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## The Effects of Depression and Optimism on Academic Stress in Korean University Students in COVID-19 Situation

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### Abstract

This study confirmed the degree of depression, optimism, academic stress, and COVID-19 life change of college students in the COVID-19 situation. An attempt was made to provide basic data for the development and application of programs to reduce the learning stress of college students. Data collection was conducted from January 1 to February 28, 2022, with the consent of the subjects, and the number of participants used for the final analysis was 170. The collected data were analyzed using descriptive statistics, t-test, ANOVA, Pearson's correlation, and multiple regression using the SPSS 26.0 statistical program. There was a significant difference according to department satisfaction and personality in the difference in depression according to general characteristics. The optimism of college students was significantly different depending on the department satisfaction and personality. There was a significant difference in the academic stress of college students according to their department satisfaction and personality. When examining the correlation between depression, optimism, and academic stress of the subjects, the depression of college students had a statistically significant negative correlation with optimism. The subject's academic stress had a statistically significant positive correlation with depression and a statistically significant negative correlation with optimism. The degree of life change of college students after COVID-19 was found to be an average of 2.33 points (out of four points). As factors affecting academic stress of college students, department satisfaction and depression showed statistically significant results. Explanatory power of academic stress caused by these factors was 37.3%. Under the COVID-19 situation, academic stress, depression, and optimism of college students had a significant effect on department satisfaction and personality. As academic stress increased, depression also increased, and as academic stress decreased, optimism increased. In other words, it was confirmed that academic stress is an important influencing factor on depression and optimism. Reduction of academic stress seems to be essential to lead a positive daily life such as optimism of college students, and it seems that it is necessary to develop various educational programs to reduce the learning stress of college students in the context of COVID-19.

**Keywords:** stress; depression; optimism; life change

### 1. INTRODUCTION

As COVID-19 is a novel infectious disease with strong contagious power, it has spread since [1]. In Korea, the first confirmed cases of COVID-19 were reported in January 2020, and the cumulative number of confirmed

cases in August 2021 was 216,206 [2], and at the end of March 2022 [2], the cumulative number of confirmed cases was 12,774,956 [2]. Currently, due to COVID-19 is still spreading and the number of confirmed cases continues to increase, the government has decided to gradually adjust the social distancing steps according to the extent of the spread [2].

In a study of the public's psychological response to coronavirus infection, it was found that most subjects experienced difficulties due to fear and usualness of COVID-19. The public was reluctant to use public transportation and go out on the way to and from school and commuting due to concerns about infection. In addition, they were afraid or worried about the current situation because the COVID-19 was not clearly identified, life was unpredictable in the COVID-19 pandemic, and infection could not be controlled. It was found that they are having trouble due to the usualness or restrictions caused by COVID-19, such as disruptions to personal and public schedules and plans [3]. The COVID-19 pandemic has also brought major changes to university education. As COVID-19 spreads across the country, as part of social distancing, from the first semester of 2020, universities have implemented online classes under the guidance of the Ministry of Education [4].

However, the sudden transition to online classes caused problems such as poor preparation for online classes by professors, deterioration of class quality, deterioration of students' concentration and learning motivation, low satisfaction with classes and difficulties in interaction between professors and students [5].

The aim of this study is to check the force of academic stress, depression, and optimism on learning satisfaction in Korean university students. To provide basic data necessary for developing teaching methods and curriculum that can improve the learning satisfaction of college students in non-face-to-face educational situations. Its specific purpose is to; first, the degree of academic stress, depression, and optimism according to the characteristics of the subject is identified. Second, the degree of the subject's depression, optimism, academic stress, and life changes after Covid-19 was confirmed. Third, the relationship between depression, optimism, and academic stress was investigated. Fourth, the effect of academic stress was investigated.

## **2. THEORETICAL BACKGROUND**

Wilks fined academic stress as academic-related demands imposed beyond the adaptive dimension available to individuals [6]. Mihyang Oh was defined as an uncomfortable psychological state such as mental burden, tension, worry, fear, depression, and nervousness, which is experienced because of academic stress due to school studies or grades, which is considered too difficult and troublesome [7]. In addition, academic stress was defined as internal and external mental stimulation, pressure, and oppression that occur in school life related to studies [8]. Academic stress is said to be a maladaptive psychological state caused by physiological, psychological, and behavioral effects that occur when an individual fails to properly respond to academic stress [9].

