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PRIVATE TUTORING AND ACADEMIC ACHIEVEMENT: SELF-STUDY AS A MEDIATOR

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I examined the relationships among private tutoring in mathematics, self-study, and academic achievement, in particular, the potential mediating role of self-study in the relationship between private tutoring and academic achievement. The responses of 3,689 Korean middle school students were analyzed. Results showed that private tutoring time positively predicted self-study time and academic achievement. Number of hours of self-study also predicted academic achievement and mediated the relationship between private tutoring and academic achievement. These findings showed that private tutoring increased the time students spent on self-study rather than replacing it. In addition, the positive effect of private tutoring on academic achievement was mediated by increased self-study time. Practical and theoretical implications are discussed.

Keywords: private tutoring, self-study, academic achievement, Korean middle school students, mathematics.

Throughout the world there has been a rapid expansion in *private tutoring* (Bray & Lykins, 2012), which is tuition that is paid for and provided independently of formal schooling (Hof, 2014). Although results of the effect of private tutoring on academic achievement are inconsistent (Choi, Calero, & Escardibul, 2012), researchers have found that private tutoring contributes to good examination performance (H. Kim, 2015; Liu, 2012; Zhao, 2015). In particular, private tutoring is effective in improving mathematics achievement (Choi et al., 2012; M.-S. Kim, Paik, & Ihm, 2016; Unal, Ozkan, Milton, Price, & Curva, 2010), including the performance of both high and low achievers (Cha, 2015). Few

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researchers have, however, examined mechanisms underlying the relationship between private tutoring and academic achievement.

It is difficult to identify the specific effect of private tutoring on academic achievement because of the influence of exogenous variables, such as family income and prior performance (Hof, 2014; Zhang, 2013). There may also be potential mediators in the relationship between private tutoring and academic achievement. For example, increased study time may function as a mediator in the relationship. Ireson (2004) and J. Y. Kim (2007) argued that the main effect of private tutoring is to extend the amount of time students spend studying. Cho and Park (2016) found that private tutoring time is positively correlated with self-study time, and J. Y. Kim (2007) found that students who receive private tutoring spend more time on independent study than students who do not, suggesting that hours spent in private tutoring do not replace hours spent in self-study.

Although results of studies on the relationship between self-study and academic achievement are inconsistent, empirical researchers have demonstrated that there is a causal relationship between self-study and academic achievement (Diseth, Pallesen, Brunborg, & Larsen, 2010; Doumen, Broeckmans, & Masui, 2014; Sun & Chung, 2013). Stinebrickner and Stinebrickner (2008) found that each additional hour of study increased students' grade point average by 0.36 in a range from 0 to 4 or 4.5, and J. Y. Kim (2007) found that each additional hour increased students' result on the Standardized Achievement Test from between 0.35 to 0.46%.

Researchers have investigated the network of relationships among private tutoring, self-study, and academic achievement. Sung and Kim (2010) and Sun and Chung (2013) found that self-study had a greater effect than private tutoring on academic achievement. Choi et al. (2012) stated that self-study may be a more efficient strategy in enhancing academic achievement than is private tutoring. However, Cho and Park (2016), Choi et al. (2012), and Y. B. Kim and Kim (2015) all found that the direct effect of self-study on academic achievement was smaller than that of private tutoring. It should be noted, however, that self-study and private tutoring were both treated as independent variables in these studies. Nevertheless, researchers have found a causal relationship between private tutoring and self-study (Cho & Park, 2016; Ireson, 2004). Thus, it is possible that self-study mediates the relationship between private tutoring and academic achievement.

In my study, I examined the relationships among private tutoring, self-study, and academic achievement, in particular, the potential mediating role of number of hours of self-study in the relationship between number of hours of private tutoring and academic achievement. Thus, I expected to shed light on how the number of hours of private tutoring improves academic achievement, and I also

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expected that the results would inform the development of education policies by the South Korean government in regard to encouraging self-study rather than private tutoring.

Method

Participants and Procedure

I used panel data collected for the Seoul Education Longitudinal Study by the Seoul Education Research and Information Institute in 2014 and 2015. I focused on mathematics because researchers have found that private tutoring is more effective for mathematics achievement than for other subjects (Choi et al., 2012; M.-S. Kim et al., 2016). The school samples for this panel were selected randomly. I analyzed data from two randomly chosen classes in each school sample. Participants were 3,689 students (boys = 1,755, girls = 1,644, missing data = 290) aged between 13 and 16 years (M = 14.93, SD = 0.27) at 319 middle schools in South Korea.

