# Statistical Study on the Academic Achievement in Science of a Loneliness

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### Abstract

To explore effects on each friendship, family, romance, and community in sub-variables of loneliness on academic achievement in science for Y-middle school students, multiple regression analysis is carried out by stepwise method. As the results, I found the following facts. Academic achievement in science for the students was expressed by the following equation. Academic Achievement=48.765+4.012×[Family]($t$=2.082, $p$=.039)-3.957×[Romance]($t$=-3.147, $p$=.002)+5.281×[Community]($t$=2.965, $p$=.003). And each variable value of the explanatory power affecting academic achievement in science for the students is presented in order of community (12.0%), family (6.6%), and romance (6.3%). But the friendship variable is not significant in affecting academic achievement in science.

Keywords: Science, Academic Achievement, Loneliness

## 1. Introduction

In oder to see variables leading academic achievement and learning strategies, many workers have been doing various studies as follows.

Self-efforts were acted as a significant predictor of academic achievement in chemistry and physics. Boys who were more interested in physics and chemistry achieved higher scores, but girls' level of interest was not correlated with their classwork[1]. Students' self-concept was used as the good predictors of academic achievement in a natural science and a desirable educational outcome per times[2]. Self-efficacy, achievement need, and entity theory of intelligence were used as middle variables between goal orientation and 'self-handicapping tendency and learning strategy' in the path model of chemistry[3]. Achievement need and self-handicapping tendency were used as mediative variables between performance goal and learning strategy in chemistry[4]. Anxiety in mathematics was certificated as important psychological factor that affects students' achievement and their general practices between male and female students. And the female students show high levels of anxiety in mathematics compared to male[5]. Science teachers playing an important role in students' choice of career should make efforts to realize the learner-centered curriculum and change students' science-related attitude into a positive direction[6]. Students showed the high academic achievement in the appropriate questions for their learning preference types in chemistry[7]. In the higher achievers, the scores of the feedback-computer assisted instruction (f-CAI) group in science learning motivation test were significantly higher than those of the CAI group. But in the lower them, there was no significant difference among the lower achievers of CAI, f-CAI, and situational context f-CAI groups[8].

The difference of self-concept was not observed for each gender. But the students having low loneliness were a negatively related to them having high self-concept. There was no significant difference between academic achievement and loneliness in terms of gender[9]. Loneliness, which is a natural part of human's life, is a separated context from the agent's social network and its effect, and also from his/her everyday life[10]. Recognizing the status of being alone, the loneliness have been stopped due to the continuous relationships between self and his/her environment which runs automatically[10]. In above two mentioned studies, the lone-

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liness variable was not divided to sub-variables and those is used without classification[9,10]. Nonetheless, in this paper I will proceed for study by classifying to friendship, family, romance, and community variable in sub-factors of loneliness. The sub-factors of loneliness that is, friendship, family, romance, and community variable will affect maybe positively or negatively students' academic achievement in science. And so in this paper a study of the academic achievement in science is proceeded by depending the sub-variables.

**Study Problem.** How do a friendship, family, romance, and community variable affect academic achievement in science for middle school students?

## 2. Experimental Section

**Subjects.** Subjects in the study were 205 students(male: 103, female: 102) in Mokpo Y-middle school during the second semester of 2013.

**Measures.** In the seventeenth week of class, students completed a questionnaire that included friendship, family, romance, and community in sub-variables of loneliness made by Schmidt and Sermat. According to them, the higher scale of each friendship, family, romance, and community was, the lower one of loneliness was[11]. Each friendship, family, romance, and community in sub-variables of loneliness inventory was consisted of 5 items measured on a 5-point Likert scale.

Herein, average score in science was 60.07. In this paper effects of each friendship, family, romance, and community in sub-variables of loneliness on academic achievement in science were studied using multiple regression analysis of SPSS 12.0 program.

## 3. Results and Discussion

How do a friendship, family, romance, and community variable affect academic achievement in science for middle school students?