Oh Jong-jin stated that academic stress refers to a mental and psychological state related to one of various difficulties and various stresses that one feels in the process of coping with and performing various academic demands during school life [10]. Geun-Young Lee, Su-Chan Choi, and Gong-Seok Gong described academic stress as a state of conflict or stress subjectively felt due to anxiety or tension caused by schoolwork [11].

Park Byeong-gi and Park Seon-mi referred to a psychological state as a psychological burden or anxiety, tension, worry, depression, and nervousness due to schoolwork [12]. Academic stress is also defined as a maladaptive psychological state such as mental burden, anxiety, and depression experienced while coping with the demands of school life and academic performance [13][41][42].

Koh explains that academic stress is a negative psychological state such as pressure or frustration that students experience from internal and external stimuli related to learning, mental burden caused by pressure, and tension and conflict about career and advancement [14].

Previous studies on college students related to academic stress include a study that showed a positive correlation between excessive learning and psychological pressure [15], and personality, interpersonal relationships, problem-solving ability, self-efficacy, major satisfaction, and nursing professionalism were negative. There was a study showing that there is a correlation [16]. Therefore, it is necessary for college students

to overcome academic stress and maintain persistent efforts and continuous interest in achieving learning satisfaction [17].

Recently, a new word, ' COVID-19 depression' or ' COVID-19 blue' has appeared in the internet media. In a situation where social distancing has to be continued for a long time due to the corona crisis, it means that people cannot meet people, do not enjoy enough leisure, and constant stress due to the fear of infection is making people depressed. Several media outlets have also reported on people's mental health crisis caused by the corona crisis, raising awareness of this crisis [18]. Many studies have revealed that people experience various psychological problems such as anxiety, depression, loneliness fear, and anger due to the COVID-19 situation [3].

Depression is on a continuum from normal mood swings to pathological conditions. The symptoms of depression include emotional symptoms such as sadness and loneliness, cognitive symptoms such as guilt, worthlessness, reduced thinking and attention, suicide, and physiological symptoms such as insomnia, loss of appetite, weight loss, and fatigue [19].

By the “Ministry of Health and Welfare”, the level of depression among people in 2021 more than doubled compared to 2018, and in particular, those in their 20s and 30s showed the highest rate of depression risk group [20]. In addition, college students who faced the COVID-19 situation experienced feelings of isolation, helplessness, and depression as social interaction became difficult due to the implementation of social distancing [21].

If depression continues to increase, academic achievement may decrease or cause a loss of motivation, leading to a situation in which daily life is given up. [22]. In relation to the depression of college students, in Hwang Eun-hee's study [23], it was found that 44.9% of college students had depression. It can be seen that intensive prevention and management are needed in relation to depression in college students [23]. Depression is one of the most important spiritual health problems to be solved because it becomes a mental health problem that takes the highest priority for college students [24].

Among the variables related to learning satisfaction, optimism, the main theme of positive psychology, refers to the tendency to think positively or hopefully about future situations or outcomes [25]. In addition, Seligman described it as a characteristic that changes the negative perception experienced in failure and difficult situations into a positive one, and a dispositional tendency to believe that there will be good results in the future [26]. People with a high level of optimism perceive less psychological pain and adapt more stably and positively when they are in transitional situations in life, compared to those who think pessimistically [26]. In a previous study on optimism, it was reported that students with a high level of optimism had a higher level of career decision than students without a level of optimism [27], and showed a more challenging and persistent tendency in terms of career preparation behavior and career exploration [27]. Studies related to such optimism have mainly been conducted in relation to intra psychological factors such as psychological depression and emotion [28], but studies related to learning satisfaction after Corona are in the beginning stages.

In Lee's study, the mediating effect of career decision self-efficacy was verified in the process where optimism affects career adaptability, and optimism is essential for career preparation behaviors to achieve career goals in the process of college students achieving career goals. It was implied that it was a variable. Looking at previous studies on optimism, the target was mainly adolescents such as middle school and high school students, and few studies related to college students have been conducted [28].

