The Moderating Effects of Growth Mindset on the Relationship between Academic Grades and Self-Esteem

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Abstract: The purpose of this study was to investigate the moderating effect of growth mindset on the relationship between academic grades and self-esteem among 350 adolescents in Korea. For the analysis, SPSS Win.21.0 and SPSS MACRO process were used. Reliability analysis, descriptive statistics, correlation analysis, mean comparison analysis, path analysis and biased correction bootstrap were conducted. Results of the study are as follow. First, there was a statistically significant correlation between academic grades, self-esteem and growth mindset. Second, in the macro process analysis, the conditional effect of academic grades on self-esteem was significant and regression coefficients of interaction of academic grades and growth mind set were statistically significant. The effect of academic grades on self-esteem was validated relative to dependence on growth mindset. Third, as a result of bootstrapping, growth mindset regulated the relationship between academic grades and self-esteem in the group with high growth mindset but not in the low group. Results will be used as a new model for the interaction of academic grades and growth mindset that can enhance self-esteem.

Key words: Self-esteem, academic grades, growth mindset, moderating effect, SPSS macro process, group

INTRODUCTION

Self-esteem is defined as self-concept or self-efficacy (Durlak *et al.*, 2011) and a subjective degree of liking, respecting and valuing self (Rosenberg, 1965). Low self-esteem has negative consequences for self-confidence and interpersonal relationships (Greenberg *et al.*, 1983). Adolescents with high are more likely to cope with stress and to have problem-solving abilities (Hong and Jeon, 2005) and successful social activities through active self-expression (Lee and Park, 2004). Self-esteem of adolescents that grows rapidly physically and mentally and establishes self-identity is critical.

Academic grades are among variables affecting self-esteem of adolescents in academic-oriented Korean society. For teenagers in secondary school, academic achievement is a central focus of their lives because they perceive that 'grades' are significant indicators of predicting future social status (Choi and Oh, 2010). Academic achievement has a positive relationship to self-esteem (Sohn and Heo, 2016; Kim, 2001; Park, 2003; Campbell, 1990) and has a positive effect on school life adaptation and research continues to be a critical factor for adolescents.

Recently, academic interest has been focused on 'mindset' based on positive psychology and brain science. Mindset was proposed by psychologist Dweck (2000) after many years of research success. Bandura and Dweck (1981) classify student's belief of their abilities as entity and incremental theories (Dweck and Leggett, 1988) and argued that intelligence may be changed as growth mindset of incremental theory. Because people with growth mindset are grounded in the brief that human intelligence can be enhanced they seek long-term growth and development focusing learning and effort on tasks and they do not avoid challenges (Dweck, 2006). Growth mindset has a positive effect on academic performance (Aronson *et al.*, 2002; Blackwell *et al.*, 2007; Good *et al.*, 2007; Grant and Dweck, 2003).

Most previous studies have focused on the relationship between academic achievement and self-esteem or between academic achievement and mindset but none have identified the role of growth mindset in the relationship between academic grades and self-esteem.

Therefore, this study was conducted to determine if the growth mindset of adolescents moderates the effect of school achievement on self-esteem. To achieve the objective of this study the following research questions were developed. First, what is the correlation between

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academic grades, self-esteem and growth mindset? Second, does growth mindset control the relationship between academic grades and self-esteem? Third, what is the conditional indirect effect of growth mindset value?

MATERIALS AND METHODS

Research model: The main analytical method of this study is the model 1 moderating effect analysis of the macro process. The conceptual research model is shown in Fig. 1.

Survey subjects and methods of data collection: This study purposively selected the subjects. Questionnaires were distributed to 351 adolescents in S City in Chungcheong Province and 350 questionnaires except for an unfair questionnaire were input for analysis. Survey subjects consisted of 61.4% women and 38.6% men. There were 54.0% high school students and 35.0% middle school students. For age 12-17, groups were distributed and 25.6% of 15 year olds was the most. And 57.8% of respondents said their academic grades were medium, 26.9% of them were not good and 15.3% were good.

