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Educational Disadvantage and Access to the Best Universities in Korea*

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Abstract

In Korea, the type of university that an individual student enters is largely determined by his or her performance on the national standardized aptitude test implemented by the Korean government. By investigating the factors that determine individual students' performance on this exam, we seek to identify the factors that determine their university placement. For this study, we use Korean Education and Employment Panel (KEEP) data (2004-2009). We use multivariate regression models to investigate factors affecting student performance on Korea's national standardized exam for college entrance and describe our extensive findings in this article. Our ultimate conclusion is that educational disadvantage stemming from socioeconomic factors is growing. That is, Korean education is moving in the wrong direction as far as educational equity is concerned. Based on our observations above, we make several suggestions for parents, guardians, teachers, schools, and educational policymakers to reverse this disturbing trend.

Keywords: educational disadvantage, access to the best universities, factors affecting academic performance, national standardized test

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Introduction

Factors affecting student academic performance have been studied extensively in various subfields of education research (e.g., Baker and Stevenson 1986; Campbell and Mandel 1990; Carey 1958; Crane 1996; Deslandes et al. 1997; Fan 2001; Georgiou 1999; Gordon 1996; Jeynes 2005; Hansford and Hattie 1982; Paulson 1994). This area of research can be linked to what education specialists call "educational disadvantage."[1] No matter what the factors promoting students' academic performance are, those who do not have the benefit of those factors can face significant educational disadvantages.

In this article, we examine students' academic performance in the country of Korea. The Korean educational system is perceived as high performing, partly because Korean students perform well in widely accepted international academic tests and competitions, which will be examined in detail below. Further, many believe that Korea's educational system is at least partially responsible for the country's rapid economic development. As we will see below, Korea is also unique in the sense that admission to certain types of universities can largely determine the course of one's life. Though this may be true in many countries, the situation is more extreme in Korea. Given the high stakes involved, Korean high school students endeavor to matriculate into a handful of elite universities. We investigate the factors that affect the academic performance (meaning the level of preparedness to successfully enter good universities) of Korean high school graduates. After analyzing Korean data, we discuss whether any of these factors constitute educational disadvantages, especially what we call relationship and socioeconomic factors. Based on our observations, we make several policy suggestions.

1. Educational disadvantage takes many different forms, but globally is a major barrier to the well-being of individuals and communities as well as to the prosperity of nations. What represents "disadvantage" will differ from country to country (IALEI 2012).

Choice of Universities and Career Consequences in Korea

Most Korean high school graduates want—and their parents want their children—to go to the *best* universities, rather than just any university, and for good reason. Tables 1.1 and 1.2 show the composition of Korean National Assembly members from the two most recent national elections by their respective alma maters. Looking at the current cohort, 129 out of 300, or 43 percent, of all National Assembly members received their bachelor's degrees from one of the following three schools: Seoul National University, Korea University, and Yonsei University, which are referred to by

Table 1.1. Undergraduate Alma Maters of the 19th National Assembly Members in Korea (2012–)

	Number	Percent
Seoul National University	79	26.3
Korea University	26	8.7
Yonsei University	24	8.0
Total SKY graduates	129	43
Others	171	57

Source: Data from An, Yi, and Choi (2012).

Table 1.2. Undergraduate Alma Maters of the 18th National Assembly Members in Korea (2008–2012)

	Number	Percent
Seoul National University	110	36.8
Korea University	25	8.4
Yonsei University	23	7.7
Total SKY graduates	158	52.9
Others	141	47.1

Source: Data from An, Yi, and Choi (2012).

the public as "SKY," the acronym coined from the initial letters of their names. Considering that there are currently 347 four-year universities and two-year community colleges in Korea, 43 percent represents an extremely high level of concentration. This percentage was 52.9 in the previous term of the National Assembly. So, in Korean politics, nearly half of the people's representatives have graduated from the three schools.

Table 2 shows the proportion of SKY graduates among top-level bureaucrats in the national government (including ministers, deputy ministers, and so on). Again, given the number of universities in Korea, an overwhelming number of SKY graduates occupy the top-most positions in government. Nevertheless, it still pays to go to a school in or near Seoul if one cannot gain admission to a SKY school. According to a 2010 data, 80.4 percent of top bureaucrats graduated from universities in the Seoul metropolitan area. So, the message is clear: if you want to be a high-level civil servant, you have to go to a university in Seoul.