### **3. RESEARCH METHOD**

#### **3-1 Study design**

This study confirmed the degree of academic stress, depression, optimism, and life change among college students enrolled in a four-year university who participated in online classes in the context of COVID-19. It is also a descriptive research study using a structured questionnaire to understand the relationship between them and their effect on learning satisfaction.

### 3-2 Study subjects

The subjects of this study were students enrolled in four-year universities located in provinces C and G, and those who understood the purpose of this study and voluntarily consented in writing to participate in the study were selected for convenience. The number of samples required for multiple regression analysis was calculated using the “G\*Power 3.1.5 program”. When the significance level was .05, the power was .95, and the effect size was .26, the calculated sample size was 151. In anticipation of the dropout, 180 copies were distributed, 170 copies were recovered, and 170 data were used for the final analysis.

### 3-3 Research tools

3.3.1 Academic stress. Academic stress is defined as a maladaptive psychological state such as mental burden, anxiety, and depression experienced while coping with the demands of school life and academic performance [13]. To measure the academic stress of college students, the “Maslach burnout inventory-student survey (MBI-SS) scale” developed by Schaufeli et al. was used. This scale consists of 15 items: five items of exhaustion, four items of cynicism, and six items of decreased feeling of efficacy (Professional Efficacy) [29]. It is on a four-point Likert scale of one for ‘not at all’ and four for ‘strongly agree’. Questions 10-15 among the items were converted into positive items in reverse, meaning that the higher the total score, the higher the academic stress. In the study of Dongwoo Shin [30], the reliability was Cronbach’s  $\alpha = .87$ , and Cronbach’s  $\alpha = .897$  in this study as well.

3.3.2 Depression. Depression refers to a wide range of psychological states in humans, ranging from simple sad or depressed moods to emotional states that include a persistent sense of loss or helplessness [31]. The integrated Korean version of “CES-D” developed by Radloff [32] and adapted by Yang Byeong-chang et al. [33] was used. “The Korean version of the CES-D scale” consists of 20 items: two interpersonal relationships, seven depressive items, four positive emotions (inverse items), and seven physical deterioration items. All items were evaluated “on a four-point Likert scale ranging from zero to three for the frequency of experiences in the past week, with higher scores indicating higher levels of depression”. Cronbach’s  $\alpha = .91$  in the study of Jeon Gyeong-gu, and Cronbach’s  $\alpha = .901$  in this study.

3.3.3 Optimism. Optimism refers to the tendency to think positively or hopefully about situations or results that will occur in the future [25]. “The Revised Life Orientation Test (LOT-R)”, revised and supplemented by Scheier et al. [26], was used by researcher Hyunsook Shin [34]. This tool was used in this study. The test consists of ten items, and consists of a single dimension of optimism. Of these, items one, three, four, seven, nine, and ten measure optimism, and the remaining items two, five, six, and eight are filler items used to prevent participants from understanding the intention of the questionnaire. Of the six items measuring optimism, one, four, and ten are positive statement items, and three, seven, and nine are negative statement items. It was composed of “zero points were not at all, one point was generally not, two points were moderately, three points were mostly yes, and four points were very much” on a five-point Likert scale. Negative statements are reverse-scored, and a high combined score indicates a high level of optimism. In the study of Shin [34], Cronbach’s  $\alpha$  was .73, and in this study, Cronbach’s  $\alpha$  was .785.

3.3.4 Life change of college students after COVID-19. The degree of change in college students after COVID-19 means evaluating the level of academic stress experienced by students due to leisure, travel, interpersonal relationships, digital device use, life stress, and online classes. In this study, on a Likert four-point scale, “‘very decrease’ one point, ‘decrease’ two points, ‘increase’ three points, and ‘very increase’ four points”. The higher the score, the more changes in the life of college students due to COVID-19.

### 3-4 Data Collection Procedure

Data collection was conducted from January 1 to February 28, 2022, for subjects who gave written consent to participate in the study. The mobile (Naver) questionnaire was posted on the university’s academic year group Kakao Talk chat room, and it was conducted for students who understood the purpose of this study and voluntarily agreed to participate in the study. Because it was an online class due to COVID-19 and face-to-face situations were unavoidable, data collection was carried out after obtaining consent via mobile.

