

A study of South Korean international school students: Impact of COVID-19 on anxiety and learning habits

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SUMMARY

The COVID-19 pandemic has impacted students worldwide on their social, mental, and physical health, as well as their academics. Many studies have shown how COVID-19 has affected different groups of students. The purpose of our research was to study the effect of COVID-19 on international high school students in South Korea. South Korea was lauded for its response to the COVID-19 outbreak, so we further investigated how the online school environment has affected this demographic in particular. We used a survey-based study to gather data on academics, mental, social, and physical health and well-being from 100 high school students attending numerous international schools in Korea. We split up our survey participants by gender and socioeconomic status and compared the averages of their answers using t-tests. Our study confirmed that female students study more than male students and feel they are doing better academically. Furthermore, more of the female students perceived COVID-19 to be dangerous compared to their male counterparts. Seventy-five percent of students also saw a change in their grades based on how their study habits had changed during online school. In addition, most students felt more depressed and anxious during the pandemic, feeling the "COVID blues." The findings from our study can be used to further improve school systems and student management, especially during a time of crisis in the future.

INTRODUCTION

In December 2019, in Wuhan, China, a new outbreak of pneumonia cases arose and gained attention from countries all around the world. After close investigation, Chinese scientists were able to identify the new coronavirus as SARS-CoV-2 for which COVID-19 is the associated disease (1). As of May 12, 2021, the virus has spread to 223 countries and has infected over 158 million people (2). With the rapid spread of the virus, public health measures such as social distancing, hand washing, testing, tracing, temperature checks, isolation, and travel restrictions have been put in place (3). More extreme public health measures have included wearing masks and lockdowns (4).

In many countries, schools closed down and moved to virtual educational platforms to prevent the spread of the virus among students during the COVID-19 pandemic, and this has affected over 171 million students (5). The closing of schools has impacted students in multiple different aspects.

In the United States, most teachers had never experienced teaching online and gaps in technology access have made it particularly hard for some students (6). Prior to closures, schools have provided many resources for students with mental health needs, which students could no longer access due to the closures. Schools also act as a coping mechanism for many students (7). Additionally, studies have predicted that school closures can lead to 0.3-0.9 year loss of quality learning (8).

In South Korea, education is highly valued in society. The heavy emphasis on academics is coined "education fever" and goes all the way back to Confucianism (9). The emphasis on the importance of education has allowed South Korea to grow rapidly in its economy (10). On the other hand, it has also led to an increase in the rate of depression and suicide among students (11). Many South Korean students attend *hagwons* (학원), commonly translated into English as private tutoring institutions, to reinforce their learning and vie to be the best (12). Unlike in the US, these *hagwons* play an important role among Korean students. Students attend *hagwons* for hours after school; some may even argue that *hagwons* are, for all intents and purposes, more important than school (13). Many students go to *hagwons* to learn ahead of their school curriculum and to get ahead of their peers. The extensive use of *hagwons* has led to a widening gap between the poor and the wealthy.

The CSAT, South Korean college entrance exam, puts a heavy burden on students because many believe that this is one of the most pivotal moments of their lives (14). At the beginning of the pandemic, the South Korean government provided classes through television broadcasting in lieu of in-person classes. Schools have now moved to a hybrid system with only a fraction of students going to school at a time based on a rotational system. With the closures of schools in South Korea, the academic gap between the wealthy and the poor has also increased (15). Studies done by Jaerim Lee, *et al.* have found that as some private tutoring institutions began to open up, those who could afford to go chose to go while those who could not stayed home (15). The lower class of South Korea has also had difficulty accessing technology for virtual learning. This leads to a short-term effect of a difference in academics and a long-term effect on socioeconomic status differences (15).

