth Policy Institute for 2017-2021.¹⁵

To scrutinize mental health issues, we primarily gathered data from the 17th (2021) Survey of Juvenile Health Behavior, conducted jointly by the Korean Disease Control and Prevention Agency and the Ministry of Education every year since 2005 (see **Online Supplementary Document**).¹⁶ This nationwide survey is an anonymous, self-reported online questionnaire for middle- and high-school students, and mental health indicators are one of the important categories. We used the report published in 2021 because it contains data from 2005 through 2021.

TARGET POPULATION OF THE STUDY

The target population of the 17th (2021) Adolescent Health Behavior Survey was the students enrolled in middle and high schools as of April 2021. In the 2021 survey, 113 questions were investigated, and 109 indicators were calculated.

For the sampling of the middle schools and high schools that took the survey in each region, we used the proportional allocation method, which took account of the size of the 17 cities and provinces in South Korea, as well as the population numbers in those regions.

For the sample selection of middle schools and high schools, a stratified cluster extraction method was applied. The first extraction unit was school, and the second extraction unit was class. For the first extraction, a sample school was selected by the permanent random number extraction method for each layer. For the second extraction, one class was randomly extracted per grade from the selected sample school. All students in the selected class took the questionnaires, but the students who were absent for a long time or had literacy problems, were excluded from the current study.

Consequently, the 30,015 middle-school respondents and 24,833 high-school respondents represented 1,339,993 middle-school students nationwide, and 1,289,595 high-school students nationwide as of April 2021.

DATA SELECTION AND LIMITATION

The data for this study has been purified through the following steps. The first step of data purification involved removing logical errors. Logical errors were reviewed through cross-analysis of grades and survey questions. The second step of data purification was related to outlier values. Outlier values were omitted in height, weight, and body mass indexes considering the following standards: Age was considered as an outlier value when students were under 12 years or over 19 years old. The time of waking up during the weekdays was considered an outlier either before 4 a.m. or after 9 a.m. The time of going to bed during the weekdays was considered an outlier when it was in the range of 4 a.m. to 8 p.m. In addition, if the average time spent sitting was 24 hours a day, it was omitted.

In addition, individual non-responses were applied when the student did not participate in the survey. The items were marked as non-responses when some questions were not answered, although the student participated in the survey. Since this survey used an online survey system that did not proceed to the next question if the previous one had not

Table 1. Total Number and Samples of Middle Schools, High Schools, and Students (2021)

Region	Total Number of Schools and Students (2021)		Target Samples (2021)	
	Schools	Students	Schools	Students
Sum	5,642	2,629, 588	800	59, 426
Seoul	709	423, 454	116	8, 511
Busan	313	147, 752	49	3, 486
Daegu	220	124, 964	42	3, 125
Incheon	265	150, 661	46	3, 462
Gwangju	159	87, 079	31	2, 349
Daejeon	150	81, 289	30	2, 267
Ulsan	122	62, 748	26	1, 883
Sejong	47	24, 508	15	945
Gyeonggi	1, 132	717, 632	161	13, 213
Gangwon	280	75, 646	31	2, 120
Chungbuk	212	81, 834	30	2, 270
Chungnam	303	114, 931	34	2, 559
Jeonbuk	343	99, 172	36	2, 579
Jeonnam	401	92, 779	35	2, 322
Gyeibgbuk	453	127, 541	46	3, 055
Gyondnam	458	179, 525	54	3, 825
Jeju	75	38, 073	18	1, 455

been responded to, there would be a no non-response for items in the original survey data. However, there were still some non-responses for certain questions due to omitting logical errors and outliers. The non-response rate for items in 2021 was less than 2%. Since the data has been purified and there are few non-responses, the study has some limitations in consideration the comprehensiveness.

RESULTS

THE INTENSITY VOLUME OF PRIVATE EDUCATION

We summarized the outcomes of our analyses in four tables. [Table 1](#) is the total number and samples of middle schools, high schools, and students participated the Survey of Juvenile Health Behavior in 2021. [Table 2](#) shows the number of hours the students spent in private classes. [Table 3](#) depicts the spending incurred on private education at the household level. [Table 4](#) outlines the health behavior indicators related to studying, sleeping, and hours of physical activity. [Table 5](#) describes the major mental health issues among middle and high school students. Figures [1](#) and [2](#) present a breakdown of leisure time for Korean middle- and high-school students in 2021.

