

Effect of depression on suicidal ideation of high school students in Korea: Mediating effect of gratitude and moderated mediating effect of growth mindset

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Abstract

Background

In modern times in Korea, depression among adolescents is very serious, and the number of adolescents who experienced depression was 20.3% in the first year of middle school to 29.0% in the third year of high school. Therefore, interest in identifying the causes of depression and reducing it is important, and academic interest in preventing suicide due to depression is also very important. **Objectives** This study aimed to present a model that can reduce the effect of depression on suicidal ideation through gratitude and growth mindset by examining the moderated mediating effect of the growth mindset. **Methods** The participants were 311 high school students residing in the northwestern part of Chungnam province in South Korea, who are selected using a convenience sampling method. For data collection, a paper questionnaire was performed. For statistical techniques, frequency analysis, reliability analysis, Pearson's bivariate correlation analysis, and moderated mediation effect analysis were applied. **Results** First, depression showed negative correlation with gratitude and growth mindset, and positive correlation with suicidal ideation. Gratitude showed a positive correlation with growth mindset, negative correlation with suicidal ideation, and growth mindset showed negative correlation with suicidal ideation. Second, the conditional direct effect of depression on suicidal ideation was significant in all three conditions of the growth mindset. And the conditional indirect effects were significant in the M and M+SD values of the growth mindset, and the moderated mediating effect was verified. **Conclusions** First, depression showed negative correlation with gratitude and growth mindset, and positive correlation with suicidal ideation. Gratitude showed a positive correlation with growth mindset, negative correlation with suicidal ideation, and growth mindset showed negative correlation with suicidal ideation. Second, the conditional direct effect of depression on suicidal ideation was significant in all three conditions of the growth mindset. And the conditional indirect effects were significant in the M and M+SD values of the growth mindset, and the moderated mediating effect was verified.

Keywords: depression, suicidal ideation, gratitude, growth mindset, high school student

Introduction

Suicidal ideation is defined as a preoccupation with thoughts of ending one's life [1]. Considering that suicidal behavior comprehensively encompasses the continuous concepts of suicidal ideation, suicidal plan, and suicidal attempt [2], it can be judged that suicidal attempt begins with suicidal ideation. In particular, suicidal ideation in adolescents affects adult suicide attempts [3]. In order to prevent suicide attempts in advance, research on suicidal ideation in adolescence is very important.

On the other hand, depression is one of the most important factors that can predict suicidal ideation as well as occur frequently during adolescence. Depression is a well-known yet serious psychiatric disorder that causes a series of physical and psychological problems [4]. Depression refers to a feeling of depression, guilt, worthlessness, and hopelessness, and as the feeling of depression continues, symptoms such as psychomotor delay, decreased appetite, and sleep disturbance appear [5]. In modern times, depression among adolescents is very serious, and according to the data from Statistics Korea from 2005 to 2020, the number of adolescents who experienced depression was 20.3% in the first year of middle school to 29.0% in the third year of high school [6]. Therefore, it is important to understand the cause of depression and how to reduce it, and academic interest in preventing suicide due to depression is also very important.

Meanwhile, many studies have been conducted to investigate the direct causal relationship between depression and suicidal ideation, both at home and abroad [7, 8, 9, 10]. However, studies on the mediating and moderating variables in the relationship between depression and suicidal ideation are rare. Furthermore, there are few studies on the moderated mediating effect that integrates the mediating and moderating variables. Therefore, this study aims to find a way to reduce suicidal ideation by identifying moderated mediators that integrate mediating and moderating variables rather than a direct causal relationship between depression and suicidal ideation. To this end, by inputting gratitude as a mediating variable and a growth mindset as a moderating variable, this study is to analyze whether the mediating effect of gratitude is moderated by the growth mindset.

Gratitude is defined as a tendency to express thanks when receiving help [11] or a generalized tendency to recognize and appreciate the contribution of others to a positive experience or outcome [11]. Such gratitude was reported to be related to depression, an independent variable, and suicidal ideation, a dependent variable, in this study. In a longitudinal study of university students, gratitude had an effect on the reduction of depression [12], and in a study of Italian adults, gratitude also reduced depression [13]. Also, in a study of 814 college students, gratitude had an effect on the reduction of suicidal ideation [14], and in a study on Chinese adolescents, gratitude also contributed to the reduction of suicidal ideation [15]. In addition, gratitude played a mediating role in the relationship between forgiveness and life satisfaction [16], and in the relationship between depression and happiness in the study of high school students [17]. In previous studies, it is revealed that depression affected gratitude, which in turn affected suicidal ideation, and gratitude played a mediating role. So this study was empirically to verify that gratitude is predicted to mediate in the relationship between depression and suicidal ideation in high school students