There are over 40 foreign and international schools that are providing education based on the American/European-based curriculum in South Korea, gaining popularity from Korean parents. Tuition to attend these schools can range between \$22,000 and \$36,000 (16). Especially with South Korea's growing wealth gap, most students attending international schools are from the top 10-20% of Koreans

with a mix of students from abroad. For reference, the top 10-20% of Korean households make a monthly income of KRW 7,624,619- 11,287,628 (USD 6,652.45-9,848.41) per household compared to the bottom 10-20% of Korean households which make a monthly income of KRW 856,685-1,790,924 (USD 747.45-1,562.57) (17). International schools, in addition to Korean schools, moved to a hybrid schedule. However, most of the students who attend the international schools are financially stable.

To provide a complete comparison, as of 2020, Korean high schools comprised an average of 701 students per school (18). South Korean high schools can be split into four categories: general high schools, special-purpose high schools, vocational high schools, and autonomous high schools. General high schools can be thought of similarly as typical American public schools that provide a wide range of education and preparation for higher education. Special-purpose high schools include STEM schools, art schools, and foreign language schools that put heavy emphasis on those specific areas of study. Vocational schools train students in a variety of specialties so that they can get jobs straight out of high school (19). In contrast, South Korean international high schools primarily focus on preparing students for admittance to competitive universities mostly located abroad.

As there is still not much data on the impacts of COVID-19 on international school students in South Korea, this study aims to identify the key impact on students and to analyze if attending an international school proves to be more beneficial for students during the pandemic over local Korean schools and US public schools.

RESULTS

Demographic Characteristics of Participants

The average age of the 100 participants was 17 years old (born 2002-2007). There were more female participants (71/100, 71%) than male participants (29/100, 29%). Approximately 59% of participants were juniors and seniors (Table 1). All the participants' socioeconomic status was perceived to be average or above average. While 23% of the participants' families were not financially burdened, 69% were mildly to highly burdened.

Academic Status of Participants

Among the effects of the COVID-19 pandemic, the attitude towards academics was most affected prior to and during the pandemic. To assess students' academic status, we asked them 28 questions. During the pandemic, 31% of students mentioned that they followed the academic integrity rules most of the time, 6% answered that they followed the rules some of the time, and 7% of students stated that they rarely followed the rules. This result implies that 44% of students broke to some degree academic integrity rules during the

Gender	Male (n=29)	Female (n=71)
Freshman	5 (17.2%)	15 (21.1%)
Sophomore	2 (6.9%)	17 (23.9%)
Junior	13 (44.8%)	25 (35.2%)
Senior	9 (31.0%)	14 (19.7%)

Table 1: Demographics of participants.

pandemic. Thirty-three percent of students stated that online school was more challenging than offline school. This may possibly suggest that more students chose to cheat during online school because they found online school harder and they had easier access to the internet. Another possibility is that these same students were breaking academic integrity rules even before the COVID-19 pandemic. We also found that students appear to be cheating similarly regardless of gender. Although there is a similarity among the number of students that cheat on assignments from both genders ($p = 0.57$), more females significantly felt that they are doing academically well ($p < 0.0001$) (Table 2). Through a linear regression test, we further found that those students who cheat when completing homework assignments also cheat when completing tests ($p = 0.004$, $R = 0.704$) (Figure 1).

Another change in academics during the COVID-19 pandemic is students' study habits. From our results, we cannot conclude whether all students' study habits got better or worse. Some students indicated that their study habits improved while others worsened compared to pre-COVID-19. However, we found that there is a direct correlation between changes in study habits and students' perceptions on how online school has affected their grades (Figure 2, $p < 0.001$, $R = 0.205$).