Table 2. Percentage of High-level Civil Servants (3rd Grade and Above) by Alma Mater and Region

Year	SKY Graduates	Graduates from Universities in Seoul and Gyeonggi-do Province (including SKY)
2006	36.5	
2007	39.4	
2008	41.6	
2009	42.9	
2010	46.7	80.4
2011	51.9	

Sources: Adapted from Shim (2010); "SKY daehak anim, gongmuwon kkumdo kkuji mara" (Unless You Graduate from a SKY School, Don't Dare Dream of Becoming a Public Official), *I Am Peter* (blog), September 14, 2010, http://impeter.tistory.com/1236; Song (2011).

Looking at the private sector, Table 3 shows the proportion of SKY graduates among the CEOs of the 100 largest corporations in Korea. Here, the imbalance is even more severe. It is clear, therefore, why most Korean high school students want to go to a handful of top schools and why Korean parents are willing to go great lengths to ensure their children a place at the one of the most elite universities.

Table 3. Undergraduate Alma Maters of the CEOs of the 100 Largest Corporations in Korea

	Number	Percent
Seoul National University	58	38.2
Korea University	23	15.1
Yonsei University	21	13.8
Total SKY graduates	102	67.1
Others	50	32.9

Source: Data from "2012 nyeonpan 100 dae gieop CEO peuropail jeonjosa" (Profiles of CEOs of TOP 100 Companies in 2012), *New Management*, May 8, 2012, http://www.newmanagement.co.kr/?p=5065.

Now that such a large proportion of high school graduates go on to college[2] and aspire to attend an elite school, the logical question is "who has access to the best universities in Korea?" Are there any factors that systematically affect high school students' academic performance, which heavily impacts which college they ultimately attend? Based on these questions, therefore, our research is not about who has access to schools of higher education, but who has access to the best universities in Korea.

One way to investigate this question is to survey a large and random sample of first year students at all of Korea's universities and to gather data on an individual basis. However, given the time and resources available to

2. According to a Korean government statistics, 81.5 percent of high school graduates went on to study in college in 2012 (http://www.schoolinfo.go.kr/index.jsp).

us, this research strategy was simply not feasible. Fortunately, there is an alternative way to investigate factors that determine high school seniors' academic performance.

The type of university that an individual student enters is largely determined by his or her performance on the national standardized aptitude test implemented by the Korean government. By investigating the factors that determine students' performance on this exam, we can understand the factors that determine which college they will attend.

Individual students can choose to be tested in subjects such as Korean language, mathematics, English language, social sciences, natural sciences, vocational education, and a second foreign language. Almost all universities require test scores from Korean language, mathematics, and English language. Thus, almost all high school seniors opt to take these three subjects, with fewer students taking tests in the other subjects. Thus, in this study, we investigate the determinants of student performance in the three subject areas: Korean language, mathematics, and English language.

Once we identify the factors that determine student performance on the national standardized test and thus access to the best universities, we will be in a position to make policy suggestions addressing how the Korean government can reduce the level of educational disadvantage faced by some students.

Hypotheses

Baseline Model

There are certain elements affecting student performance on the national standardized test that are not necessarily disadvantageous. Because they do affect test scores, however, we must control for their impact in our analysis. We discuss these elements first.

There is a common perception that female students perform better in language exams than their male counterparts, while the latter do better in math and science. Studies of gender difference in academic achievement

in mathematics started as early as the 1950s by scholars like Carey (1958). Regarding the Korean situation, Ko, Do, and Song (2008) analyzed the results of the National Assessment of Education Achievement (NAEA) between 2004 and 2006. They find that although male students do significantly better than female students in all types of math questions, this gap is narrowing. They conjecture that this change is due to social and policy reasons. The NAEA data used by the above authors became available in 2003 when the Korea Institute for Curriculum and Evaluation assessed the academic achievement of students at the national level and determined the factors affecting their performance. The 2009 NAEA reports show that, among Korean high school freshmen (equivalent to 10th graders in the United States), the average score in English language was higher among female students than among their male counterparts; in math, the proportion of students who belonged to the high-performing group was higher among male students (17.0%) than female students (14.6%); and in Korean language, the average score for female students was higher than that of male students. The proportion of students who belong to the high-performing group in Korean language was also higher among female students (37.8%) than among their male counterparts (26.2%). Given the trend above, we hypothesize the following:

H1. Male students perform better in mathematics, while female students do better in Korean and English (language in general).

Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs. For children, breakfast consumption has been associated with better learning and school performance (Murphy et al. 1998; Pollitt and Mathews 1988; Vaisman et al. 1996). The importance of breakfast for academic achievement is reflected in the effects of breakfast on cognitive performance (Dye and Blundell 2002; Dye, Lluch, and Blundell 2000). Research suggests that skipping breakfast detrimentally affects problem-solving ability (Pollitt et al. 1983), short-term memory (Vaisman et al. 1996), and attention and episodic memory (Wesnes et al. 2003) of children. Conversely, when children consume breakfast, performance is enhanced on measures of vigilance

attention, arithmetic ability (Conners and Blouin 1983), problem-solving tasks (Pollitt, Leibel, and Greenfield 1981), and logical reasoning (Marquez Acosta et al. 2001). Among Korean studies, S. Kim (1999), Choe et al. (2003), and Park et al. (2008) all find that high school students who eat breakfast regularly tend to perform better academically than those who do not. The leading reason given by those who do not eat breakfast regularly is lack of time in the morning. Based on previous studies, we hypothesize the following:

H2. Eating breakfast regularly has a positive impact on student performance.

For the past decade or so, Korea's best students have tended to apply for pre-med programs, regardless of their interest in the subject or the reputation of the university as a whole. This is due to the stability and income-earning potential of the medical profession, especially at a time when college graduates are finding it difficult to secure jobs for themselves. Because pre-med programs have become magnets for the best students, and these students' performance on the national test is likely to be high, we must control for their impact on our research. On the other hand, those who apply to music, art, and physical education programs tend to have lower test scores because the university admission criteria for these majors are different in nature from those of other subjects. That is, these students take their own performance tests, be they in singing, playing musical instruments, drawing, and so on. As a result, they focus much of their time on practicing for these specialized tests rather than studying traditional academic subjects, so their academic performances tend to be lower. Given the considerations above, we hypothesize the following:

H3. Those who matriculate into pre-med programs perform better in all subjects than other students, while arts, music, and physical education majors perform below average.

In his study of educational achievement in England and Wales, Gordon (1996) shows a negative relationship between the size of the student's residential community and academic achievement. This is partly due to the

high level of unemployment in inner cities. This is not the case in Korea. There have been many studies showing consistent urban-rural differences in academic achievement in favor of urban areas (e.g., Na and Min 2011; Sung 2011). We believe this to be true because everything is concentrated in metropolitan areas in small countries with large populations, as is the case in many countries in Asia. Affluent people live in condos and apartments in urban centers rather than in the suburbs. Good schools and "out-of-school learning" (hereafter, OSL)[3] facilities are concentrated in urban centers. Based on this observation, we expect opposite results of findings in the West:

H4. Those students living in large cities show higher academic achievement than those living in small towns and rural areas.

Relationship Disadvantages

Here we test whether having good relationships with others helps students perform better academically. Kwak (2012) finds that in Korea, good teacher-student relationships facilitate student adjustment to the school environment, which in turn raises academic performance.

In their study of Canada, Deslandes et al. (1997) find what they call "parental behavioral control" to be positively related to student performance. In his study of student achievement in the United States, Paulson (1994) finds that parental involvement significantly and positively predicts achievement above and beyond dimensions of parenting style. Jeynes (2005) performs a meta-analysis of 41 previous studies examining the relationship between parental involvement and academic achievement of urban elementary school children. His results indicate a considerable and consistent relationship between parental involvement and academic achievement among urban students.

Among Korean studies, K. Kim (2005) and Won (2009) find that social capital—defined as parental knowledge of their children's friends, school

3. In this article, we call students' learning activities before or after regular school hours "out-of-school learning."

life, and so on—has a positive impact on children's academic achievement. On the other hand, Kang (2001) finds that "parental behavioral control" has little to do with the Korean elementary school students' academic performance. Byun and Kim (2008) find that parental involvement—defined as parental participation in school activities, interaction among parents, enforcing rules in the family, and so on—has selective impact on middle school students' academic achievement, primarily affecting those whose parents have attained high levels of education.

Georgiou (1999) finds that parental attribution of achievement to the child's own effort enhances the child's self-confidence and is positively related to actual achievement. Hansford and Hattie (1982) perform a metaanalysis of 128 previous studies to see the relationship between various self-measures and measures of achievement. They find 15 different self-terms in their studies. Their analysis reinforces findings from a number of studies that have reported large positive correlation between self-concepts of ability and academic performance. Based on the works above, we hypothesize the impact of individual students' relationships with their teachers, parents, and themselves—in the form of self-confidence or self-awareness. Hypotheses 5 through 8 are:

H5. Those students having good relationships with their teachers perform better on the national standardized exam.

H6. Those students with parents who know of their children's school and social lives perform better than those whose parents are less knowledgeable.

H7. Those students whose parents are "involved" in their children's study habits and lives perform better, in general, than those students whose parents are not ("Tiger-Mom Hypothesis").

H8. Those students with self-confidence perform better than those who are less self-confident.