### 3-5 Data analysis method

SPSS/WIN 26.0 statistical program was used for the collected data, and the analysis method is as follows. 1) The general characteristics of college students were analyzed by frequency and percentage. 2) The degree of college students' depression, optimism, academic stress, and life changes after COVID-19 were analyzed with the mean and standard deviation. 3) To investigate the differences in depression, optimism, and academic stress according to general characteristics of college students, t-test and ANOVA were used, and the post-hoc test was analyzed using LSD. 4) Correlation between depression, optimism, and academic stress in college students was analyzed with Pearson's correlation coefficients. 5) Factors influencing college students' academic stress were identified by multiple regression analysis.

## 4. RESULTS

### 4-1 The characteristics of subjects and differences in depression, optimism, and academic stress

The gender of the subjects was 83 men (48.8%) and 87 women (51.2%), and the age was 124 (72.9%) under the age of 23 and 46 (27.1%) over the age of 24. As for the majors, 102 people were in science and engineering, accounting for 60.0%, followed by humanities and other fields including arts and sports. In terms of grade, 83 students (48.8%) were in 1st and 2nd grade, 87 (51.2%) were in 3rd and 4th grade, and 122 (71.8%) answered that they had no religion. As for satisfaction with the department, 104 subjects (61.2%) answered that they were satisfied, and 141 subjects (82.9%) answered that their personality was positive.

Depression of college students was significantly different according to department satisfaction and personality. That is, there was a statistically significant difference in department satisfaction between groups ( $F=3.62, p=.029$ ). In the post hoc test, it was found that there was a significant difference between the group that answered 'normal' ( $0.79\pm0.50$ ) and the group that answered 'satisfactory' ( $0.61\pm0.41$ ). In addition, it was found that there was a statistically significant difference between the group who answered positive ( $0.62\pm0.41$ ) and the group who answered negative ( $0.98\pm0.53$ ) about their personality ( $t=-3.46, p=.001$ ). There was no statistically significant difference in other characteristics.

The optimism of college students was significantly different depending on the department satisfaction and personality. That is, in the department satisfaction, the group who answered as satisfied ( $2.55\pm0.66$ ) had a higher optimism score than the group who answered as average ( $2.19\pm0.72$ ), and there was a statistically significant difference ( $F=5.83, p=.004$ ). There was a statistically significant difference between the group that answered positive ( $2.55\pm0.63$ ) and the group that answered negative ( $1.73\pm0.68$ ) in terms of personality ( $t=6.29, p<.001$ ). There was no statistically significant difference in other characteristics.

There was a significant difference in the academic stress of college students according to their department satisfaction and personality. That is, there was a statistically significant difference between the group who answered dissatisfied ( $3.08\pm0.84$ ), average ( $2.83\pm0.51$ ) and satisfied ( $2.24\pm0.53$ ) in department satisfaction ( $F=27.17, p<.001$ ). There was also a statistically significant difference between the group that answered positive ( $2.40\pm0.60$ ) and the group that answered negative ( $2.88\pm0.60$ ) in terms of personality ( $t=-3.90, p<.001$ ). In addition, there was no statistically significant difference between gender, age, sibling rank, family, grade, and religion [Table 1].

[Table 1] The characteristics of subjects and differences in depression, optimism, and academic stress (N=170)

Characteristics	Categories	n(%)	depression		optimism		academic stress	
			M±SD	t/F(p) LSD	M±SD	t/F(p) LSD	M±SD	t/F(p) LSD
gender	men	83(48.8)	0.65±0.45	-1.01 (.315)	2.35±0.75	-1.04 (.301)	2.51±0.63	0.67 (.500)
	women	87(51.2)	0.72±0.45		2.46±0.66		2.45±0.63	
age	<= 23	124(72.9)	0.67±0.42	-0.55	2.47±0.65	1.95	2.44±0.61	-1.45