In general, those who thought that their study habits got better during the pandemic also stated that their grades

Academic Questionnaires	Male (n=29)		Female (n=71)		p-value
	Mean	SD	Mean	SD	
How many hours do you spend gaming?	3.742	2.194	2.26	1.459	0.0003***
How well do you think that you are doing academically? (Scale 1-5)	2.96	1.499	4.00	0.667	<0.0001****
On average, how many hours per day do you spend studying?	4.70	1.353	5.37	1.485	0.0047**
How anxious are/were you when preparing for CSAT/SAT/ACT? (Scale 1-5)	3.03	1.160	3.59	1.146	0.004**
On average, how many hours of sleep do you get on school days?	6.55	1.281	5.81	1.443	0.025*
How many hours do you spend on your cell phone?	3.96	1.400	5.80	2.112	<0.0001****
How many hours do you spend on watching TV/movies?	3.41	1.394	4.44	1.467	0.0026**
How often do you fight with your friends? (Scale 1-5)	1.88	0.892	1.59	0.496	0.05*
How often do you follow the rules regarding academic integrity when completing homework assignments? (Scale 1-5)	4.29	0.993	4.40	0.804	0.57
How often do you follow the rules regarding academic integrity when taking tests? (Scale 1-5)	4.44	0.934	4.52	0.766	0.67

Table 2: Comparison of the mean between males and females based on questions from the survey regarding academics. Statistically significant p-values: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ and **** $p \leq 0.0001$.

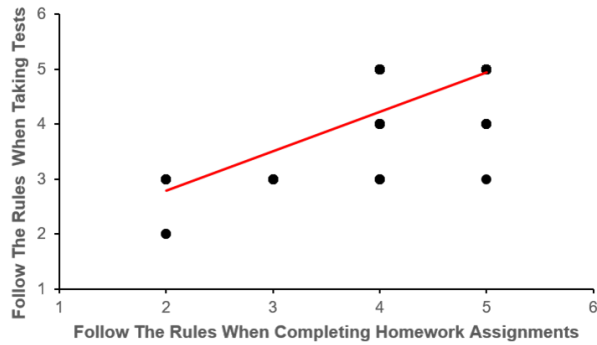


Figure 1: Correlation between academic integrity of those taking tests and academic integrity of those completing homework. Linear regression test was used to analyze the correlation between students who followed academic integrity rules when completing homework compared to those who followed academic integrity rules when taking tests. Students answered both of the questions using a scale from 1 through 5, 1 meaning "never following the academic integrity rules" and 5 meaning "always following the academic integrity rules." The red line represents the correlation between the two variables and the dots represent multiple individuals that selected the corresponding response, not just one individual. ($p = 0.004$, $R = 0.704$)

improved with online school. On the other hand, students who stated that their study habits got worse during the pandemic also stated that their grades were worse with online school.

We found that there was a correlation between how students thought COVID-19 affected their grades and whether they found online school easier or harder ($p = 0.004$). Those who found online school easier also found that their grades were better than before the COVID-19 pandemic. Furthermore, there exists a significant correlation between

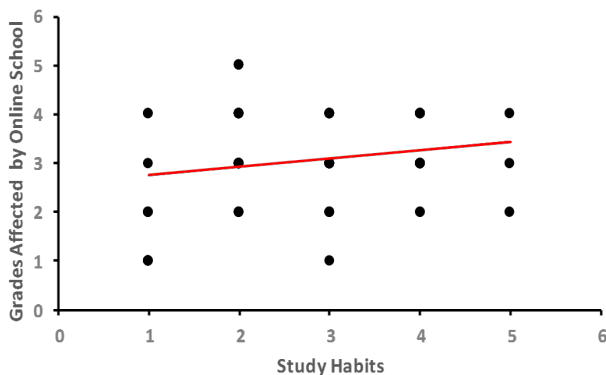


Figure 2: Correlation between change in study habits and how grades were affected by online school. Linear regression test was used to analyze the correlation between students' study habits and how much students' grades were affected by online school. Students answered the question about their study habits using a scale from 1 through 5, 1 meaning "a lot worse study habits" and 5 meaning "a lot better study habits." Students also answered how online school affected their grades using a scale from 1 through 5, 1 meaning "getting much lower grades than regular school" and 5 meaning "getting much higher grades than regular school." The red line represents the correlation between the two variables and the dots represent multiple individuals that selected the corresponding response, not just one individual. ($p < 0.001$, $R = 0.205$)

how well students managed their time and how COVID-19 affected their grades ($p = 0.02$). Those who managed their time better felt that their grades improved even with online schooling, while those who did not manage time well felt that their grades got worse. On the other hand, gender, socioeconomic status, and grade level did not have any significant impact on whether students found that their school grades improved or not ($p = 0.940$, $p = 0.591$ and $p = 0.818$, respectively).