[Table 2](#) indicates that, overall, students from bigger cities (e.g., Seoul) spending more time in private classes than their counterparts from mid-sized and smaller cities or towns. On average, students spent 6.7 hours per week in private classes, while public high-school students in Seoul spent 10 hours a week. Moreover, the higher the monthly household income, the more hours students dedicate to studying. A noteworthy result is that public high school

students spent more hours taking private lessons than students in specialized high schools. One explanation for this finding is that students from specialized high schools have access to more resources that support college admissions preparation. Specialized high schools are generally private institutions which focus on certain subjects, such as foreign languages, science, or mathematics. The entrance exam for such high schools is extremely competitive, and because the attending students are “screened,” the schools customize education for their students (e.g., skipping basic mathematics or offering high-level science programs). The hours of attendance for these schools are longer than those at public schools, and they provide more assistance to students for college admissions.

[Table 3](#) shows a high proportion of middle- and high-school students had reported taking private classes. A larger percentage of middle-school students (12-15 years old) indicated that they engaged in private education more than high-school students. The proportion of students taking private classes at different educational levels has remained consistent over the years. Among high school students (15-18 years old), those who have attended public high schools tended to participate more in private education for the past five years. They also spent more hours in the private education system each week than students from specialized high schools. Notably, students in specialized high schools spent less time in private classes, signaling that public schools lacked the resources to prepare students for college, forcing them to pursue private education.

[Table 3](#) also provides information on Korean parents’ financial support for private education. Regarding middle-

Table 2. Average time (hours/week) spent in private classes among middle- and high-school students in Korea

Indicators		Overall average time	Middle schools	Specialized high schools	Public high schools
Residential area	All	6.7	7.0	6.3	7.1
	Big cities	7.4	7.7	7.2	8.2
	Seoul	8.3	8.4	8.8	10.0
	Metropolitan cities	6.9	7.2	6.1	6.9
	Non-metropolitan cities	6.3	6.6	5.7	6.4
	Middle/small cities	6.7	7.0	6.3	6.9
	Towns	5.3	5.5	4.1	4.8
Monthly household income (unit: KRW)	< 2000	2.9	2.9	2.5	3.3
	2000–3000	4.1	4.3	3.7	4.6
	3000–4000	5.4	5.6	5.2	6.1
	4000–5000	6.7	6.7	6.0	6.8
	5000–6000	7.2	7.3	6.6	7.2
	6000–7000	8.0	8.2	7.6	8.1
	7000–8000	8.4	8.9	7.8	8.3
	> 8000	9.1	9.6	8.6	9.1

and high-school students, the monthly cost of private classes ranged from 432,000 to 535,000 KRW (equivalent to approximately 400 USD to 500 USD) at the household level, depending on the year. In Korea, the average household's net adjusted disposable income per capita was 24,590 USD per year.¹⁷ According to these figures, each household allocated between 21.1% and 32.9% of their household spending on high-school students' private education, more spending than any other country in the world. This amount has not changed significantly over the years, implying that parents have consistently carried a heavy financial burden in supporting their children's private education.

[Table 4](#) outlines the statistics regarding health indicators related to private education (number of hours spent on sleeping, physical activities, and studying). We used data from the KCDC and the annual survey of juvenile health behavior (2017–2021) to illustrate that the data have remained consistent over the past years. The table suggests that the proportion of students who reported that they took part in physical activities instead of studying did not change drastically over the years; however, there was at least a 5% difference in engagement in physical activities between middle-school students in Grade 1, and high-school students in Grade 3.

As for the average number of hours slept during the week, all middle-school students in Grade 1 through high-school students in Grade 3, slept less than eight hours a day during the past five years. The amount of sleep has remained consistent over the years. In particular, the higher the grade, the lower the number of hours the students slept; the oldest students slept an average of 5.5 hours a day during the week. The results also revealed that as

grades increased, students' sleep satisfaction rate (i.e., whether the amount of sleep was perceived as sufficient to overcome fatigue) decreased.

Finally, almost half of the middle-school students (48.5%) spent 1–3 hours on leisure activities per weekday, whereas 13.5% and 8.6% dedicated five or more and less than an hour to leisure time per weekday, respectively. For high-school students, more than half (53.3%) spent 1–3 hours of leisure time per weekday. Compared with middle-school students, more high-school students (15.2%) reported spending less than one hour on leisure activities per weekday.