H8a. Those students with perceived knowledge of their own abilities perform better than those without this perception.

Socioeconomic Disadvantages

Now, we discuss factors that serve as socioeconomic (dis)advantages when high school students prepare for the national standardized test for college entrance.

Crane (1996) shows that both the father's and mother's levels of education have positive impacts on their children's mathematics achievement. Baker and Stevenson (1986) find that a mother with at least a college education knows more about her child's school performance, has more contact with her child's teachers, and is more likely to take action to manage her child's academic achievement. Several Korean studies also argue that parents' levels of education both directly and indirectly affect their children's academic performance in Korea (Park and Doh 2005; Lee and Lee 2009). Based on these earlier studies, we hypothesize:

H9. Those students whose parents are well-educated perform better than those whose parents are not.

In Korea, a large proportion of high school students and their parents believe that a regular high school education curriculum is inadequate to prepare for the national test. Students tend to get even busier *after* school due to OSL activities, which is quite an odd phenomenon. These activities range from relatively inexpensive options, such as long-distance learning, to very expensive alternatives such as one-on-one tutoring with a tutor of national repute.

Using various large-scale data, Park, Sang, and Kang (2008), Kim and Lee (2011), and Lee and Kim (2005) all find that OSL experiences have positive impacts on high school students' performance in math. Lee (2007) finds that the amount of money spent on OSLs also impacts middle school students' academic performance. Based on these previous studies, we assume that extra learning activities are effective and formulate the following two hypotheses:

H10. Those students with OSL supplements perform better on the national standardized test than those without them.

H11. Those students who take more expensive OSL supplements perform better than those who take relatively cheaper alternatives.

As we are interested in socioeconomic (dis)advantages related to test performance, we are also interested in whether children from affluent families perform better than those from less wealthy families. Many studies have shown that socioeconomic status (SES), especially family income, has positive impacts on student performance in the United States (e.g., Crane 1996). Some Korean studies have shown that family income indirectly affects student performance through increased OSL spending, family relations, self-confidence, and so on (e.g., Sohn and Kim 2006). Based on these previous findings, we hypothesize:

H12. The level of a student's household wealth makes a difference in test performance.

Finally, we add a hypothesis, which may be intuitive and universal. Despite all of the factors we have discussed so far, students must spend time studying both the material learned in school and their OSL supplements to perform well on the national standardized exam. As such, we hypothesize:

H13. The amount of time that a student actually spends on studying makes a difference in performance.

Data

To investigate the factors influencing students' performance on the national standardized test, we used data from the Korean Education and Employment Panel (KEEP) (2004-2009) collected by the Korea Research Institute for Vocational Education and Training (KRIVET), a government-created think-tank. Starting in 2004, this data was collected to study the educational experiences, college selection, and career patterns of Korean youth. Since 2004, the same sample of young people has been surveyed to develop meaningful panel data. The data was made public in 2009, the sixth year of the study.

In 2004, a random sample of 2,000 students each was selected from: (1) the graduating classes of middle schools (9th graders in the U.S. system), (2) the graduating classes of regular high schools, and (3) graduat-

ing classes of vocational schools (12th graders in the U.S. system). These 6,000 students and their household members have been surveyed every year since then.

The KEEP data was collected based on one-on-one interviews using PDAs and notebooks. We chose to use the KEEP data set because it contains many survey items we can use to investigate the factors affecting student performance on the national standardized exam. Furthermore, all 12th grader survey responses were matched with the students' actual scores on the test.

We use multivariate regression models to investigate the factors affecting student performance on the national standardized exam for college entrance. We report our findings in the following section.

Findings

The individual variables we use in our models are described in detail in Appendix. We first report the findings from the baseline model. Tables 4.1 and 4.2 show findings based on the data describing students who entered college in 2005 and 2008, respectively:

Table 4.1. Baseline Model of Factors Affecting Students' Performance in the National Standardized Test (2005)

Variables	Korean	Mathematics	English
Constant	4.204 (.155)	3.879 (.169)	4.121 (.000)
Gender	.202* (.080)	–.027 (.085)	.255** (.081)
Breakfast	.367*** (.057)	.409*** (.062)	.412*** (.057)
Pre-med	3.433*** (.628)	2.794*** (.638)	3.419*** (.630)
AMPE majors	–.917*** (.140)	–1.102*** (.177)	–1.388*** (.142)
N	1,733	1,578	1,729
R^2	.069	.065	.103

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

Table 4.2. Baseline Model of Factors Affecting Students' Performance in the National Standardized Test (2008)