Although all students who attended international schools are financially stable, most students perceived themselves as average regarding socioeconomic status. One of the main determinant factors of how students perceived their socioeconomic status was how financially burdened their family felt. Students who felt more financially burdened were more likely to associate themselves as average, while those who did not feel financially burdened associated themselves as being rich or very rich ($p = 0.003$) (Table 3). Socioeconomic status also does not appear to determine how much students go to *hagwons* and how anxious students feel about the future ($p = 0.108$ and $p = 0.550$, respectively) (Table 3).

Socioeconomic Status of Participants

A majority (91%) of the students noted that they were anxious, at least to a certain extent, about taking their college entrance exams, and 96% stated that they were anxious about their future (Figure 3A-B). The numbers show that these high school students deeply cared about their immediate and long-term future. Going to an international school and being more financially stable does not change the anxiety students feel about their futures. This anxiety can also correlate with how they felt during the COVID-19 pandemic. Fifty percent of students stated that they feel more depressed during the pandemic, and 54% stated that they feel more anxious during the pandemic (Figure 4A-B). Therefore, it can be seen

Financial Situations	Average (n=62)		Rich/Very Rich (n=38)		p-value
	Mean	SD	Mean	SD	
How financially burdened does your family feel? (Scale 1-6)	2.3	0.849	1.75	0.693	0.003**
How many hours per week on average do you go to <i>hagwon</i> and/or tutoring?	1.49	0.751	1.74	0.639	0.108
How anxious are/were you when preparing for the CSAT/SAT/ACT? (Scale 1-5)	3.31	1.048	3.59	1.241	0.289
How anxious are you about the future? (Scale 1-5)	3.87	1.263	3.74	0.848	0.55

Table 3: Comparison of the mean between different socioeconomic statuses based on questions from the survey regarding academics and social life. Statistically significant p-values: ** $p \leq 0.01$.

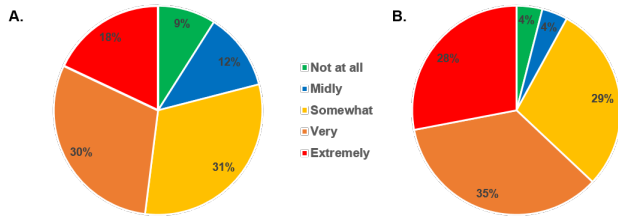


Figure 3: Feelings of anxiety about entrance exam preparation and the future. A) How anxious students felt/feel when preparing for college entrance exams. B) How anxious students feel about the future. Green: Not at all anxious, Blue: Mildly anxious, Yellow: Somewhat anxious, Orange: Very anxious, Red: Extremely anxious.

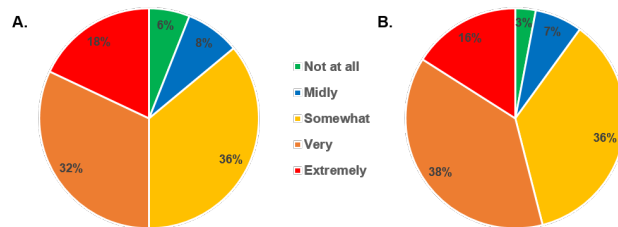


Figure 4: Changes in feelings of depression and anxiety during and after the pandemic. A) How depressed students feel during the pandemic compared to before. Green: Not at all depressed, Blue: Mildly depressed, Yellow: Somewhat depressed, Orange: Very depressed, Red: Extremely depressed B) How anxious students feel during the pandemic compared to before. Green: Not at all anxious, Blue: Mildly anxious, Yellow: Somewhat anxious, Orange: Very anxious, Red: Extremely anxious.