(years old)	> 24	46(27.1)	0.71±0.52	(.580)	2.24±0.81	(.053)	2.60±0.66	(.149)
major	humanities	43(25.3)	0.65±0.35	0.14 (.869)	2.40±0.53	0.05 (.954)	2.46±0.54	0.62 (.940)
	science engineering	102(60.0)	0.70±0.50		2.40±0.75		2.50±0.65	
	other fields	25(14.7)	0.67±0.41		2.415±0.79		2.46±0.70	
grade	1, 2	83(48.8)	0.72±0.46	1.12 (.263)	2.41±0.70	0.12 (.903)	2.44±0.61	-0.91 (.366)
	3, 4	87(51.2)	0.64±0.44		2.40±0.66		2.52±0.65	
religion	No	122(71.8)	0.67±0.41	-0.75 (.455)	2.37±0.68	-1.12 (.264)	2.45±0.60	-1.06 (.292)
	Yes	48(28.2)	0.72±0.53		2.50±0.76		2.56±0.9	
department satisfaction	dissatisfaction <sup>a</sup>	10(5.9)	0.85±0.49	3.62 (.029)	2.13±0.78	5.83 (.004)	3.08±0.84	27.17 ( $<.001$ )
	moderate <sup>b</sup>	56(32.9)	0.79±0.50		2.19±0.72		2.83±0.51	
	satisfaction <sup>c</sup>	104(61.2)	0.61±0.41		b>c		2.55±0.66	
Personality	positive	141(82.9)	0.62±0.41	-3.46 (.001)	2.55±0.63	6.29 ( $<.001$ )	2.40±0.60	-3.90 ( $<.001$ )
	negative	29(17.1)	0.98±0.53		1.73±0.68		2.88±0.60	

#### 4-2 Depression, optimism, life change, and academic stress level of subject's

Subject's depression was averaged 13.65 (±9.00) points, ranging from the minimum 0 to the maximum of 43 points in the range of 0 to 60 points. Optimism ranged from a minimum of 1 to a maximum of 24 on a range of 0 to 24, with an average of 14.44 (±4.23) points. Academic stress ranges from a minimum of 15 to a maximum of 64 out of a range of 15 to 75, with an average of 37.22 (±9.40) points. The life change of college students after COVID-19 ranged from 6 to 24 points, from the minimum value of 6 points to the maximum value of 19 points, with an average of 12.66 (±1.67) points [Table 2].

[Table 2] Depression, optimism, life change, and academic stress level of subjects (N=170)

Variable	range	minimum	maximum	M±SD
depression	0~60	0	43	13.65±9.00
optimism	0~24	1	24	14.44±4.23
academic stress	15~75	15	64	37.22±9.40
life change	6~24	6	19	12.66±.278

#### 4-3 Correlation between depression, optimism, and academic stress in subjects

Depression of college students had a statistically significant negative correlation with optimism ( $r = -.58$ ,  $p < .001$ ). Subject's academic stress showed a statistically significant positive correlation with depression ( $r = .44$ ,  $p < .001$ ) and a statistically significant negative correlation with optimism ( $r = -.42$ ,  $p < .001$ ) [Table 3].

[Table 3] Correlation between depression, optimism, and academic stress in subjects (N=170)

Variable	depression	optimism	academic stress
depression	1		
optimism	-.58** ( $<.001$ )	1	
academic stress	.44** ( $<.001$ )	-.42** ( $<.001$ )	1

\* $p < .05$ , \*\* $p < .001$

#### 4-4 Factors affecting subject's academic stress

Prior to the regression analysis, tolerance and variance inflation factor (VIF) values were examined to determine whether multi-collinearity occurred between each variable. The tolerance limit values were 0.63 to 0.97, which were all larger than 0.1, and the dispersion expansion values were 1.033 to 1.599, all not exceeding 10, indicating that there was no problem of multicollinearity. Multiple regression analysis was conducted with the variables correlated with college students' academic stress: depression, optimism, and department satisfaction. As factors affecting academic stress, department satisfaction ( $\beta = -.391, p < .001$ ) and depression ( $\beta = .27, p < .001$ ) showed statistically significant results. The explanatory power of academic stress caused by these factors was 37.3% [Table 4].