In this paper to see effects of each friendship, family, romance, and community on academic achievement in science for middle school students, multiple regression analysis is carried out by stepwise method (Table 1). As analyzing Table 1, R square on multiple regression analysis of the family to academic achievement in science is 6.6%, which represents the explanatory power of 6.6% for the model 1 (family variable: F=4.578, p=.034) and has a significant value statistically. As shown in Table 1, whenever the variable is added, increase of R square values means change in the values of the explanatory power for the models. Analyzing the change in R square value, which is increased 6.3% (model 2: F=4.565, p=.012), and 12.0%(model 3: F= 6.091, p=.001) by adding romance, and community in order, respectively.

When seeing through the standardized regression

**Table 1.** Multiple Regression Analysis on a Loneliness' Effects of the Academic Achievement in Science

| Model | | Unstandardized coefficients | | Standardized coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. error | Beta | | |
| 1 | (Constant) | 45.469 | 5.044 | | 6.455 | .000 |
| | Family | 3.568 | 0.668 | .149 | 2.140 | .034 |
| | R square=.066, Adjusted R square=.058, F(p)=4.578(.034) | | | | | |
| 2 | (Constant) | 56.432 | 5.698 | | 6.488 | .000 |
| | Family | 3.915 | 0.662 | .163 | 2.356 | .019 |
| | Romance | -3.327 | 0.573 | -.146 | -2.115 | .036 |
| | R square=.129, Adjusted R square=.110, F(p)=4.565(.012) | | | | | |
| 3 | (Constant) | 48.765 | 5.918 | | 5.468 | .000 |
| | Family | 4.012 | 0.639 | .228 | 2.082 | .039 |
| | Romance | -3.957 | 0.679 | -.206 | -3.147 | .002 |
| | Community | 5.281 | 0.781 | .350 | 2.965 | .003 |
| | R square=.249, Adjusted R square=.231, F(p)=6.091(.001) | | | | | |

coefficients, academic achievement in science for the students was expressed by the following equation (1).

Academic Achievement=48.765+4.012×[Family]($t$= 2.082, $p$=.039)-3.957×[Romance] ($t$=-3.147, $p$=.002)+ 5.281×[Community]($t$=2.965, $p$=.003)　　　　(1)

Investigating the results of multiple regression models by Table 1 and equation (1), effects on the family, romance, and community in the sub-factors of the middle school students' loneliness to academic achievement in science should be seen under the influence at statistically significant level, $F$=6.091($p$=.001). That is, as shown in equation (1), academic achievement in science is positively related for each 4.012 and 5.281 of path coefficients to family and community variable but presents a negative relationship for 3.957 of that to romance variable.

Therefore judging above mentioned results, each variable value of the explanatory power affecting academic achievement in science for Y-middle school students is presented in order of community (12.0%), family (6.6%), and romance variable (6.3%). But friendship variable is not significant in affecting academic achievement in science for the students. And the higher each scale of community and family is, the higher academic achievement in science is. But the higher each scale of romance is, the lower academic achievement in science is.

## 4. Conclusion

Academic achievement in science is positively related for each 4.012 and 5.281 of path coefficient to family and community variable but presents a negative relationship for 3.957 of that to romance variable. $R$ square on multiple regression analysis of the family to academic achievement in science is 6.6%, which represents the explanatory power of 6.6% for the model 1 (family variable: $F$=4.578, $p$=.034) and has a significant value statistically. And whenever the variable is added, increase of $R$ square values means change in the values of the explanatory power for the models, which is increased 6.3% (model 2: $F$=4.565, $p$=.012), and 12.0% (model 3: $F$=6.091, $p$=.001) by adding romance, and community in order, respectively. But friendship variable is not significant in affecting academic achievement

in science for Y-middle school students. Also as in this study, it should be investigated by someone whether or not academic achievement in the other subjects is related to the loneliness.

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