Students whose parents had permitted them to respond to the survey participated in this study. Participants and their parents were well informed about the survey in advance. Participants were asked to take the mathematics examination for 1 hour and to complete the self-report surveys in the classroom. Participants' parents also provided information about family income and the private tutoring of their children by mail.

Participants' prior achievement (general competence) in mathematics was obtained from 2014 data. Data that comprised the number of hours of private tutoring and self-study for mathematics, achievement in mathematics (general competence), and the family income were obtained from 2015 data.

Measures

The independent variable was participants' number of private mathematics tutoring hours per week (M = 4.51, SE = 2.48). Private tutoring involved attendance at private fee-charging educational institutes (75.4%), work with private tutors (18.6%), and use of privately published or online lectures (6.0%). To examine the reliability of the stated private tutoring hours, I compared these figures with parents' responses to participation in private tutoring. Consistency in the number of hours stated between participants' and their parents' responses was 98.85%. The 43 responses that were discrepant between participants' and their parents' responses were excluded from analysis.

The mediator variable was the amount of time participants spent per week studying mathematics independently or doing mathematics homework (M = 2.84, SE = 1.93). To examine the reliability and validity of self-study hours, I calculated the correlation between self-study hours and study attitude in regard to homework, preview, and review of mathematics rated on a 5-point Likert-type

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scale ranging from 1 = *not at all true* to 5 = *very true* (three items, $\alpha = .87$, $M = 3.75$, $SE = 1.02$). The correlation coefficient was statistically significant, ranging from $r = .32$ to .35).

The dependent variable was participants' mathematics score in the 2015 Academic Achievement Test based on the Korean national curriculum for mathematics and developed by the Seoul Education Research and Information Institute ($M = 15.72$, $SE = 8.87$; range of scores: 0–30; mean-square fit statistics: 0.72–1.63). The test is composed of 30 items, which include number sense and numeration, measurement, geometry and spatial sense, patterning and algebra, and data management and probability.

For participants' background factors, I used family income per month as reported by their parents, and their mathematics score in the 2014 Academic Achievement Test (30 items, $M = 15.38$, $SE = 8.31$; range of scores: 0–30; mean-square fit statistics: 0.78–1.47).

Data Analysis

I used three regression equations to determine whether or not self-study played a mediating role in the relationship between hours of private tutoring and academic achievement. According to Baron and Kenny (1986), mediation can be declared to exist only if the following conditions are met: (a) the independent variable significantly affects the mediator in the first equation; (b) the independent variable influences the dependent variable in the second equation; (c) the mediator affects the dependent variable in the third equation, and the effect of the independent variable on the dependent variable is less in the third equation than in the second. I also followed Hayes' (2013) approach to mediation, and computed bootstrap confidence intervals (CI) using PROCESS. I performed the Sobel test, a significance test for the indirect effect of the independent variable on the dependent variable via the mediator.

Results

I performed three sets of multiple regression analyses. In the first analysis, hours of private tutoring, family income, and prior achievement accounted for 15.8% of the variance in hours of self-study ($F = 151.61$, $p < .001$). In the second analysis, hours of private tutoring, family income, and prior achievement accounted for 51.6% of the variance in participants' academic achievement ($F = 863.33$, $p < .001$). In the third analysis, hours of private tutoring time, family income, prior achievement, and hours of self-study accounted for 52.3% of the variance in participants' academic achievement ($F = 661.74$, $p < .001$). In the third analysis, the result showed that controlling for the effect of self-study on academic achievement reduced the effect of hours of private tutoring on

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participants' academic achievement. The results of the multiple regression analyses are shown in Table 1.

Table 1. *Results of Regression Analysis of Relationships Among Variables*

Set	Independent variable	Outcome variable	*B*	*SE*	β	*t*
1	Hours of private tutoring	Hours of self-study	0.18	0.02	.23	11.67***
	Family income		0.00	0.00	.11	5.63***
	Prior achievement		0.05	0.01	.23	11.68***
2	Hours of private tutoring	Academic achievement	0.52	0.05	.15	9.89***
	Family income		0.00	0.00	.01	0.92
	Prior achievement		0.69	0.02	.66	43.97***
3	Hours of private tutoring	Academic achievement	0.45	0.05	.13	8.46***
	Family income		0.00	0.00	.00	0.246
	Prior achievement		0.67	0.02	.64	41.62***
	Hours of self-study		0.39	0.07	.09	5.75***

Note. *** $p < .001$.