Variables	Korean	Mathematics	English
Constant	2.996 (.315)	3.083 (.310)	2.597 (.315)
Gender	.674*** (.123)	.358** (.121)	.636*** (.123)
Breakfast	.210*** (.042)	.275*** (.041)	.254*** (.042)
Place of residence	.266*** (.062)	.312*** (.062)	.376*** (.062)
Pre-med	2.565** (.978)	2.156* (.952)	2.209* (.973)
AMPE majors	−1.523*** (.267)	−2.100*** (.284)	−1.616*** (.268)
N	1,030	1,003	1,021
R^2	.091	.120	.114

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

There is a clear performance gap between male and female students, with girls performing better across all three main subjects. There was no clear difference in math in 2005, but a gap appeared in 2008. It is very interesting to see that those who eat breakfast perform better in all three subjects across time. Those who progressed to medical school clearly performed better across all three subjects and across time periods. Those who chose arts, music, and physical education programs clearly perform worse across all three subjects and across time periods. "The place of residence" variable is available for 2008 only. Results show that those living in large cities perform best with declining performance as the respondents move from large cities to rural areas.

Now we report the findings from expanded models containing what we call relational (dis)advantage variables. They appear in Tables 5.1 and 5.2. With the models expanded to incorporate relationship disadvantages, the gender differences in performance shrank in 2005, but not in 2008. There were clear gender differences in performance across all three subjects. The results from the pre-med, arts, music, and physical education majors are consistent with the findings of the baseline model. Eating breakfast regularly remains a very important determinant of student performance, and students living in large cities still perform better than those in rural areas.

Table 5.1. Model of Factors Affecting Students' Performance in the National Standardized Test in 2005 (baseline plus relational factors)

Variables	Korean		Mathematics		English	
(Constant)	1.596	(.374)	1.086	(.399)	.482	(.370)
Gender	.131	(.081)	–.101	(.086)	.154*	(.080)
Breakfast	.309****	(.058)	.335****	(.063)	.338****	(.057)
Pre-med	3.234****	(.619)	2.618****	(.627)	3.152****	(.611)
AMPE majors	–.903****	(.138)	–1.072****	(.174)	–1.387****	(.138)
Teachers	–.009	(.034)	–.058	(.036)	–.014	(.033)
Parental awareness	.072****	(.010)	.070****	(.011)	.086****	(.010)
Self-confidence	.032**	(.013)	.051****	(.014)	.061****	(.013)
N	1,673		1,521		1,669	
R^2	.106		.106		.167	

*$p < 0.1$ **$p < 0.05$ ***$p < 0.01$ ****$p < 0.001$

Table 5.2. Model of Factors Affecting Students' Performance in the National Standardized Test in 2008 (baseline plus relational factors)

Variables	Korean		Mathematics		English	
(Constant)	–1.116	(.5936)	–.896	(.584)	–2.248	(.581)
Gender	.507****	(.128)	.220*	(.126)	.487****	(.126)
Breakfast	.152****	(.043)	.201****	(.043)	.193****	(.043)
Place of residence	.275****	(.067)	.282****	(.066)	.323****	(.066)
Pre-med	2.784**	(1.290)	2.291*	(1.258)	2.693**	(1.260)
AMPE majors	–1.322****	(.277)	–1.798****	(.293)	–1.530****	(.274)
Teachers	.054	(.046)	.074*	(.045)	.088**	(.045)
Parental awareness	.088****	(.017)	.077****	(.017)	.098****	(.016)
Parental involvement	.016	(.017)	.053***	(.016)	.037**	(.016)
Self-awareness	.074****	(.020)	.055****	(.020)	.078****	(.020)
N	857		834		851	
R^2	.164		.191		.221	

*$p < 0.1$ **$p < 0.05$ ***$p < 0.01$ ****$p < 0.001$

Interestingly, a good teacher-student relationship does not seem to affect a student's performance on the national standardized test. It had zero effect in 2005 and had significant impact in English only in 2008. Our results show that when parents pay attention to their children's school and general environments, students perform better in all three subjects across different time periods. The "parental involvement" variable is available for 2008 only, which turns out to be an effective tool for evaluating math and English, but not Korean language. We see that the "self-confidence" variable in 2005 and the "self-awareness" variable in 2008 both have significant impacts on student performance in all three subjects.

