

## Factors associated with Anxiety and Depression among University Students during the COVID-19 Pandemic in Korea

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### Abstract

**Backgrounds:** As the COVID-19 pandemic continues, the university students population is one of the high risk and vulnerable groups. This study analyzed the status of student's mental health, including anxiety and depression caused by COVID-19, and its related factors among a university students in Korea.

**Methods :** Our study subjects included university students in Korea. The survey items included general characteristics, teaching methods, physical activity, eating habits (SDBQ-L), weight-related questions, general anxiety disorder-7(GAD-7), and depression symptoms checklist. Frequency analysis, chi-square test, and logistic regression analysis were performed and data was analyzed using R version 4.1.2 program.

**Results :** The prevalence of anxiety complaints was 5.5%, while the prevalence of depression complaints was 30.8%. In the multivariable logistic regression analysis of factors influencing anxiety, anxiety occurred 19.081 times (95% confidence interval (CI): 2.352-154.807) in the group with unhealthy diet ( $p < 0.01$ ). While in the multivariable analysis to identify factors affecting depression, women were 2.607 times significantly higher (95% CI: 1.255-5.415) than men, 0.407 times (95% CI: 0.197-0.840) for residents of the metropolitan area, 3.418 times higher (95% CI: 1.633-7.198) for unhealthy dietary people, and 2.225 times higher (95% CI: 1.080-4.582) for weight gainers ( $p < 0.05$ ). The type of class had no effect.

**Conclusions:** COVID-19 and its associated interventions had negative effects on the mental health status including anxiety and depression in university students in Korea. Based on our results we recommend developing mental health interventions and prevention strategies for students in all universities in Korea.

**Keywords:** COVID-19, Anxiety, Depression, University Students, Korea

## 1. INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared COVID-19 as a global pandemic. Since then, COVID-19 has become a problem with not only huge public health and health care impacts in

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Korea but also to all countries around the world. In addition, it has had huge impacts on other aspects of life such as economy, society and culture. The Republic of Korea declared its first COVID-19 case in January 2020. Since then, the number of infected individuals have increased rapidly in Korea. As a result, not only has the physical health of numerous individuals been threatened, but also individual mental health sometimes referred to as 'corona depression'. Recently there has been increased concerns and interest in the mental health status such as depression and anxiety among students in higher education. In a study of students attending public universities in the United States, 91% of students were psychologically negatively affected during the coronavirus pandemic, of which 89% complained of difficulty concentrating, and 86% of students reported having difficulty falling asleep [1].

The COVID-19 pandemic has brought about changes in teaching methods from the tradition face to face to non-face-to-face classes through online lectures as part of the social distancing interventions [2]. Therefore, this study investigated the difference in mental health effects on college students who take non-face-to-face classes and those who continue to take face-to-face classes.

The government recommended refraining from unnecessary going out and suspending the operations of facilities with a high risk of infection, such as religious facilities, indoor sports facilities, and entertainment facilities. Accordingly, the National Health Promotion Institute of the Graduate School of Public Health at Yonsei University conducted a survey of 1,500 adults (768 men, 732 women) between the ages of 20 and 65 from September to October 2020. Results of this study showed that there was a decrease in physical activity in October 2020

Therefore, this study aimed to investigate whether there are changes in health behaviors such as changes in physical activity, eating habits, and weight of college students due to COVID-19, and whether these changes affect their mental health. Mental health consists of two dimensions: psychosis and neurosis. Delusions and hallucinations appear mainly, and in the case of psychosis, which is a state in which the ability to judge reality is generally not available and schizophrenia is typical, it is applied to a study of a normal group. Therefore, in the study of normal people, the representative neurosis of depression and anxiety symptoms is widely used because it is necessary to have the ability to judge reality. Several studies targeting college student's mental health with depression and anxiety symptoms as representative subscales of mental health related to neurosis have been carried out [3,4]. Similarly our study focused on depression and anxiety, which represent the mental health of college students. Mental disorders, such as mood disorders and anxiety disorders, are also known to be associated with obesity, and overweight [5]. Since the complaints of depression and anxiety symptoms are greatly affected by socio-cultural and economic contexts [6,7], it is meaningful to investigate various countries and regions.

This study analyzed the effects of COVID-19 on the mental health of Korean university students during the COVID-19 pandemic, and examined the related factors of changes in class methods as well as health behaviors on mental health after the COVID-19 epidemic.