Students' academic performance was also related to the length of leisure time a student spent. For instance, 12.7% of the high-performing students spent less than an hour of leisure time on a weekday, higher than the 11.7% and 10.3% of the middle- and lower-grade students, respectively. Additionally, most students who spent more than five hours of weekday leisure time were low-performing students, with only 11.7% being high-performing students.

MENTAL HEALTH INDICATORS AMONG STUDENTS IN KOREA

[Table 5](#) presents results of mental health indicators for middle- and high-school students. The suicidal ideation rate ranged from 10% to 15%, which is astonishingly high. The patterns were not very different among middle and high school students. Compared with suicidal ideation and planning (2.9–5.2%), suicide attempts ranged from 1.9% to 3.9%.

Table 3. Private education engagement and costs

Year	School level	Private education engagement (%)	Monthly private education spending per participating student (unit: 10 USD)	Monthly private education spending rate per household (%)
2017	Middle schools	67.4	43.2	21.1
	Specialized high schools	55.9	51.0	24.9
	Public high schools	62.2	53.4	26.1
2018	Middle schools	69.6	44.8	21.9
	Specialized high schools	58.5	54.9	26.8
	Public high schools	65.2	57.6	28.1
2019	Middle schools	71.4	47.4	23.1
	Specialized high schools	61.0	59.9	29.2
	Public high schools	67.9	62.6	30.5
2020	Middle schools	67.3	50.8	24.8
	Specialized high schools	61.6	64.3	31.4
	Public high schools	68.5	66.7	32.5
2021	Middle schools	73.1	53.5	26.1
	Specialized high schools	64.6	64.9	31.7
	Public high schools	71.3	67.5	32.9

Severe general anxiety disorder (GAD-7) was a new category added to the survey in 2020. The data shows that 9–14.4% of middle- and high-school students experienced severe anxiety. Furthermore, depression rates were high across all grades, ranging from 19.9% to 30.6%. However, unlike those serious symptoms, we found that students' stress awareness rates in all grades remained below 50%. Feelings of loneliness were reported as being 11.8–17.4% among middle- and high-school students.

DISCUSSION

The findings of this study suggests that students in big cities spend more than seven hours a week on private education (Table 2). In Seoul, students received private classes for 8–10 hours a week. Along with the proportion of students who took private classes (55.9–73.1%), the number of hours for those who participated in private education was

likely to be about 1.3–2 times longer (Table 3), resulting in 10–20 hours spent per week. This is significantly longer, given that students are in school until late afternoon. Private classes also tend to give students considerable homework. Thus, the time spent taking private classes and completing homework becomes substantially longer for middle- and high-school students.

Furthermore, middle- and high-school students reported spending between 373.6 and 515 minutes (approximately between 6–9 hours) studying on weekends (Table 4). Half of them even reported having merely 1–3 hours of leisure time a day during the week. The students also did not get enough sleep. While the American Center for Disease Control and Prevention strongly recommends that adolescents between 13 and 19 years of age should sleep for 8–10 hours,¹⁸ from our findings no Korean middle- or high-school students follows this recommendation; additionally, high-school students slept less than six hours per day (Figures 1 and 2). Sleep deprivation has been shown to be associated with

Table 4. Middle and high school students sleeping hours, physical activity, and study time

Indicator	School grade	2017	2018	2019	2020	2021
High-intensity physical activity for > 3 days a week (%)	M1 ¹	47.4	47.3	41.7	33.1	36.1
	M2 ²	45.2	44.4	37.3	29.9	35.0
	M3 ³	44.0	43.4	36.0	29.6	34.0
	H1 ⁴	32.6	32.9	26.7	24.2	25.2
	H2 ⁵	31.5	32.7	27.5	25.1	26.1
	H3 ⁶	27.8	29.5	24.4	23.1	22.7
Physical activity for ≥ 60 minutes per day for > 5 days per week (%)	M1	16.6	17.3	18.9	16.9	17.7
	M2	16.2	16.8	17.1	15.5	16.8
	M3	17.5	16.4	16.5	15.7	16.6
	H1	11.8	11.2	12.8	11.6	11.4
	H2	11.7	12.0	12.5	12.9	13.1
	H3	10.5	11.2	11.4	11.7	11.7
Time spent studying on the weekends (minutes)	M1	373.6	343.4	377.1	370.3	416.6
	M2	395.9	385.1	412.4	384.4	435.4
	M3	394.7	390.5	425.7	377.7	442.8
	H1	500.9	479.8	511.9	447.0	502.7
	H2	499.0	485.0	515.0	443.7	498.8
	H3	519.1	505.3	543.7	474.2	461.8
Average time slept on a weekday (hours)	M1	7.4	7.5	7.5	7.3	7.1
	M2	7.0	7.0	7.0	6.8	6.7
	M3	6.7	6.6	6.6	6.5	6.3
	H1	5.8	5.8	5.7	5.7	5.7
	H2	5.7	5.7	5.6	5.6	5.6
	H3	5.5	5.4	5.5	5.5	5.6
Rate of sleep: The substantive satisfaction rate (%)	M1	40.4	38.3	34.3	41.1	32.4
	M2	32.5	30.1	26.0	34.7	27.0
	M3	28.9	25.3	22.4	30.6	22.3
	H1	17.8	16.2	15.2	25.1	16.9
	H2	18.2	16.5	15.9	26.1	17.4
	H3	17.7	15.8	16.1	23.7	20.4