Table 6.1. Full Model of Factors Affecting Students' Performance in the National Standardized Test in 2005

Variables	Korean		Mathematics		English	
(Constant)	1.601	(.379)	1.279	(.398)	.434	(.365)
Gender	.156*	(.081)	–.084	(.085)	.188**	(.078)
Breakfast	.250****	(.057)	.270****	(.061)	.261****	(.055)
Pre-med	2.814****	(.607)	2.420****	(.610)	2.603****	(.587)
AMPE majors	–.740****	(.138)	–.830****	(.171)	–1.160****	(.136)
Teachers	–.023	(.034)	–.062*	(.035)	–.023	(.033)
Parental awareness	.054****	(.011)	.050****	(.012)	.062****	(.011)
Self-confidence	.017	(.013)	.029**	(.014)	.036***	(.013)
Father's education	.024	(.018)	.002	(.019)	.057***	(.017)
Mother's education	.089****	(.025)	.034	(.026)	.103****	(.024)
OSL experience	.151*	(.090)	.522****	(.089)	.129	(.081)
OSL expenses	.001	(.001)	3.430E-5[a]	(.001)	.001	(.001)
Household income	–4.018E-5[a]	(.000)	.000	(.000)	.000	(.000)
Amount of time studied by her/ himself	.122****	(.018)	.126****	(.109)	.156****	(.018)
N	1,650		1,500		1,646	
R^2	.147		.167		.236	

[a] The coefficient for "household income" is -4.018E-5 (.000), which means it is an extremely small number, thus is negligible, and further, statistically insignificant for the year 2005.

*$p < 0.1$ **$p < 0.05$ ***$p < 0.01$ ****$p < 0.001$

Now we report findings from what we call "full" models containing all relevant variables whose impacts we investigate. The results are shown in Tables 6.1 and 6.2. In this full model, the gender gap appeared again. Given the pattern in all three models, it appears that female students perform better in languages (Korean and English) across time periods, with no clear differences between genders in mathematics (H1 partially supported). Eating breakfast regularly continues to have a strong impact on student performance in all three subjects across time periods (H2 sup-

Table 6.2. Full Model of Factors Affecting Students' Performance in the National Standardized Test in 2008

Variables	Korean		Mathematics		English	
(Constant)	–.385	(.590)	.116	(.580)	–1.198	(.566)
Gender	.390***	(.123)	.105	(.120)	.353***	(.117)
Breakfast	.089**	(.042)	.146****	(.041)	.126***	(.040)
Place of residence	.129*	(.067)	.114*	(.066)	.129**	(.064)
Pre-med	2.042*	(1.226)	1.554	(1.192)	1.884	(1.170)
AMPE majors	–.950****	(.266)	–1.443****	(.279)	–1.131****	(.257)
Teachers	.047	(.043)	.078*	(.042)	.086**	(.041)
Parental awareness	.056***	(.016)	.043***	(.016)	.060****	(.016)
Parental involvement	–.006	(.016)	.027*	(.016)	.004	(.016)
Self-awareness	.054***	(.019)	.033*	(.019)	.053***	(.018)
Father's education	.022	(.024)	.017	(.024)	.033	(.023)
Mother's education	.097**	(.040)	.081**	(.039)	.127***	(.038)
OSL experience	.754****	(.139)	.489****	(.137)	.688****	(.134)
OSL expenses	.001	(.002)	.003*	(.002)	.004**	(.002)
Household income	.000*	(.000)	.001**	(.000)	.000*	(.000)
Amount of time studied by oneself	.024****	(.004)	.028****	(.004)	.028****	(.004)
N	857		834		851	
R^2	.256		.285		.338	

*$p < 0.1$ **$p < 0.05$ ***$p < 0.01$ ****$p < 0.001$

ported). Our full models show that, while pre-med majors clearly performed better in all subjects than other students in 2005 and that superiority declined in 2008, the poorer performance of the arts, music, and physical education majors remained consistent (H3 supported). The size of the city of the student's residence still matters as its coefficients hover around the level of significance (H4 supported).

Weak ties between a good student-teacher relationship and the student's performance remained constant (H5 not supported). According to the OECD report (2004), the level of students' attachment to regular schools in Korea is the lowest among OECD countries. At the same time, Korean students achieved top scores in the Program for International Student Assessment (PISA). We believe that this strange combination—low level of attachment to schools and high level of performance—is indirectly caused by students' OSL experiences in Korea, which we discuss extensively below. Simply put, Korean students' heavy reliance on OSLs explains both their good performance on PISA and their low level of attachment to regular schools, which in turn, explains the weak ties between (regular school) teacher-student relationship and student performance.