## **2. MATERIALS AND METHODS**

### **2.1 Research design and study subjects**

A survey involving university students in Korea was conducted in May 2021. To calculate the minimum number of subjects required for this study we used the G power 3.1.9 program. Using a two-sided test with a significance level of 0.05, a power of 0.95, and an effect size of 0.8 the minimum required sample size was 176. At the end of the survey a total of 201 individuals participated in the study.

## 2.2 Survey items

Our survey items consisted of the following sub-items; the general characteristics of the participants, the 2 method of class (face to face and non-face to face), 3 physical activity surveys, 5 eating habits, 3 weight-related questions, and 7 questions for anxiety and 9 questions for depression.

Information on participants gender, age, grade, and region were collected as general characteristic variables of the subjects of the study, and the class method variables were divided into face-to-face classes and online classes.

Physical activity was divided into high-intensity, moderate-intensity physical activity, and walking. High-intensity physical activity was defined as three or more days of intense physical exertion for 10 minutes or more during the past week with shortness of breath. Adequate moderate physical activity was defined as 5 or more days of moderate physical activity that was slightly harder or slightly heavier than usual for 10 minutes or more during the past week. Walking was defined as 5 or more days of walking for more than 10 minutes. In this study, physical activity was defined as more than moderate physical activity, defined as a case that satisfies two conditions of high intensity or moderate physical activity.

For eating habits, 5 items of the Short Diet Behavior Questionnaire for Lockdowns (SDBQ-L) [8] were applied during the lockdown period. These 5 items were; unhealthy food intake and uncontrollable intake, snack intake, binge drinking, and frequency of meals were each scored from 0 (never) to 3 (always). (Nutritional Questionnaire).

To measure the level of anxiety, the General Anxiety Disorder-7 (GAD-7) [9] was used, and to measure the level of depression, the Patient Health Questionnaire-9, PHQ-9 [10] was used. AD-7 and PHQ-9 were used to evaluate mental health including anxiety and depressive disorders in various population groups. GAD-7 consists of 7 items, and PHQ-9 consists of 9 items.

The GAD-7 score was calculated by assigning scores of 0, 1, 2, and 3, to the response categories of 'not at all', 'several days', 'more than half the days', and 'nearly every day', respectively, and adding together the scores for the seven questions. Scores of 5, 10, and 15 are taken as the cut-off points for mild, moderate and severe anxiety, respectively. GAD-7 was rated on a scale of 0 to 21, and a questionnaire with a score of 10 or higher indicates that they have a significant anxiety disorder.

The PHQ-9 is the 9-item depression module from the full Patient Health Questionnaire (PHQ). Questions are about the level of interest in doing things, feeling down or depressed, difficulty with sleeping, energy levels, eating habits, self-perception, ability to concentrate, speed of functioning and thoughts of suicide. Responses range from "0" (Not at all) to "3" (nearly every day). The PHQ-9 is rated on a scale of 0 to 27, with scores of 0-4 representing None-minimal depression, scores of 5-9 Mild depression, scores of 10-14 Moderate depression, scores of 15-19 Moderately Severe depression, and scores of 20-27 Severe depression. Cronbach's alpha was computed to measure the reliability between the survey items (0.91 for GAD-7, 0.94 for PHQ). In this study, anxiety and depression levels were measured in 2019 before the outbreak of COVID-19 and in 2020-2021 after the outbreak. The occurrence of anxiety and depressive disorder was defined as when the level after the outbreak of COVID-19 exceeded the level before the outbreak.

The collected data were analyzed through the R version 4.1.2 program. Frequency analysis and chi-square test were applied to the independent and dependent variables such as general characteristics, teaching method, and health behavior of the survey subjects and related analysis of anxiety and depression, and logistic regression was used to identify factors affecting anxiety and depression. For all analysis statistical significance levels was considered at  $p < 0.05$ .

### 3. RESULTS

#### 3.1 Distribution of anxiety and depression complaints according to the distribution of general characteristics of survey subjects

Out of the 201 study participants, 103 were females (51.2%) while 98 were males (48.8%). Stratifying by age, 85 people (42.1%) were 22 or younger, and 117 were 23 or older (57.9%). In the grade distribution, there were 100 students (49.5%) in the lower grades and 102 students (50.5%) in the upper grades, and 98 students (49%) were in the metropolitan area such as Seoul and Gyeonggi Province, and 103 students (51%) from other regions) The prevalence of anxiety complaints was 5.5%, and the prevalence of depression complaints was 30.8%. There were significant differences in depression by gender, age group, and region (Table 1). Cronbach's alpha was 0.91 for GAD-7 and 0.94 for the PHQ-9.