that the “COVID blues” has also been affecting high school students who are considerably wealthier. Additionally, grade level does not appear to affect anxiety level. While we did not get as many Freshmen and Sophomores to answer our survey, with the data we collected, we found that they were anxious about the CSAT/SAT/ACT and the future similarly to Juniors and Seniors. Seventy-two percent of Freshmen and Sophomores were anxious, somewhat to extremely, about taking the CSAT/SAT/ACT compared to 77% of Juniors and Seniors who were somewhat to extremely anxious about taking the CSAT/SAT/ACT. A factor that may have impacted the results is that 95% of the students’ fathers graduated university and/or graduate school, while 95% of the students’ mothers graduated university and/or graduate school. Most Korean international school students had parents who both attended higher education. Therefore, the expectation of having to pursue higher education can possibly explain why the students are anxious about their futures and worry about their academics to a significant extent.

Fear of Contracting COVID-19 and Impact of COVID-19 on Family Relations

Sixty-one percent of students surveyed stated that they were worried about contracting COVID-19, and 69% also recognized that COVID-19 is dangerous for young people. Sixty-five percent of students stated that they would get the COVID-19 vaccine once it becomes available. Despite this, 17% of students mentioned that their parents prioritize their academics before their health, sending them to *hagwons*

instead of keeping them at home. This goes to show how heavily academics are emphasized in South Korea.

During the COVID-19 pandemic, many students felt more depressed and anxious. To investigate what factors contributed to students’ depression and anxiety, linear regression and multivariable linear regression were used to analyze their answers to the survey. We found that how students felt before COVID-19, change in study habits, number of friends, number of fights with parents, difficulty of online school, transition from offline to online school, and the amount of learning together have high significance regards to how students feel during the pandemic. Individually, the correlation is weak, but through multivariable linear regression, we found that the correlation became much stronger, showing that all variables were predictive factors for how students have felt during COVID-19 (Table 4).

Furthermore, we found that the more friends students have, the less depressed and anxious they felt during the pandemic. We also found that students fought more often with their parents during online school compared to before the pandemic. Students who felt that online school was more challenging than offline school were more depressed and anxious and had a harder time transitioning from in-person school to online. Surprisingly, the percentage of schooling that was online and the fact that COVID-19 is infectious did not affect how depressed and anxious the students felt during the pandemic ($p = 0.320$ and $p = 0.528$, respectively).

DISCUSSION

Through this study, we were able to analyze the effects of COVID-19 on international high school students in South

Independent Variables	Coefficients	Standard Error
Which best describes you before COVID-19?	0.241	0.115
How do you compare your study habits now versus before COVID?	0.269	0.114
How many friends do you have?	0.172	0.111
How often do you fight with your parents?	-0.199	0.118
Do you feel that school is harder or easier with online school?	-0.227	0.108
How smooth was the transition moving from offline to online?	0.200	0.153
How much do you learn during online classes compared to offline?	0.018	0.128
Sample Size	100	100
R²	0.342	0.342

Dependent Variable: Which best describes you during COVID-19?

Table 4: Multivariable regression model of factors contributing to students’ depression and anxiety. The coefficients show how much the specific independent variable affects the dependent variable. The positive or negative sign indicates how much the dependent value should increase or decrease if that independent variable is increased by one, holding all the other independent variables constant. Dependent Variable: Which best describes you during COVID-19?