On the other hand, the growth mindset, a moderating variable, is emerging as a positive psychological variable that predicts success in various fields. According to the implicit theory, there are entity and incremental theories for recognizing or interpreting intelligence, personality, and morality [18]. Entity theory refers to the belief that intelligence is fixed and does not change easily with individual effort, whereas incremental theory refers to the belief that intelligence is fluid and can be changed through effort [19,20] named the entity theory as a fixed mindset and the incremental theory as a growth mindset. In other words, a growth mindset is closely related to a successful life with the belief that human intelligence (IQ) and personality can be changed through learning and effort [21]. According to previous studies, it has been reported that people with a growth mindset view a situation as an opportunity to learn when faced with a challenge, show high resilience when there is an obstacle, and respond to the obstacle as part of learning [22,23]. Conversely, people with a fixed mindset tend to view

challenges as an evaluation of their abilities because they believe that their abilities cannot be changed, focus on 'looking competent', pursue only familiar challenges, and avoid challenges that can fail [24].

A number of studies have identified a growth mindset to play a moderating role. In the moderating effect analysis, the group with a high growth mindset showed a relatively small increase in depression when cyberbullying damage increased, whereas the group with a low growth mindset showed a relatively higher increase in depression when cyberbullying increased. In the moderated mediating effect analysis, as the growth mindset increased, the effect on cyberbullying → psychological stability → depression gradually decreased. So, a growth mindset played a moderated mediating role [25]. In addition, the growth mindset moderated the effect of the attitude toward tourism on the sense of meaning in life [26]. That is when the positive attitude toward tourism increased in the group with a high growth mindset compared to the group with a low growth mindset, the sense of meaning in life increased more steeply. And the relationship between hope and organizational effectiveness was moderated by the growth mindset. When hope increased, organizational effectiveness increased. As the growth mindset increased, the effect of hope on organizational effectiveness further increased, and the growth mindset played a moderating (synergistic) role [27]. Based on the results of these previous studies, the growth mindset is expected to play a buffering role by moderating the relationship between depression and suicidal ideation.

Objectives

Therefore, this study aimed to present a model that can reduce the effect of depression on suicidal ideation through gratitude and growth mindset by examining the moderated mediating effect of the growth mindset in the effects of depression on suicidal ideation through gratitude for high school students. To achieve this purpose, the following research questions were established.

First, what is the correlation between depression, gratitude, growth mindset, and suicidal ideation?

Second, does the growth mindset moderate the path (relationship) of depression → gratitude → suicidal ideation (conditional indirect effect)?

Research method

Research model

The research model of this study was set up as shown in [Figure 1]. A model was established to test the effects that gratitude plays a mediating role between depression and suicidal ideation in high school students, and a growth mindset has a moderating effect (conditional direct effect) that moderates the relationship between depression and suicidal ideation, and moderate the mediating pathway of depression → gratitude → suicidal ideation (conditional indirect effect). This model was analyzed according to the moderated mediating effect analysis procedure, which is Model 15 of PROCESS macro ver. 4.1.

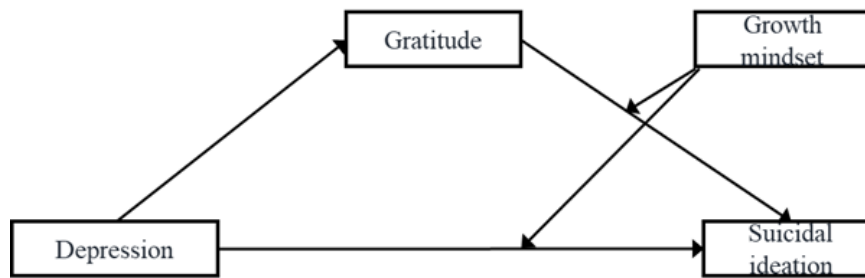


Figure 1. *Research model*

Participants and data collection

The participants of this study were limited to high schools in Chungcheongnam-province, where it is easy to apply the research results. The subject of this study was students enrolled in high school. Considering the possibility of generalization, two cities and a county of Chungcheongnam were intentionally selected, and then two high schools in each city and county were selected. Students whose gender and grade were equally distributed was intentionally sampled.