**Table 1. Distribution of anxiety and depression by general characteristics among study subjects during COVID-19 pandemic in Korea**

Variables	Total	Anxiety <sup>a</sup>			Depression <sup>b</sup>		
		No	Yes	p-value*	No	Yes	p-value*
Total	201(100.0)	190(94.5)	11( 5.5)		139(69.2)	62(30.8)	
Gender							
Men	98(48.8)	94(95.9)	4( 4.1)	0.598	80(81.6)	18(18.4)	0.000
Women	103(51.2)	96(93.2)	7( 6.8)		59(57.3)	44(42.7)	
Age(years)							
≤ 22	85(42.1)	83(97.6)	2( 2.4)	0.077	66(77.6)	19(22.4)	0.022
≥ 23	117(57.9)	107(91.5)	10( 8.5)		73(62.4)	44(37.6)	
Grade <sup>c</sup>							
Low	100(49.5)	92(92.0)	8( 8.0)	0.249	71(71.0)	29(29.0)	0.545
High	102(50.5)	98(96.1)	4( 3.9)		68(66.7)	34(33.3)	
Region <sup>d</sup>							
Capital	99(49.0)	94(94.9)	5( 5.1)	0.768	61(61.6)	38(38.4)	0.034
Other	103(51.0)	96(93.2)	7( 6.8)		78(75.7)	25(24.3)	

\*by chi-square test

<sup>a</sup> assessed by General Anxiety Disorder-7 (GAD-7)

<sup>b</sup> assessed by Patient Health Questionnaire-9 (PHQ-9)

<sup>c</sup> low grade included freshman and sophomore, high grade included junior and senior

#### 3.3 Distribution of Anxiety and Depression Complaints According to Class Method and Health Behavior

In this study, 55 people (27.2%) took face-to-face classes, while 147 people (72.8) took online classes. Also 85 people (42.1%) practiced moderate or more moderate physical activity, and 140 people (69.3%) practiced appropriate walking. By eating habits, 69 people (34.2%) practiced healthy eating, and 78 people (38.6%) gained weight. For anxiety, 2 (1.5%) of healthy eating practitioners reported anxiety, and 10 (14.5%) of unhealthy eating practitioners were anxious. ( $p < 0.05$ ). For depression, 19 people (22.4%) of moderate or more physically active practitioners and 44 people (37.6%) of non-exercises complained of depression, and 28

people (21.1%) of healthy eating practitioners complained of depression, 35 (50.7%) of those who practiced unhealthy diet complained of depression, 39 (50.0%) of those who increased in weight gain, and 24 (19.4%) of those who did not gain weight. Healthy eating practices and weight gain were derived as significant variables ( $p < 0.05$ ) (Table 2).

**Table 2. Distribution of anxiety and depression by class type and health behaviors among study subjects during COVID-19 pandemic in Korea**

Variables		Total	Anxiety			Depression		
			No	Yes	p-value*	No	Yes	p-value*
Class type <sup>a</sup>	Face to face	55(27.2)	54(98.2)	1(1.8)	0.186	42(76.4)	13(23.6)	0.175
	Online	147(72.8)	136(92.5)	11(7.5)		97(66.0)	50(34.0)	
Moderate PA <sup>b</sup>	No	117(57.9)	108(92.3)	9(7.7)	0.247	73(62.4)	44(37.6)	0.022
	Yes	85(42.1)	82(96.5)	3(3.5)		66(77.6)	19(22.4)	
Walking <sup>c</sup>	No	62(30.7)	57(91.9)	5(8.1)	0.519	47(75.8)	15(24.2)	0.188
	Yes	140(69.3)	133(95.0)	7(5.0)		92(65.7)	48(34.3)	
Healthy diet	Good	133(65.8)	131(98.5)	2(1.5)	0.000	105(78.9)	28(21.1)	0.000
	Bad	69(34.2)	59(85.5)	10(14.5)		34(49.3)	35(50.7)	
Weight gain	No	124(61.4)	118(95.2)	6(4.8)	0.542	100(80.6)	24(19.4)	0.000
	Yes	78(38.6)	72(92.3)	6(7.7)		39(50.0)	39(50.0)	

\* chi-square test

<sup>a</sup> student who received more classes during the third semester after COVID-19 pandemic