In this full model, "parental awareness," that is, parental knowledge of the student and his environment, made a significant difference in the student's performance in all three subjects in both 2005 and 2008. On the other hand, "parental involvement," or parental control of the student's study habits and life in general had little to no effect on the student's performance level (H6 supported; H7 not supported). However, we note that scholars have used the term "parental involvement or control" to refer to many different types of "involvement" or "control" (Deslandes et al. 1997). For example, Paulson (1994) measures "parental involvement" by including both types of survey questions we used to construct "parental attention" and "parental involvement." In the above-mentioned metaanalysis, Jeynes (2005) finds that:

> It was not particular actions, such as attending school functions, establishing household rules, and checking student homework that yielded the statistically significant effect sizes. Rather, variables that reflected a

> general atmosphere of involvement produced the strong results. Parental expectations and style may create an educationally oriented ambience, which establishes an understanding of a certain level of support and standards in the child's mind.

Campbell and Mandel (1990) also show that parental influence involves a mix of variables that cannot be understood in a variable-by-variable analysis; they must be viewed as an interrelated schema. They argue that a mix of parental factors including low levels of help, pressure, and monitoring, together with relatively high levels of psychological support, produce a high level of mathematical achievement. High levels of parental pressure, help, and monitoring were found to be dysfunctional. Fan (2001) assesses the effect of parental involvement in students' academic growth during high school years in the United States and identifies 14 items as related to parental involvement using exploratory factor analysis to examine the underlying dimensions of parental involvement. His "supervision" dimension resembles our "parental involvement" variable encompassing items such as setting limits for television watching, checking homework, and so on. His results show that the "supervision" dimension has no statistically significant effect on student academic performance, which echoes our findings about parental involvement based on similar survey items (see Appendix). In his study of student performance in Cyprus, Georgiou (1999) similarly finds that a child's school achievement is not significantly related to what he calls "parental controlling behavior," measured by such survey questions as "controlling child's TV watching time" and "approving child's friends."

The "self-confidence" (in 2005) and "self-awareness" (in 2008) variables still matter, except in the Korean language subject in 2005 (H8 supported). For some reason yet unknown, the father's education level seems to have little to no impact on the performance of the student. On the other hand, the mother's education level seems to impact the student's performance across the board, except math in 2005 (H9 partially supported).

In 2005, having OSL supplements appears to have a strong impact on performance in math, and hovers around the level of statistical signifi-

cance on Korean language performance, while having no apparent impact on English language performance. Furthermore, it is the experience of OSL that mattered; the amount the household spent on OSLs, or the level of household wealth itself did not seem to make a difference in performance level (H10 partially supported; H11 not supported; and H12 not supported in 2005). However, things changed in 2008, when the OSL experience had strong impacts on performance levels in all three subjects. Furthermore, the level of money spent began to make a difference in English and, to a lesser extent, in math. It appears that more expensive tutors tracked the national standardized exam scheme better than less expensive ones. In 2008, household wealth started to matter, too. That is, *all other things equal*, the greater the household income, the better the student's performance on the national standardized exam. This is the case while controlling for expenses on the OSL experience. This is a troublesome trend (H10 supported; H11 partially supported; and H12 supported).[4]

One positive and intuitive finding is that, in the end, the amount of time that a student spends studying matters significantly across different subjects and time periods. Even after controlling for the impacts of all other variables in our model, it still pays to study hard (H13 supported).

4. Readers may wonder if there is a high correlation between any pair of independent variables in our models. Obvious candidates are the pair of "parental awareness" and "parental involvement" and the combination of "OSL experiences," "OSL expenses," and "the household income." In our 2005 sample, the correlation coefficients are as follows: r = .3 between OSL experience in Korean and OSL expenses; r = .28 between OSL experience in math and OSL expenses; r = .31 between OSL experience in English and OSL expenses; r = .231 between OSL experience in Korean and household income; r = .188 between OSL experience in math and household income; r = .237 between OSL experience in English and household income; and r = .507 between OSL expenses and household income. As we can see, the correlations among these variables are low enough to give us confidence in our results. The correlation coefficients for our 2008 sample are similar, and we do not report them here due to space. The correlation coefficient between "parental awareness" and "parental involvement" is .414 for our 2008 sample (there is no "parental involvement" variable in our 2005 model). For the models reported in Tables 6.1 and 6.2, the *vif* values are between 1.0 and 1.6, showing no indication of multicollinearity.

Discussion

As we explained in the introduction, most Korean high school graduates want—and their parents want their children—to go to the best universities, rather than just any university. Now that such a large proportion of high school graduates go on to college and most of them want to go to a handful of elite schools, we investigated whether there are any factors that systematically affect high school students' academic performance, which heavily influence which college they ultimately attend.