Survey tools
Self-esteem: The Self-Esteem Scale (RSES) developed by Rosenberg (1965) was used in this study. The scale consists of 10 items and measurement was scored on 5-point Likert scale from 'not at all' to 'highly agree'. The higher the score, the higher self-esteem. The overall reliability of Cronbach's α in this study was 0.746.

Growth mindset: The growth mindset scale developed by Dweck (2006) and used by Lee *et al.* (2016) was used. The scale consisted of four items measuring belief about change in intelligence and four items measuring belief about personality change. Measurements were scored on a 5-point Likert scale from 'not at all'-'highly agree'. The higher the score, the higher the growth mindset. In this study, the reliability of growth mindset was Cronbach's α of 0.735.

Academic grades: Academic grades were measured as one item, on a 5-point Likert scale and students were asked to fill in their grades directly.

Data analysis: In this study, SPSS Win. 21.0 and Hayes (2013) proposed SPSS macro process (http://www. afhayes.com) were used. SPSS Win. 21.0 was used for
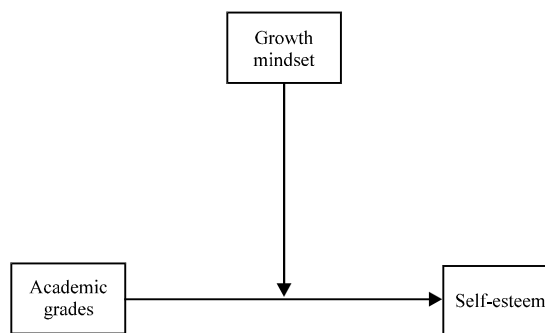

Fig. 1: Conceptual research model

frequency, reliability analysis and correlation analyses. Moderating effect was analyzed using SPSS macro process and the model was verified by applying bootstrapping.

RESULTS AND DISCUSSION

Correlation and descriptive statistics: Table 1 reveals results of Pearson's correlation analysis identifying correlation among variables. There was a statistically significant correlation between academic grades, self-esteem and growth mindset. Results are in line with the study that there is a statistically significant relationship between academic achievement and self-esteem (Kim, 2001; Park, 2003; Campbell, 1990) and that there is a statistically significant correlation between growth mindset and academic achievement (Park and Hyun, 2013).

The correlation coefficient between self-esteem and growth mindset was the highest at r = 0.529. The correlation coefficient between self-esteem and academic grades was r = 0.206 and academic grades and growth mindset was r = 0.134. The higher academic grades and growth mindset, the higher the self-esteem. Mean scores of self-esteem and growth mindset exceeded the middle point (3 points) and school grades did not exceed the middle point.

Verification of moderating effect: Table 2 reveals results of the hierarchical regression analysis determining the interaction effect of independent variables and mediating variables on dependent variables. Durbin-Watson was 1.940 and tolerance was 0.019-0.982 that was within normal range. First, we put academic grades, second, growth mindset, third, the interaction item of academic grades and growth mindset.

Academic grades had a negative effect on self-esteem in model 1 and 2 and negative effects in model 3 where an interaction item was inserted. Results were supported by

Table 1: Correlation and descriptive statistics

Variables	Academic grades	Self-esteem	Growth mindset	M	SD
Academic grades	1			1.88	0.64
Self-esteem	0.206**	1		3.50	0.62
Growth mindset	0.134*	0.529**	1	3.56	0.66

*p<0.05, **p<0.01

Table 2: Hierarchical regression analysis on self-esteem

Independent variables	Self-esteem		
	Model 1 B(β)	Model 2 B(β)	Model 3 B(β)
Academic grades	0.198(0.206) ***	0.132(0.137) **	-0.607(-0.631)*
Growth mindset		0.479 (0.513)***	0.092(0.098)
Academic grades X Growth mindset			0.209(0.930)*