<sup>b</sup> students who engage in moderate (more than 5 days of moderate intensity physical activity per week) or more intensity (more than 3 days of vigorous intensity physical activity per week) of physical activity

<sup>c</sup> students who engage in adequate walking activity (more than 5 days of walking per week)

<sup>d</sup> good dietary habit means score 0-4, bad dietary habit means score 5-15 by Short Diet Behavior Questionnaire for Lockdowns (SDBQ-L)

### 3.4 Multivariate Logistic Regression Associated with Anxiety

Logistic regression analysis was performed to identify factors affecting anxiety during the COVID-19 outbreak. In the multivariate logistic regression analysis, sex, age, and healthy eating that were significant in univariate analysis were input and analyzed. In both univariate and multivariate logistic regression analysis, the healthy eating variable was the only statistically significant variable. In univariate analysis, anxiety was 11.102 times (95% CI: 2.359-52.251) in the case of unhealthy eating, and 19.081 times (95% CI: 2.352-154.807) in multivariate analysis ( $p < 0.01$ ) (Table 3).

### 3.5 Multivariate Logistic Regression Analysis Associated with Depression

Univariate and multivariate logistic regression analysis were performed to identify factors affecting depression during the COVID-19 outbreak. In the multivariate logistic regression analysis, variables such as gender, age, region, moderate or higher physical activity, healthy eating, and weight gain that were significant in univariate analysis were input and analyzed. In the multivariate analysis, women reported depression 3.315 times (95% CI: 1.742-6.307) than men, and in age, 23 years and older than 22 years old 2.094 times (95% CI: 1.112-3.942). Residents in the metropolitan area, reported 0.515 times more depression (95% CI: 0.281-0.943) compared to other areas, moderate or more physical activity practitioners had 0.478 times depression (95%

CI., 0.254-0.899) than non-exercises, and unhealthy eating habits for healthy eating habits Compared to the practitioners, there were 3.860 times (95% CI:2.057-7.246) and individuals who gained weight 4.167 times (95% CI: 2.222-7.815) more significantly ( $p < 0.05$ ) than those who didn't gained weight. In the multivariate analysis, women's complaints of depression were 2.607 times (95% CI: 1.255-5.415) than men, 0.407 times (95% CI: 0.197-0.840) for residents of the metropolitan area, 3.418 times (95% CI: 1.633-7.198) for unhealthy eaters, and 2.225 times for those who gained weight (Table 4).

**Table 3. Logistic regression analysis of factors related with complains of anxiety among study subjects during COVID-19 pandemic in Korea**

Variables		Univariable analysis					Multivariable analysis				
		B	SE	OR	95% CI	p-value	B	SE	OR	95% CI	p-value
Gender	Men			1.000					1.000		
	Women	0.539	0.643	1.714	0.489-6.047	0.403	0.407	0.673	1.502	0.401-5.621	0.546
Age(years)	≤ 22			1.000					1.000		
	≥ 23	1.355	0.788	3.879	0.827-18.183	0.086	0.772	0.825	2.167	0.430-10.916	2.167
Grade	Junior			1.000							
	Senior	-0.756	0.629	0.469	0.137-1.611	0.229				Not included	
Region	Capital			1.000							
	Other	0.315	0.603	1.371	0.420-4.472	0.601				Not included	
Class type <sup>a</sup>	Face to face			1.000							Not included
	Online	1.474	1.057	4.368	0.550-34.656	0.163					
Moderate PA <sup>b</sup>	No			1.000							Not included
	Yes	-0.823	0.683	0.439	0.115-1.673	0.439					
Walking <sup>c</sup>	No			1.000							Not included
	Yes	-0.511	0.607	0.600	0.183-1.970	0.400					
Healthy diet	Good			1.000					1.000		
	Bad	2.407	0.790	11.102	2.359-52.251	0.002	2.949	1.068	19.081	2.352-154.807	0.006
Weight gain	No			1.000							Not included
	Yes	0.494	0.596	1.639	0.509-5.275	0.407					

<sup>a</sup> students who received more classes during the third semester after COVID-19 pandemic

<sup>b</sup> students who engage in moderate (more than 5 days of moderate intensity physical activity per week) or more intensity (more than 3 days of vigorous intensity physical activity per week) of physical activity

<sup>c</sup> students who engage in adequate walking activity (more than 5 days of walking per week)