Korea. The data collected from our surveys were able to show that despite the difference in socioeconomic status and location, international high school students still endured an increase in depression and anxiety intensified by the COVID-19 pandemic. This is similar to the phenomenon seen in students in the US. A survey done in 2020 by *Active Minds* concluded that 20% of college students found that their mental health deteriorated during the COVID-19 pandemic, and 38% of all students (high school and college students) found work/school the most stressful of all stressors (22). Likewise, a survey run by ChildFund Korea found that 50% of local Korean students felt more depressed due to social restrictions imposed by the COVID-19 pandemic (23). Despite the well-off socioeconomic status of international high school students, they still seemed to experience a similar toll on their mental health as other local Korean and US students do. This is not what we hypothesized at the beginning of this study. Therefore, we may conclude the fact that schools closed for an extended period of time forcing students to transition to virtual learning caused depression and anxiety to increase among these students.

Even before the COVID-19 pandemic, South Korea was infamous for its high depression and suicide rates among the whole population. According to Statistics Korea, 27.1% of middle and high schoolers had depression in 2018 (24). In addition, in 2017, South Korea had the highest suicide rate in the world for 10 to 19-year-olds (25). For South Korean youth, most suicides are caused by stress related to academics (25). Most students spend over 16 hours a day at school and *hagwons* in order to get admitted into the most prestigious universities possible (Seoul National University, Korea University, and Yonsei University). For these students, getting into one of these universities means bringing prestige and honor not only to themselves but also to their family name (25). Because of the social and peer pressure to perform well academically, many students fall into depression and occasionally take their own lives. The pressure to do well and the closure of schools amidst the COVID-19 pandemic could possibly be attributable factors as to why there has been an increase in the level of anxiety and depression among students.

A survey done by the Seoul Education Research and Information Institute in South Korea on South Korean public school students during the COVID-19 pandemic showed other factors that may contribute to this increase in anxiety and depression. The study claimed that because of COVID-19, middle schoolers and high schoolers felt an increase in anxiety, stress, and loneliness (26). Students were less focused and active in participating. The study also mentions that the number one difficulty middle school and high school students felt during online school was self-management, taking care of themselves, and going on with normal daily life. The study does not mention a direct cause and effect. However, we speculate that the students felt more anxious and lonely because of their inability to go about their daily lives and manage themselves. This could possibly also be the case with international high school students. No matter what school the students attend, social isolation and online school seemed to affect their mental and emotional health. Staying at home for prolonged periods of time could also be a factor. From our results, we found that students fought more often with their parents during the pandemic. Our data

confirmed a previous study that showed that students fought more often with their parents during online school compared to pre-COVID-19 times, potentially because they were forced to stay physically in the same household as their parents for greater periods of time (15, 21).

Even with online school, cheating remains prevalent and may have even increased due to easier access to the internet. During the pandemic, 44% of students broke to some degree academic integrity rules. Surprisingly, this number is much lower than the United States' average percentage of cheating in high school, which is 64% for cheating on tests and 58% for plagiarism (20). We also found that there was a correlation between students who cheated on smaller assignments and students who cheated on bigger assessments. From this, we can speculate that students who start cheating on smaller assignments may continue to cheat on larger tasks. Further study is needed to know if this correlation is still the case when COVID-19 is no longer persistent. Study habits also changed among students during the pandemic. Our data does not show *how* study habits have changed, but we can see a clear correlation between overall changes and the COVID-19 pandemic. Online school proved to be different from regular in-person school in difficulty level for most individuals. The difference in difficulty level reveals how little schools are prepared to deal with major crises like the COVID-19 pandemic.

Additionally, we found that in general, females are more studious than males. This could be resulting from a change in mindset among South Koreans in society. Unlike a couple of centuries ago, in the past 20 years, females have been more widely accepted into higher education and higher-paying jobs, even graduating with more degrees than men (27). In particular, females have become more vocal in South Korea about gender equality, slowly breaking the glass ceiling (27). The stereotype that only males can receive higher education and obtain certain jobs is shifting towards giving females the opportunity to achieve the same. This may be the impetus behind why females appear to be investing more in their education, taking advantage of a progressive shift in societal norms.