A questionnaire was used to collect data, and after visiting high schools, researcher explained the principal and teachers the purpose of the questionnaire, and after obtaining the consent of the students, the questionnaire was distributed. Excluding the poor questionnaire, 311 questionnaires were used for the final analysis.

The participants were 47.9% male and 52.1% female, and the ratio of males and females was similar, with 51.4% of sophomores and 88.4% of residences in small and medium-sized cities. As for the family composition, the number of students living with both parents was high at 87.7%.

Research tools

Depression

For depression, a scale adapted by [28] among the subscales of SCL-90 was used, and consists of 10 items such as “I worry too much about things I don’t need to worry about” and “I feel like I’m at a dead end”. Each item is on a 5-point Likert scale ranging from 1 “not at all” to 5 “always”, with higher scores indicating higher depression. The reliability of depression was Cronbach's α of .888.

Gratitude

For gratitude, the Korean version of the gratitude scale (K-GQ-6), which was adapted by [29] from the gratitude questionnaire (CQ-6) developed by [30] was used. This scale consists of 6 items, such as “I have so many things to be grateful for in my life” and “If I could list everything I have been grateful for so far, it would be very long”. Each item is on a 5-point Likert scale ranging from 1 for “not at all” to 5 for “always”, with higher scores indicating higher gratitude. The reliability of gratitude Cronbach's α was .857.

Growth mindset

The growth mindset which was developed by [20] and adapted by [31] was used. This scale consists of 4 items measuring beliefs about changes in intelligence, such as “Human intelligence (IQ) is innate and cannot be changed (inverted items)” and 4 items measuring beliefs about personality changes such as “can change” People have different personalities, but

everyone can change their own personality.” It is a total of 8 items. Each item is on a 5-point Likert scale ranging from 1 “not at all” to 5 “always”, with a higher score indicating a higher growth mindset. The reliability of the growth mindset was Cronbach's α was .807.

Suicidal ideation

The suicidal ideation scale which [32] adapted the Suicidal Ideation Scale developed by [33] was used. It consists of 5 items. Each item is on a 5-point Likert scale ranging from 1 for “not at all” to 5 for “always”, with higher scores indicating higher suicidal ideation. The reliability of the suicidal ideation was Cronbach's α .931.

Data analysis

In this study, SPSS PC+ Win. Ver. 25.0 and SPSS PROCESS macro Ver. 4.1 were used for analysis. Frequency analysis was performed to identify the trends of variables, and Cronbach's α , an internal consistency reliability coefficient, was calculated to determine the reliability. To understand the correlation between variables, Pearson's bivariate correlation analysis was applied, and model 15 of the SPSS PROCESS macro was used to analyze the moderated mediating effect. In the moderating effect analysis, the confidence level was set at 95%, the number of bootstrap samples was set at 5,000, and the conditions for confirming the conditional effect were set to M and $M \pm SD$, and the independent and moderating variables were analyzed after centering the mean.

Results

Correlation between variables

As a result of analyzing correlations between variables using Pearson correlation analysis, depression showed a negative correlation with gratitude ($r = -.401$, $p < .01$) and growth mindset ($r = -.231$, $p < .01$), and a positive correlation with suicidal ideation ($r = .677$, $p < .01$). The gratitude showed a positive correlation with the growth mindset ($r = .273$, $p < .01$), and a negative correlation with the suicidal ideation ($r = -.423$, $p < .01$), and the growth mindset showed a negative correlation with suicidal ideation ($r = -.178$, $p < .01$). Among them, the correlation coefficient between depression and suicidal ideation was the highest, followed by gratitude and suicidal ideation.

As a result of comparing the averages of major variables, gratitude and growth mindset were higher than the median value of 3 points, but depression was lower than the median value, and suicidal ideation was the lowest with an average of 1.8354.

Table 1. *Correlation between major variables and descriptive statistics*

	Depression	Gratitude	Growth mindset	Suicidal ideation
Depression	1			
Gratitude	-.401**	1		
Growth mindset	-.231**	.273**	1	
Suicidal ideation	.677**	-.423**	-.178**	1
M	2.5990	3.7924	3.3453	1.8354
SD	0.81238	0.73788	0.76589	1.01976

** $p < .01$

Moderate mediating effect of a growth mindset

The moderate mediating effect of the growth mindset using SPSS PROCESS macro Ver. 4.1 was analyzed. Model 15 of the SPSS PROCESS macro was used for moderate mediating effect analysis. In the effect analysis, the confidence level was set at 95%, the

number of bootstrap samples was set at 5,000, and the conditions for confirming the conditional effect were set to M and $M \pm SD$, and the independent and moderating variable were analyzed after centering the mean.