¹M1: Middle school, grade 1.²M2: Middle school, grade 2.³M3: Middle school, grade 3.⁴H1: High school, grade 1.⁵H2: High school, grade 2.⁶H3: High school, grade 3.

obesity, high blood pressure, cerebral apoplexy, negative impacts on mental health, and even early death.¹⁹

Our results shows that the higher the household income, the more the households invested in private education. Furthermore, it indicates that the portion of households' spending on private education was 21.1–32.9%. The fact that many households spent nearly one-third of their incomes on private education implies that it could be a serious financial burden on families. However, is it possible that this is also more common among wealthy families?

Remarkably, our statistical analysis revealed that most middle- and high-school students were suffering from

mental illnesses. While the adults (18 years or older) rates of suicidal ideations, planning, and attempts were 1.3%, 0.5%, and 0.1% in 2021,²⁰ respectively, middle- and high-school students had corresponding rates of 10–15%, 2.9–5.2%, and 1.9–3.2%. The figure for students with severe GAD was 9–14%, significantly higher than the proportion of adults with GAD (mild and severe), which was 3.1%. The rate of students with depression was 19.9–30.6%, which is staggeringly high compared to adults (1.7%).²⁰ The high rates of mental ill health in students require immediate government attention and appropriate interventions.²¹

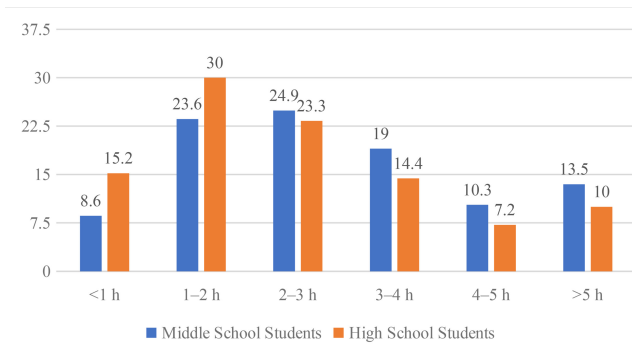


Figure 1. Middle and high school students’ weekly leisure time in Korea in 2021.

Source: National Youth Policy Institute: Child and Adolescent Human Rights Condition Survey.

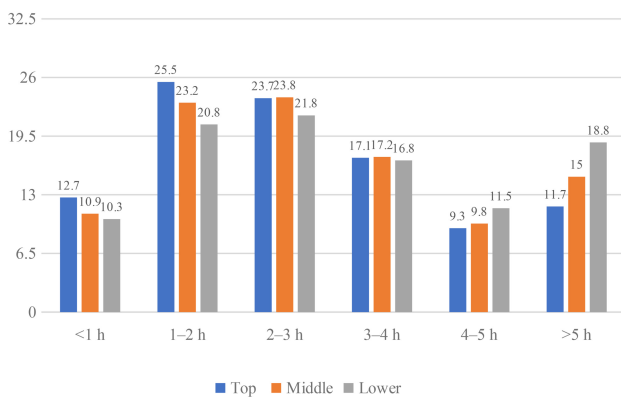


Figure 2. Students’ weekly leisure time in Korea in 2021 (as a function of academic performance). Students’ leisure time in a week is shown based on their academic performance.

Source: National Youth Policy Institute: Survey on the Human Rights of Children and Adolescents.