[Table 4] Factors affecting subject's academic stress

Variable	B	SE	$\beta$	t	p
(Constant)	3.833	.289		13.27	<.001
Department satisfaction	-.405	.065	-.391	-6.21	<.001
depression	0.38	.105	.272	3.61	<.001
optimism	-.134	.068	-.151	-1.96	.051
	R <sup>2</sup> = .388	Adj R <sup>2</sup> = .373	F=26.16	P <.001	

#### 4-5 Life change of college students after COVID-19

Compared to before COVID-19, the level of leisure life after COVID-19 was found to be 2.18±.838 (out of 4 points). Compared to before COVID-19, the degree of travel after COVID-19 was found to be 1.52±.627 points. Compared to before COVID-19, the degree of meeting with friends after COVID-19 was 1.79±.617 points. Compared to before COVID-19, the degree of use of digital devices (including mobile phones) for non-class purposes after COVID-19 was 3.32±.631 points. Compared to before COVID-19, the level of life stress after COVID-19 was 2.75±.703 points. Compared to before COVID-19, the degree of academic stress due to online classes after COVID-19 was 2.45±.746 points [Table 5].

[Table 5] Life change of college students after COVID-19 (N=170)

Variable	M±SD
1. How is your leisure life after COVID-19?	2.18±.838
2. How many trips did you travel after COVID-19?	1.52±.627
3. How many times have you met your friends after COVID-19?	1.79±.617
4. Compared to before COVID-19, how much digital devices (including mobile phones) are used for non-class purposes after COVID-19?	3.32±.631
5. How is your life stress level after COVID-19 compared to before COVID-19?	2.75±.703
6. How is your academic stress level due to online classes after COVID-19 compared to before COVID-19?	2.45±.746

### 5. DISCUSSION

This study was to determine the degree of academic stress, depression, optimism, and life changes of college students after COVID-19 among college students enrolled in 4-year colleges who participated in online classes in the context of COVID-19.

As a result, the average academic stress of college students was 2.48. This was higher than the 2.21 point in Kim In-gu's study of nursing students in the COVID-19 situation [35], and it can be seen as a result similar to the 2.38 point of Kim Mi-jung's study of college students [36]. Kim In-gu's research was an early COVID-19 situation study, and this study was conducted at a time point of 2 years, and it is judged that it is due to the

difference in period. In other words, it seems that academic stress increases as students have more experience with COVID-19.

As a result of analyzing the difference in academic stress according to general characteristics, it was found that there was a statistically significant difference between the group who answered 'positive' and the group who answered 'negative' in terms of their personality. The academic stress of Kim In-gu's study [35] was different from this study by showing significant results in grade, nursing department application motivation, and major satisfaction.

In the era of the fourth revolution, online classes continue and professors adapt to this, and a change is needed to introduce a class method suitable for students, and continuous research on this will be required [35]. In addition, specific learning strategies should be prepared to prepare for future college education by establishing an educational foundation that maximizes the effect of learning by identifying and alleviating the causes of college students' academic stress when participating in non-face-to-face classes.

Because of this study, the average score of optimism among college students was 2.40. This was lower than the 3.40 study in Oh So-young [37], a university student in the pre-COVID-19 situation. The optimism survey in this study seems to show a difference in optimism because it was conducted two years after the outbreak of COVID-19.

The result of analyzing differences in optimism according to general characteristics, there was a significant difference in the optimism of college students according to department satisfaction and personality. In terms of department satisfaction, there was a statistically significant difference between the group that answered dissatisfied and the group that answered satisfaction. The greater the satisfaction with the department, the higher the optimism. There was a statistically significant difference between the group who answered 'positive' and the group who answered 'negative' about their personality. In other words, the group who answered that their personality was positive showed higher optimism.

Optimism can be said to be the main psychological resource an individual has and the source of strength to overcome problem situations. It also refers to the tendency to think positively or hopefully about situations or results that will occur in the future. It can be explained as a belief that, even if one has experienced failure, it is temporary and that if one endures in the face of adversity, it can be overcome by the next action [38]. The higher the optimism, the lower the level of perception of pain in the situation of adversity faced by the individual, and the more stable and positive the person adapts to the situation [39]. Optimism is essential for managing student-learning stress. Therefore, it will be necessary to develop an educational program that can improve optimism.

Result of the study, the average depression score of college students was 0.68. This was lower than the 0.94 point study in Kim In-gu, a nursing student in the COVID-19 situation. Nursing students have a relatively large amount of work compared to other departments, and in an environment, that requires clinical practice, it is thought that if they do not adapt to their major and school life, their motivation to learn decreases and depression increases [35].