First, it was analyzed whether the growth mindset moderated the relationship between depression and suicidal ideation, and gratitude and suicidal ideation. Depression had a positive effect on suicidal ideation (.7732, $p < .001$), and the interaction term of depression and growth mindset had a negative and significant effect on suicidal ideation (-.2467, $p < .001$). That is, the growth mindset moderated the relationship between depression and suicidal ideation, and in particular, played a buffering role in alleviating the positive effect of depression on suicidal ideation.

Also, gratitude had a negative effect on suicidal ideation (-.2276, $p < .001$), and the interaction term between gratitude and growth mindset also had a significant negative effect on suicidal ideation (-.2420, $p < .01$). That is, the growth mindset moderated the relationship between gratitude and suicidal ideation, and as gratitude increased, suicidal ideation decreased, and the growth mindset made this decrease larger.

Next, as a result of analyzing the conditional effect (M , $M \pm SD$) of depression according to the growth mindset, the conditional effect of depression according to the growth mindset was significant in all three conditions. When the growth mindset increased (-.7659 \rightarrow .7659), the positive effect of depression on suicidal ideation decreased (.9621 \rightarrow .5849), and thus the growth mindset played a buffering role.

As a result of analyzing the conditional effect (M , $M \pm SD$) of gratitude according to the growth mindset, the conditional effect of gratitude according to the growth mindset was significant in all three conditions. When the growth mindset increased (-.7659 \rightarrow .7659), the negative effect of gratitude on suicidal ideation increased (-.0423 \rightarrow -.4130), and the growth mindset played a synergistic role.

As a result of analyzing the significance area of Johnson-Neyman, the conditional effect of depression according to the growth mindset was significant in all areas as the growth mindset increased.

On the other hand, the conditional effect of gratitude according to the growth mindset was significant only in the area where the growth mindset value was higher than -.3658, which accounted for 73.0% of the survey subjects. And the value of growth mindset was no longer significant in areas lower than -.3658, and these areas occupied 27.0% of the survey subjects. This means that when the growth mindset is higher than -.3658, the growth mindset moderates the effect of gratitude on suicidal ideation.

Since the moderating effect of the growth mindset was statistically significant, the results of visualizing the moderating effect to confirm the form are shown in [Figure 2] and [Figure 3]. In order to confirm the pattern of significant interaction, the slope of the growth mindset, which is a moderating variable, was examined according to the low ($M - SD$), medium (M), and high ($M + SD$) conditions. Looking at [Figure 2], as depression increased, suicidal ideation increased, and the group with a low growth mindset showed a steeper increase in suicidal ideation than the group with a high growth mindset. As shown in Figure 3], as gratitude increased, suicidal ideation decreased, and the group with a high growth mindset showed a steeper decline in suicidal ideation than the group with a low growth mindset.

Table 2. *Moderating effect of growth mindset in the moderated mediation model*

Items	Mediating variable model (DV: Gratitude)			Dependent variable model (DV: Suicidal ideation)			
	Coeffect	SE	t value	Coeffect	SE	t value	
Constant	.0000	.0384	.0000	1.8371	.0421	43.6500***	
IV	Depression	-.3640	.0473	-7.6881***	.7732	.0560	13.8146***
Mediator	Gratitude			-.2276	.0620	-3.694***	
Moderator	Growth mindset			.0466	.0565	.8238	
	Depression × growth mindset			-.2467	.0667	-3.7016***	
Interaction	Gratitude x growth mindset			-.2420	.0790	-3.0630**	
Conditional effects of depression according to a growth mindset							
Growth mindset	Effect(B)	se	t value	LLCI	ULCI		
	-.7659	.9621	.0761	12.6401***	.8123	1.1119	
	.0000	.7732	.0560	13.8146***	.6630	.8833	
	.7659	.5842	.0754	7.7497***	.4359	.7325	
Johnson-Neyman's Conditional Effect Significance Area							
Growth mindset	Effect(B)	se	t value	LLCI	ULCI		
	-2.3453	1.3518	.1665	8.1166***	1.0241	1.6795	
			∴				
	1.6547	.3649	.1232	2.9621**	.1225	.6073	
Conditional effect of gratitude according to the growth mindset							
Growth mindset	Effect(B)	se	t value	LLCI	ULCI		
	-.7659	-.0423	.0904	-.4678	-.2201	.1355	
	.0000	-.2276	.0620	-3.6694***	-.3497	-.1056	
	.7659	-.4130	.0828	-4.9883***	-.5759	-.2501	
Johnson-Neyman's Conditional Effect Significance Area							
Growth mindset			% below		% above		
	-.3658		27.0096		72.9904		
Johnson-Neyman's Conditional Effect Significance Area							
Growth mindset	Effect(B)	se	t value	LLCI	ULCI		
	-2.3453	.3399	.2005	1.6957	-.0545	.7344	
			∴				
	-.5453	-.0957	.0786	-1.2177	-.2502	.0589	
	-.3658	-.1391	.0707	-1.9678	-.2782	.0000	
	-.3453	-.1441	.0699	-2.0605*	-.2816	-.0065	
			∴				
	1.6547	-.6281	.1397	-4.4951***	-.9030	-.3531	