F = 15.250***, 73.862***, 52.946***; R² change = 0.42, 0.259, 0.016; R² = 0.042, 0.301, 0.317; *p<0.05, **p<0.01, ***p<0.001

Table 3: Moderating effect of growth mindset

Variables	β	SE	t-values	p-values
Growth mindset	0.0915	0.1429	0.6404	0.5223
Academic grades	-0.6072	0.2638	-2.3016	0.0220
Growth mindset ×Academic grades	0.2087	0.0735	2.8407	0.0048

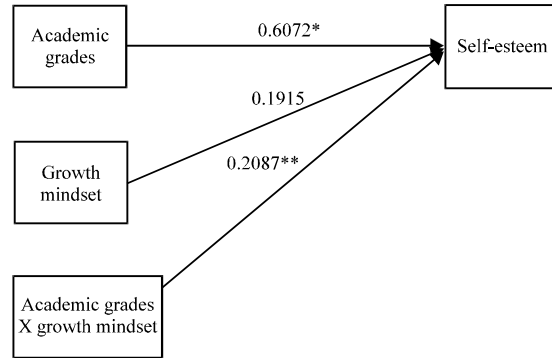R^2 increase depending on interaction; $R^2 = 0.0161$; F = 8.0698; p = 0.0048

Fig. 2: Statistical model (*, **significant values)

studies of the relationship between academic achievement levels and self-esteem (Sohn and Heo, 2016; Kim, 2001; Park, 2003; Campbell, 1990; Lee *et al.*, 2001) and the study that growth mindset had a statistically significant effect on academic achievement (Aronson *et al.*, 2002; Blackwell *et al.*, 2007; Good *et al.*, 2007; Grant and Dweck, 2003; Paunesku *et al.*, 2015; Dweck *et al.*, 1995; Stipek and Gralinski, 1996).

The total explanatory power of the independent variable was 31.7%. In model 3, interaction items between academic grades and growth mindset had a significant effect on self-esteem (t = 2.841, p = 0.005) validating the moderating effect.

Results and models of the moderation model using the macro process are shown in Table 3 and Fig. 2. The independent variable, academic grades had a significant negative impact on self-esteem (β = -0. 6072, p<0.05) that may be interpreted as such the self-esteem of a person with academic grades are one unit higher than that of a person with one-unit difference in academic grades is 0.6072 lower than the self-esteem of a person with academic grades are one-unit lower.

Growth mindset did not affect self-esteem but had a moderating effect on academic grades and self-esteem that was statistically significant (β = 0.2087, p<0.01). The negative effect of academic grades on self-esteem was a buffering effect that the negative effect decreased as growth mindset size increased.

Results indicate that the effect of academic grades on self-esteem depends on growth mindset and as academic grades increase, self-esteem decreases while the increase in growth mindset alleviates this decrease. The relationship between academic grades and self-esteem is different from previous studies (Sohn and Heo, 2016; Lee *et al.*, 2001) that academic achievement and academic attitudes have a positive effect on the self-esteem of adolescents. This suggests that the influence of the

independent variable on the dependent variable depends on the growth mindset, the moderating variable. The increment of R^2 from introduction of interactions was 0.0161 (p<0.01) and statistically significant.

Table 4 reveals conditional effects of independent variables on dependent variables at specific values of moderating variables. As a result, the simple slope of academic grades on self-esteem was significant at the level of growth mindset of 3.56 (M) or more. The effect of academic grades on self-esteem was insignificant when the growth mindset level was below the average (M-1 SD).

Table 4 presents significant areas by the Johnson-Neyman method for floodlight analysis for the full range of moderating variables. It is possible to understand in which area the moderating effect according to the control variable value is significant.

The effect of academic grades on self-esteem was significant only in areas in which growth mindset value was >3.3416 and decreased as growth mindset value decreased but was no longer significant in areas <3.3416.