<sup>d</sup> good dietary habit means score 0-4, bad dietary habit means score 5-15 by Short Diet Behavior Questionnaire for Lockdowns (SDBQ-L)

**Table 4. Logistic regression analysis on the related factors with complains of depression among study subjects during COVID-19 pandemic in Korea**

Variables		Univariable analysis					Multivariable analysis				
		B	SE	OR	95% CI	p-value	B	SE	OR	95% CI	p-value
Gender	Men			1.000					1.000		
	Women	1.198	0.328	3.315	1.742-6.307	0.000	0.958	0.373	2.607	1.255-5.415	0.010
Age(years)	≤ 22			1.000					1.000		
	≥ 23	0.739	0.323	2.094	1.112-3.942	0.022	0.618	0.382	1.856	0.878-3.920	0.105
Grade	Junior			1.000							
	Senior	0.202	0.304	1.224	0.674-2.223	0.507			Not included		
Region	Capital			1.000					1.000		
	Other	-0.665	0.309	0.515	0.281-0.943	0.032	-0.899	0.370	0.407	0.197-0.840	0.015
Class type <sup>a</sup>	Face face to			1.000							
	Online	0.510	0.362	1.665	0.819-3.386	0.159			Not included		
Moderate PA <sup>b</sup>	No			1.000					1.000		
	Yes	-0.739	0.323	0.478	0.254-0.899	0.022	-0.133	0.378	0.875	0.421-1.821	0.722
Walking <sup>c</sup>	No			1.000							
	Yes	0.492	0.346	1.635	0.830-3.220	0.155			Not included		
Healthy diet	Good			1.000					1.000		
	Bad	1.351	0.321	3.860	2.057-7.246	0.000	1.232	0.378	3.428	1.633-7.198	0.001
Weight gain	No			1.000					1.000		
	Yes	1.427	0.321	4.167	2.222-7.815	0.000	0.800	10.369	2.225	1.080-4.582	0.030

<sup>a</sup> students who received more classes during the third semester after COVID-19 pandemic

<sup>b</sup> students who engage in moderate (more than 5 days of moderate intensity physical activity per week) or more intensity (more than 3 days of vigorous intensity physical activity per week) of physical activity

<sup>c</sup> students who engage in adequate walking activity (more than 5 days of walking per week)

<sup>d</sup> good dietary habit means score 0-4, bad dietary habit means score 5-15 by Short Diet Behavior Questionnaire for Lockdowns (SDBQ-L)

#### 4. DISCUSSION

Among college students, mental health is known as one of the major factors for academic success because of its effects on academic motivation, concentration, and social interaction [1]. The COVID-19 pandemic has

been shown to affect the mental health of various population subgroups. This study aimed at identifying the mental health status including anxiety and depression, of college students and its associated factors according to the changing teaching methods and health behaviors according during the COVID-19 pandemic. Due to interventions that were implemented to mitigate the spread of COVID-19, the possibility of negative mental health effects on university students in Korea have been reported.

Due to the COVID-19 associated anxiety and fear about individual and family members infection, restrictions on physical and social activities were implemented which resulted in the change in lifestyle. Mentioned stressors of viral epidemics, to include fear of infection, frustration, boredom, insufficient supply, inadequate information, financial loss and social stigma [11]. Most investigations and evaluations of the psychological and mental health effects of COVID-19 have focused on medical workers, patients, children, and the general population. However, the impact on higher education students is insufficient (Son et al., 2020). There is little evidence on the effects of COVID-19 on the psychological and mental health of college students, known to be an important vulnerable group [12]. In addition, national, regional, and racial differences in these influences, and the related influencing factors are expected to be different.

In this cross-sectional survey, the anxiety group of the study subjects was about 18%, which was slightly lower than a previous study in which the anxiety group of university students during the corona-19 epidemic in China was 24.9% [13]. This observed difference could be due to the disparities in the COVID-19 epidemic situation in Korea and China. Only 5.5% of cases where the anxiety level after the COVID-19 outbreak exceeded the pre-epidemic level. In a study investigating anxiety in the general public in Korea after the COVID-19 outbreak [14], 12.5% of the study population had anxiety.

The prevalence of emotional disorders among adolescents is on the rise [15], and it has been reported that a 12-month major depressive episodes in American adolescents increased from 8.7% in 2005 to 11.3% [16].