* p<.05, ** p<.01, *** p<.001

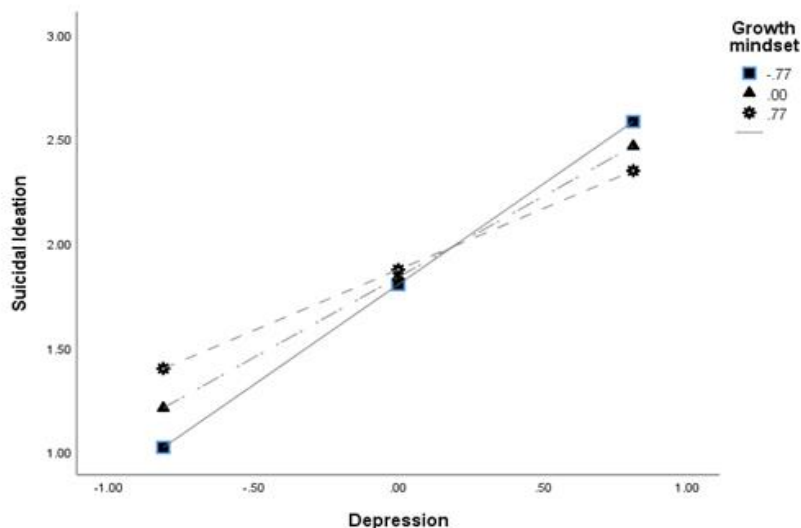


Figure 2. Moderating effect of growth mindset between depression and suicidal ideation

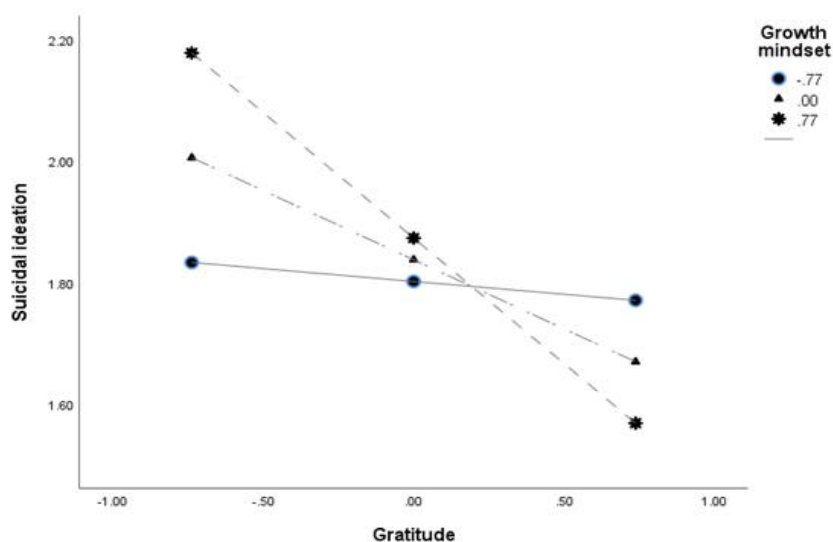


Figure 3. Moderating effect of growth mindset between gratitude and suicidal ideation

The effect of depression on suicidal ideation via gratitude was analyzed whether growth mindset moderates the mediating effect. First, the conditional direct effect of depression on suicidal ideation was significant in all three conditions of the growth mindset, and as the growth mindset increased, the effect of depression on suicidal ideation decreased.