Because of analyzing the difference in depression according to general characteristics, there was a statistically significant difference in department satisfaction and personality. In other words, there was a statistically significant difference between the group who answered dissatisfied and the group who answered "satisfied" in department satisfaction, and the greater the satisfaction with the department, the lower the depression. There was a statistically significant difference between the group who answered 'positive' and the group who answered 'negative' about their personality. That is, the group who answered that their personality was positive showed a lower level of depression. In Kim's study [35], the difference in depression showed a statistically significant difference in nursing department application motivation and major satisfaction, showing similar results to this study. Depression experienced by college students is highly likely to persist into adulthood, so measures to prevent and reduce depression in advance are needed.

The subject's academic stress was found to have a significant positive correlation with depression and a significant negative correlation with optimism. Depression of college students was found to have a significant negative correlation with optimism. As academic stress increased, depression also increased, and as academic



stress decreased, optimism increased. In other words, it was confirmed that academic stress is an important influencing factor on depression and optimism. As the depression of college students increased, optimism was found to decrease. Reduction of academic stress seems to be essential to lead a positive daily life such as optimism of college students, and it seems that it is necessary to develop various educational programs to reduce the learning stress of college students in the context of COVID-19.

Because of regression analysis of factors affecting the subject's academic stress, Academic stress of college students showed statistically significant results in department satisfaction and depression. The explanatory power of academic stress caused by these factors was 37.3%. Kim Ji-young's study showed that major satisfaction, school life satisfaction, online education effect, health status, and standard of living had significant effects in the Corona-19 situation [40], showing similar results for major satisfaction. However, since this study did not investigate other variables, direct comparison was not possible.

Changes in life of college students after COVID-19, the degree of travel was 1.52 points out of four points, and the degree of meeting with friends was 1.79 points, showing two points or fewer (decreased). The degree of use of digital devices (including mobile phones) outside of class was 3.32 points, the level of life stress was 2.75 points, the degree of academic stress due to online classes was 2.45 points, and the degree of leisure life was 2.18 points, showing 2 points or more (increased). It seems that after COVID-19, interpersonal relationships among college students have decreased due to social distancing and quarantine management, and travel to other areas or overseas has decreased due to movement restrictions due to infectious diseases. In addition, the use of digital devices for non-class purposes increased, and it was found that students' academic and life stress increased through online classes. This result is consistent with the research result of Kim In-gu [35], which showed that academic stress increased due to online classes. In order to increase the learning satisfaction of students due to online classes, it is necessary to develop various teaching methods and methods to promote mutual communication. In addition, continuous efforts and research on the development and operation of appropriate teaching and learning programs for online classes are required.

## **6. CONCLUSIONS**

This study confirms the degree of academic stress, depression, optimism, and life changes of college students after COVID-19 in the COVID-19 situation. It is also a technical study to provide basic data for the development and application of programs to reduce the learning stress of college students by identifying the effect on academic stress.

Under the COVID-19 situation, academic stress, depression, and optimism of college students had a significant effect on department satisfaction and personality. That is, the higher the academic stress and depression, the lower the department satisfaction and the negative tendency of personality. The higher the optimism, the higher the department satisfaction and it was found that the personality showed a positive trend. As academic stress increased, depression also increased, and as academic stress decreased, optimism increased. In other words, it was confirmed that academic stress is an important influencing factor on depression and optimism. Reduction of academic stress seems to be essential to lead a positive daily life such as optimism of college students, and it seems that it is necessary to develop various educational programs to reduce the learning stress of college students in the context of COVID-19.

The research proposal is as follows. First, since the study was conducted with some universities, there is a limit to generalization, so it is necessary to expand the sample and continuously verify it through repeated studies. Second, by identifying characteristics related to online class methods of college students, repeated research on various variables affecting academic stress is suggested. Third, as a self-report questionnaire, this study has limitations in reflecting objective measurement values. Therefore, in order to supplement the shortcomings of the questionnaire, follow-up research should be conducted in the form of data collection that can be obtained through interviews and observations, and short-term and long-term counseling

## **7. ACKNOWLEDGEMENTS**

### **Authors' contributions**

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all

the aspects of this work.

#### Declaration of Conflicts of Interests

Authors declare that they have no conflict of interest.

#### Declarations

Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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