According to some studies, the prevalence of pandemic-related depressive symptoms among university students is reported to be 29-38% [12,16-19]. In this study, 30.8% of the depressive symptoms are relatively consistent with the range, but it is evaluated at a rather low level. In addition, it has been reported that loneliness, helplessness, financial and academic uncertainty due to the pandemic and other various factors also influence depressive symptoms and suicidal thoughts [1].

In this study, as a factor affecting anxiety after the COVID-19 outbreak, only the unhealthy diet was statistically significant. These results are consistent with the results that the COVID-19 pandemic affects sleep and eating habits, and that these variables are related to depressive symptoms and anxiety [20].

Many studies have consistently reported that female students show significantly higher anxiety than male students and have a higher risk of anxiety disorder [21,22].

Factors influencing depression in this study were women, residents of metropolitan areas, unhealthy diet, and weight gain. The teaching style did not significantly affect the anxiety and depression status of students. The high rate of complaints of depressive symptoms in women is consistent with the above-described characteristics of higher anxiety risk than men. In the univariate analysis of this study, age showed a significant result. According to previous studies, the influence of anxiety and worry about an unstable future and employment was higher in the high graders who have just graduated than in the low grades who have just entered the university [23]. However, it was not derived as a significant variable in the multivariate analysis of this study. Also, in the univariate analysis, moderate or higher physical activity practitioners showed significant results, which is similar to the results of previous studies showing that physical activity acts as a buffer for mental health deterioration and reduces depression [25] In the case of unhealthy eaters, it is thought that the pandemic affected eating habits and is related to depressive symptoms [19]. Weight gain also showed to be a significant contributing variable. Depression and obesity or weight gain have a two-way relationship,



and mental health problems in adolescents are known to be high risk factors for obesity [24]. Depression and anxiety disorders are related to negative effects on lifestyle such as eating habits and physical activity, contributing to weight gain, and may affect changes due to fat accumulation. Conversely, social stigma toward overweight and obesity may cause depression and anxiety disorders due to negative effects on body image and self-esteem [25,26].

The inability to control food intake and get regular exercise as a result of social distancing due to COVID-19 could explain the weight gain. Consistent with the explanation that many people who do not maintain a normal weight eat excessive carbohydrate-rich foods, and may be vulnerable to daily, monthly, or seasonal fluctuations that cause resistance to physical activity [27].

It has been confirmed that there are negative psychological effects such as anxiety and depression in college students due to the long-lasting COVID-19 pandemic situation and quarantine measures such as social distancing, and it is necessary to develop a mental health intervention and prevention strategy for college students reflecting the results of this study.

This study has some limitations. First, it is a cross-sectional study which cannot be used to infer causal relationships. Second, it was an online survey which will not be able to rule out the respondents' selection bias or non-response bias, and the level of anxiety and depression may not be accurate as it is a self-evaluation according to the questionnaire tool. Thirdly, there is a limit to the representativeness of the sample. Although the sample size was calculated and the sample subjects were recruited, there may be limitations in the representativeness and generalization of the study results to all Korean university students. In filling out the questionnaire, the class method was divided into only two classes, face-to-face and non-face-to-face classes.

However, consideration of the mix of class methods such as face-to-face and non-face-to-face classes was insufficient, and anxiety and depression levels may not be reflective of the individual class methods. While the survey was conducted before and after the onset of COVID-19, the survey on health behaviors such as physical activity, eating habits, and body fat percentage was conducted only after COVID-19 onset, so there could be limitations in the questionnaire used in this study. In addition, the questionnaire was divided into only before and after Corona. Since there have been various events since the start of the outbreak of COVID-19, and more than a year has passed, we should be prudent when analyzing, interpreting and generalizing the results. We recommend that future studies should do extensive well-designed studies to determine the anxiety and depression factors associated to the COVID-19 pandemic in various regions and in a larger population in Korea.

## **5. CONCLUSIONS**

During the COVID-19 pandemic, the college student population is one of the vulnerable groups. This study analyze the level of mental health such as anxiety and depression due to Corona 19 and the factors affecting it in Korean university students.

The prevalence of anxiety complaints was 5.5%, and the prevalence of depression complaints was 30.8%. In the multivariate logistic regression, factors that significantly affected the anxiety and depression status of students were; gender, unhealthy eating habit, metropolitan area, and individuals with weight gain.

To conclude, the COVID-19 pandemic and its public health interventions such as social isolation implemented for control has a negative mental health effects in college in Korea. Developing a mental health intervention and prevention strategy for college students in Korea is important for the promotion of the wellbeing of the students.

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