Next, it was analyzed whether the growth mindset moderates the effect that gratitude mediates the effect of depression on suicidal ideation. As a result, the conditional indirect effects were significant in the M and M+SD values of the growth mindset, and the moderated mediating effect was verified. That is, when the growth mindset increased from M to M+SD, the effect of depression on suicidal ideation via gratitude increased, and the growth mindset played a synergistic role.

The moderated mediating effect index of the effect of depression on suicidal ideation through gratitude was .0881, and there was no 0 between the lower and upper limits (.0226 ~ .1565) in the bootstrap confidence interval (CI), so the moderated mediating effect index was statistically significant.

Table 3. *Conditional direct and indirect effects according to a growth mindset*

Conditional direct effect (Depression → Suicidal ideation)					
Growth mindset	Effect(B)	se	t value	LLCI	ULCI
-.7659	.9621	.0761	12.6401***	.8123	1.1119
.0000	.7732	.0560	13.8141***	.6630	.8833
.7659	.5842	.0754	7.7497***	.4359	.7325
Conditional indirect effect (Depression → Gratitude → Suicidal ideation)					
Growth mindset	Effect(B)	BootSE	BootLLCI	BootULCI	
-.7659	.0154	.0326	-.0449	.0857	
.0000	.0828	.0268	.0363	.1427	
.7659	.1503	.0415	.0770	.2406	
Index of moderated mediation					
Growth mindset	Index	BootSE	BootLLCI	BootULCI	
	.0881	.0339	.0226	.1565	
		*** p<.001			

Discussion

This study examined the moderated mediating effect of a growth mindset in the effects of depression on suicidal ideation through gratitude in high school students. The discussion based on the results of the study is as follows.

First, depression showed negative correlation with gratitude and growth mindset, and positive correlation with suicidal ideation. Gratitude showed a positive correlation with growth mindset, negative correlation with suicidal ideation, and growth mindset showed negative correlation with suicidal ideation. These findings were consistent with studies showing a positive relationship between depression and suicidal ideation [7-10] Also, it was consistent with the research results that depression showed a negative relationship with gratitude [12], and gratitude showed a negative relationship with suicidal ideation [15]. Therefore, the correlation results of this study were consistent with the results of other studies.

Second, the growth mindset played a role in buffering the relationship between depression and suicidal ideation. As depression increased, suicidal ideation increased. Suicidal ideation increased sharply in the group with a low growth mindset, whereas it increased gently in the group with a high growth mindset. It is judged that the growth mindset plays a role in preventing the increase in suicidal ideation according to the increase in depression. Such a reason can be interpreted as a belief that people with a high growth mindset find ways to reduce suicidal ideation, and if they work hard, they can reduce suicidal ideation. These results were partially consistent with the research results that a growth mindset plays a buffering role [25].

Also, the growth mindset played a role in increasing the negative effect of gratitude on suicidal ideation. That is, as gratitude increases, suicidal ideation decreases, and as growth mindset increases, the width of this decrease increases. These results were also found in the moderated mediating effect in the present study. In other words, the growth mindset played a role in enhancing the negative effects of depression on suicidal ideation through gratitude. These results were in line with the research results that a growth mindset plays a synergistic role in moderated mediation model [26,27). However, a moderated mediating effect was verified for the growth mindset in the M and M+SD conditions, and the moderated mediating effect was not verified for the growth mindset in the low condition (M-SD). This suggested that the growth mindset should be somewhat higher.

In conclusion, the growth mindset played a buffering role in the relationship between depression and suicidal ideation and a moderating role with mediating role of gratitude, both of which decreased suicidal ideation. These results sufficiently suggested the possibility of using a growth mindset to reduce suicidal ideation in counseling or education fields.

The limitations of the study and suggestions for follow-up studies are as follows. First, this study sampled high school students from 3 cities located in one province. If possible, a nationwide sampling and a plan to expand the study target for middle school students with high depression or suicidal ideation during puberty are needed. Second, depression is a disease experienced by a significant number of adolescents, and suicidal ideation may increase due to such depression. In order to solve this problem, research on solving depression and suicide should be continued by inputting psychological variables not addressed in this study as mediating and moderating variables.

Despite the limitations of this study, this study is meaningful in that it determines whether the growth mindset plays moderated mediating role through gratitude targeting adolescents with high suicidal ideation, and suggests a model to reduce the suicidal ideation of adolescents through these results.

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