CONCLUSIONS

The Korean college admissions process is complex and fast-changing, making it very difficult for public schools to prepare their students accordingly. Coupled with Koreans’ fervor to be accepted into a premium college, to guarantee a better life, private education has become essential in helping students prepare for college admissions. Overall, many students undertake private education, with greater numbers in big cities and long hours of private classes. Moreover, families spend a substantial portion of their disposable income on private education.

Our review of mental health indicators revealed that many Korean students suffer from mental illnesses beyond mere stress. Compared with adults, the rates of suicidal ideation among students are nearly 10 times higher, than those for severe GAD are at least 3–5 times higher, and those for depression are 10–15 times higher. This highlights the need for Korean college admissions policymakers to reflect on the mental health implication of the current

college program requirements, students experience and revise their policies accordingly.

The Korean college admissions policymakers may have made efforts to create a policy promoting efficiency and fairness. However, our findings show that policymakers should revise the process and prioritize students’ mental health.

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DATA AVAILABILITY

All data used in this study are publicly available from Korean Statistical Information Service. <https://kosis.kr/eng/>.

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AUTHORSHIP CONTRIBUTIONS

Xu, JY: formal analysis and writing the original draft; Lee, SG: conceptualization, resources, writing, reviewing, and editing. Both authors read and approved the final manuscript.

DISCLOSURE OF INTEREST

The authors completed the ICMJE Disclosure of Interest Form and disclose no relevant interests.

ADDITIONAL MATERIAL

The 17th (2021) Survey of Health Behavior of Youth Output Indicators (109 Indicators) is included in the Online Supplementary Document.

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Table 5. Major mental health issues among middle and high school student

Indicator	Year	2017	2018	2019	2020	2021
	Samples	%	%	%	%	%
Suicidal ideation rate	M1 ¹	10.1	11.8	12.4	8.9	12.8
	M2 ²	14.3	14.6	14.0	10.9	13.7
	M3 ³	13.6	14.9	15.9	11.2	13.6
	H1 ⁴	10.6	12.4	12.2	10.4	11.8
	H2 ⁵	12.5	13.2	12.8	12.3	12.2
	H3 ⁶	11.7	13.0	11.6	11.8	12.1
Suicidal planning rate	M1	3.7	4.0	4.0	3.4	4.3
	M2	5.2	5.1	4.4	3.8	4.4
	M3	5.0	5.6	5.3	3.9	4.5
	H1	2.8	3.8	3.7	2.9	3.8
	H2	3.6	3.8	3.8	3.8	3.5
	H3	3.6	4.0	2.9	3.6	3.6
Rate of suicidal attempts	M1	2.5	3.4	3.3	2.0	2.5
	M2	3.4	3.7	3.6	1.9	2.5
	M3	3.1	3.8	3.9	2.1	2.1
	H1	1.9	2.7	2.6	1.7	2.0
	H2	2.4		2.4	2.3	1.9
	H3	2.3	2.6	2.1	2.1	2.2
Serious generalized anxiety disorder (GAD-7) rate	M1	--	--	--	9.0	10.8
	M2	--	--	--	10.4	11.9
	M3	--	--	--	11.1	13.0
	H1	--	--	--	10.6	12.1
	H2	--	--	--	12.2	11.9
	H3	--	--	--	14.2	14.4
Depression rate	M1	19.9	21.8	23.3	20.3	23.8
	M2	24.4	25.7	27.7	23.5	26.0
	M3	26.1	27.8	29.5	25.3	28.1
	H1	24.0	26.6	28.0	25.4	26.7
	H2	27.3	28.9	29.4	27.9	27.7
	H3	27.7	30.3	30.6	29.0	28.5
Stress awareness rate	M1	30.9	34.7	34.5	28.6	35.1
	M2	35.5	37.3	38.7	30.5	36.0
	M3	35.6	38.9	38.4	32.3	38.2
	H1	35.8	42.4	40.8	33.9	39.7
	H2	40.9	43.1	43.2	37.7	40.1
	H3	42.2	44.5	43.2	42.0	43.7
The rate of experiencing loneliness	M1	--	--	--	11.8	13.7
	M2	--	--	--	13.0	15.2
	M3	--	--	--	13.8	16.4
	H1	--	--	--	14.8	17.2
	H2	--	--	--	15.7	17.4
	H3	--	--	--	15.7	16.3

¹ M1: Middle school, grade 1.² M2: Middle school, grade 2.³ M3: Middle school, grade 3.

⁴ H1: High school, grade 1.

⁵ H2: High school, grade 2.

⁶ H3: High school, grade 3.



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