Furthermore, we found that Freshmen and Sophomores were anxious about the CSAT/SAT/ACT and the future similarly to Juniors and Seniors. The similarity in the number of students anxious about the exams among grade levels shows that regardless of when they have to take it, students worry a significant amount about the exam. This may be a result of the strong emphasis on education in South Korea.

In the future, schools should implement a system to help maintain academic rigor - both offline and online - while ensuring students get the social interactions they need. There are a couple of methods by which schools can accomplish this. One method could be teaching in smaller study groups of 4-5 students. Small-group settings can prevent the spread of COVID-19 while motivating students with challenging tasks and allowing social interactions among peers. Another method is shifting the curriculum during online school so that instead of testing students' knowledge through exams, students can be tested through individual and group projects. Projects will make it more difficult for students to cheat, and group projects can provide time for students to check in with each other.

One of the strengths of our study was that we explored

multiple aspects of students' lives to better understand how the pandemic affected students. Most of the questions required subjective answers. However, we believe it was necessary to evaluate how students' viewed themselves. On the other hand, our study was limited by its sample size and demographic. In addition, as our survey was voluntary, we were not able to get as many male and underclassmen responses. Students who felt more financially burdened may have also been less willing to answer our survey because of the number of questions that were asked about their background. While our study did aim to specifically analyze international high school students in South Korea, the highly specific demographic group prevented us from finding a more general pattern among high school students. In addition, because our study was through a convenience sample, we were only able to gather 100 survey responses. To find a better general trend, a bigger sample size would be needed.

To conclude, our study revealed that the COVID-19 pandemic and online school has caused an increase in depression and anxiety among international high school students in South Korea. Regardless of socioeconomic class, students seemed to experience a similar impact on their mental health compared to students in the US and public school students in South Korea. Additionally, grade level did not impact how anxious and depressed students were. This is important to keep in mind for the future. It may be critical to create stronger welfare programs within school and outside of school to ensure the mental health of the youth. It seems crucial to have open access to these programs even during times of social isolation when everything else may be closed. Furthermore, creating online mental health support programs may help students cope with the consequences of social isolation. It is important to note that everyone is vulnerable to the side effects of this pandemic, and more initiative needs to be taken by the government and the education board to ensure that everyone across all socioeconomic spheres receives the mental support they need.

MATERIALS AND METHODS

Study Design

An 85 question survey was designed to investigate five different aspects of students' well-being. The first section (13 questions) looked at students' basic information, including their birth year, religion, father's and mother's education, and socioeconomic status. The second section (28 questions) focused on the students' academics. The answers were mainly on a scale from 1 through 5 to assess the students' subjective outlook on their academic status. The third section (9 questions) looked outside of academics, focusing on how students spent their time after school. The fourth section (19 questions) asked questions about the social, mental, and physical health of the students. The last section (16 questions) asked questions specifically on COVID-19, including how worried they were and whether they had contracted it or not. The survey was created through Google Forms, and the questions were designed after discussions with multiple people. The surveys collected were then distributed to several international high schools for volunteers to anonymously complete them. At the end, a total of 100 surveys were received.

Statistical Analyses

The data from the surveys were analyzed using t-test, single factor ANOVA, and linear regression through XL Miner and SPSS. $P < 0.05$ was set as the statistical significance level. Linear regression was used to predict a relationship between one or more variables and a single output. A multivariable linear regression test was used to analyze the correlation between multiple independent variables on a single dependent variable. The independent variables used were the following: (1) Which best describes you before COVID-19? (2) How do you compare your study habits now versus before COVID-19? (3) How many friends do you have? (4) How often do you fight with your parents? (5) Do you feel that school is harder or easier with online school? (6) How smooth was the transition moving from offline to online? and (7) How much do you learn during online classes compared to offline?

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