This effect was significant for 41.04% of respondents but not for 58.96% of respondents. It is significant to note that academic grades are responsible for reducing self-esteem but a group with high growth mindset has no such negative effect.

The adjustment effect of growth mindset was statistically significant, so, the moderating effect was visualized to confirm its shape as shown in Fig. 3. To identify patterns of significant interaction, growth mindset was classified into low and high groups and variation of the mean was examined.

Table 4: conditional indirect effect according to growth mindset value

Conditional indirect effect	β	Boot Se	BootLLCI	BootULCI
M-1SD (2.90)	-0.0025	0.0642	-0.1289	0.1238
M (3.56)	0.1350	0.0434	0.0497	0.2204
M+1SD (4.22)	0.2726	0.0658	0.1431	0.4020

Value at growth mindset	β	SE	t-values	p-values
2.0000	-0.1899	0.1213	-1.5648	0.1186
2.1500	-0.1586	0.1111	-1.4270	0.1545
2.3000	-0.1272	0.1011	-1.2592	0.2088
2.4500	-0.0959	0.0912	-1.0517	0.2937
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3.2000	0.0606	0.0501	1.2078	0.2280
3.3416	0.0901	0.0458	1.9669	0.0500
3.3500	0.0919	0.0456	2.0135	0.0448
3.5000	0.1232	0.0435	2.8320	0.0049
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5.0000	0.4362	0.1155	3.7757	0.0002

Boot LLCI = Boot the lower bound of the indirect effect within 95% confidence interval; Boot ULCI = Boot the higher bound of the indirect effect within 95% confidence interval
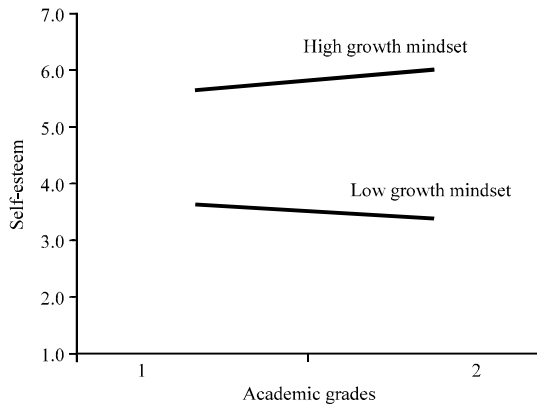

Fig. 3: The moderated effect of growth mindset on the relationship between academic grades and self-esteem

In the high growth mindset group, self-esteem also increased with the increase of academic grades but self-esteem decreased even with the increase of the academic grades.

CONCLUSION

This study was conducted to investigate the moderating effect of growth mindset on the relationship between academic grades and self-esteem among 350 adolescents in Korea. Results of the study are as follow. First, there was significant positive correlation between academic grades, self-esteem and growth mindset. Second, growth mindset had a moderating effect on buffering the relationship between academic grades and self-esteem. As academic grades increases, self-esteem decreases but as growth mindset increases this decrease is alleviated. Third, the effect of academic grades on self-esteem was significant only in areas in which growth mindset was above the mean value. In the group with high growth mindset, academic grades did not have a negative effect on self-esteem.

SUGGESTIONS

Suggestions for future research are as follow. First, the growth mindset of adolescents is the main variable in moderating the relationship between academic grades and self-esteem. Development and application of a practical activity program that can raise growth mindset as well as self-esteem of youth should be promptly followed.

Second, even if academic grades are high, if growth mindset is low, self-esteem is lower than that of other students. Special attention should be devoted to interpreting the process of verifying conditional effects. Third, it is necessary to conduct research on adolescents from various regions because there is a limitation on generalization because of limitation of the study area. However, it is meaningful to validate that growth mindset is a critical variable that moderates the relationship between academic grades and self-esteem among adolescents in Korea.

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