The result using Hayes' (2013) approach to mediation was that the bootstrapped indirect effect was significant, 95% CI [0.214, 0.310]. If zero is not included in the CI, the indirect effect is significant (Hayes, 2013). The Sobel test statistic was 10.18. As Sobel statistic values above 1.96 or lower than -1.96 indicate a significant mediating effect (Baron & Kenny, 1986), I concluded that the hours of self-study significantly mediated the relationship between hours of private tutoring and academic achievement.

Discussion

Two major findings emerged from my examination of the relationships among academic achievement, and hours of private tutoring and self-study, and in particular, the mediating role of hours of self-study in the relationship between hours of private tutoring and academic achievement.

First, private tutoring appeared to be supplementary to, rather than a substitute for, self-study among the participants. The result that showed that time spent in private mathematics tutoring positively predicted time spent in self-study, and this is consistent with previous results (Cho & Park, 2016; J. Y. Kim, 2007). To understand why having private tutoring increases the amount of time spent on self-study, it is necessary to understand country-specific educational traditions and factors relating to educational systems and culture. Participants in this study were from South Korea, where there is an extensive private education system that has been developed because of the highly competitive nature of an examination, the passing of which determines entrance to upper school (An, 2015).

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I found it interesting, and in contrast to other countries, that in South Korea high achievers take more private lessons than low achievers (Korea National Statistical Office, 2016; Shin & Kim, 2010). This suggests that in South Korea the use of private tutoring is driven by student desire for enrichment rather than for remedial learning (Shin & Kim, 2010). To satisfy the needs of students and parents who want their child to achieve high scores and pass the entrance examination for a school that is highly rated by the educational authorities, Korean instructors in private educational institutes tend to teach material that is in advance of the standard curriculum, train students to mechanically problem solve, assign a lot of homework, and take complete control of students' learning (Y. C. Kim, Song, Joo, & Hwang, 2008; Lee & Kim, 2013). Therefore, one might expect a positive association between the amount of private tutoring that students receive and the number of assignments they have; in other words, it seems likely that when students have private tutoring this would lead to an increase in the time that they spend on self-study. This, in turn, suggests that time spent on private tutoring does not replace time spent on self-study, especially in Korea.

Second, according to my findings, the effect of hours of private tutoring on academic achievement appears to be significantly partially mediated by hours of self-study. Although the number of hours of private tutoring had a direct effect on academic achievement, it also had an indirect effect, through the mediation of hours of self-study. This result corroborated previous results that showed that having private tutoring had a positive effect on students' academic achievement (e.g., H. Kim, 2015; Liu, 2012; Unal et al., 2010). That result in my study is also consistent with previous findings indicating that there is a causal relationship between self-study and academic achievement (Diseth et al., 2010; Doumen et al., 2014; J. Y. Kim, 2007; Stinebrickner & Stinebrickner, 2008; Sun & Chung, 2013). Furthermore, this finding implies that the process of how private tutoring affects academic achievement may be complex, and many mediating factors may be involved in the factor of hours of self-study as a mechanism. Students who receive private tutoring may have to do homework assigned by their tutor(s) as well as by school teachers, and may have to prepare for examinations for both formal school and private tutoring. It would seem that these activities would increase the amount of time they spend on self-study.

There are some limitations in this study. First, I used self-reports of number of hours of self-study, which may represent an overestimation or underestimation of the actual length of time that participants spent on self-study. Future researchers should use an objective measure of time spent on self-study.

Second, I limited this study to mathematics and Korean students. Y. B. Kim and Kim (2015) found that only in the case of the subject of mathematics was academic achievement influenced by both length of time spent getting private

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tutoring and time spent on self-study. This suggests that the mediating role of self-study in the relationship between private tutoring and academic achievement may be specific to certain academic subjects. Sung and Kim (2010) argued that it is difficult to generalize findings to other subjects and countries, because private tutoring systems and the use of these systems vary between countries. Future researchers can investigate in other settings the relationships that were examined in this study. Third, although I chose the schools and classes for our study randomly, it is possible that participants were nested within classes in each school. Thus, multilevel mediation analysis would be required to control higher order correlations in further research.

Overall, my results support the idea that, rather than replacing the time spent on self-study, the length of time spent receiving private tutoring increases the length of time students spend in self-study, and also that the effect of private tutoring on academic achievement is mediated by self-study.

My findings have theoretical and practical implications. First, the positive effect of the length of time spent receiving private tutoring on academic achievement being mediated by the length of time spent on self-study implies that other factors may mediate the relationship. Future researchers should investigate potential mediators and attempt to explain the complicated causal relationship linking private tutoring to academic achievement. Second, to improve their school grades, students should spend more time on self-study rather than enrolling in expensive private institutes, because increasing students' self-study time is one of the mechanisms by which private tutoring improves academic achievement.

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