As we also mentioned in the introduction, the kind of university that a student enters is largely determined by his or her performance on the national standardized test administered by the Korean government. By investigating the factors that influence individual student performance in this exam, we can understand the factors that determine which school they will attend. Thus, in this study, we investigated the determinants of student performance in the three subject areas of Korean, mathematics, and English, on which almost all high school seniors are tested.

Of all the factors identified above as relevant to student performance on the national standardized test, some of them may indeed represent "educational disadvantage" while some may not. As we have shown above, female students perform better than male students, especially in Korean and English languages. We are uncertain if this has to do with a systemic disadvantage that male students face. Rather, this disparity may have more to do with behavioral patterns of different genders in that age cohort. As we also found, eating breakfast regularly has a systematic impact on student performance. This appears to stem from lifestyle and habits rather than from economic conditions. Likewise, the performance of pre-med, arts, music, and physical education majors has more to do with the nature of their respective subjects rather than the (dis)advantages they face.

Now, we should discuss what we perceive as relational (dis)advantages. Strong family ties in the form of parental attention to a student and his environment turned out to be a definite advantage to the student. On the other hand, "parental involvement," or parental control of a student's study habits and life in general, has little to no effect on the student's per-

formance level. "Self-confidence" and "self-awareness," which we call a relationship with self, turned out to be important determinants of student performance. As these are subjective self-assessments by students, it is important for parents and teachers to instill self-confidence and enhance self-image in children from a very young age. Finally, it is puzzling to find that a good teacher-student relationship does not lead to better performance for a student in Korea, and the current student-teacher relationship leaves something to be desired. We believe that this type of disconnect between regular school teachers and student performance is at least partially caused by extensive exposure to OSLs by Korean students.

Among socioeconomic disadvantages, we found that students living in large cities perform better than those in small towns and rural areas. Many universities already have quota-type admissions policies, which mandate admission to students from certain areas. However, it appears that the government should invest more in small towns and rural areas to alleviate this disadvantage and to enhance the quality of high school education there. Our results show that having a mother with a high level of education is a definite educational advantage. Though this is not something that can be changed in a short period time, given the high rate of college education for female students and their good academic performances, this (dis)advantage may gradually disappear.

As we have examined above, the OSL experience has had growing impacts on students' performance levels in the national standardized test. Furthermore, a comparison of the 2005 and 2008 results show that the level of money spent on OSLs makes a difference. It appears that more expensive tutors were simply better at figuring out trends in the national standardized exam scheme than less expensive ones. Our results also show that, while controlling for OSL experiences and incurred expenses, household wealth started to matter in 2008. This means that the educational disadvantage stemming from socioeconomic factors is growing. That is, Korean education is moving in the wrong direction, as far as equity is concerned. Korean educational authorities must develop inexpensive substitutes for expensive OSL options, such as private tutoring. Furthermore, they must modify regular school curricula so that high school stu-

dents can go to high-caliber universities without the benefit of OSLs. Fundamentally, the Korean government must pursue redistributive policies to level the playing field.

Finally, our Korea-based study confirms a universal truth: despite all of the potential disadvantages we found above, ultimately, a student must willfully spend time studying to perform well on the college entrance exam and matriculate to a good college.

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Appendix: Description of Individual Variables

Gender	This is a dummy variable with female students coded as 1 and male students as 0.
Breakfast	This is a categorical variable with a value of 1 meaning "I do not eat breakfast" and 5 meaning "I eat breakfast every day."
Place of residence	A categorical variable that shows the place of residence as either a large municipality, a city, a township, and a rural area.
Pre-med	This is a dummy variable indicating those who entered the pre-med program in college (including traditional medicine majors).
AMPE majors	This is a dummy variable indicating those who ended up majoring in arts, music, or physical education in college.
Teachers	This is a composite index created from four survey statements: "I have a teacher(s) that I particularly respect." "I have a teacher(s) who pays attention to my ability and future plans." "I have a teacher(s) that I particularly like." "I have a teacher(s) who understands my problems." The responding student was asked to answer "yes" or "no." We gave a score of 1 for each "yes" answer and 0 for each "no." The value of the "teachers" variable is the sum total of the scores given based on the student's responses to the four questions above.
Parental awareness	This is a composite index created from the following survey statements: "I know the student's performance at school well." "I know about the student's friends well." "I know about the parents of the student's friends well." "I know about the student's school life well." "I know the general life habits of the student well." "I know about the student's current concerns well." The responding parent (or guardian) was asked to rate the level of his or her knowledge on a five-point scale for each of the statement above. The value of the "parental awareness" variable is the sum total of the scores given by the parent.

Parental involvement	This is a composite index created from the following survey statements: "I check the student's homework." "I check the student's daily schedule." "I regularly communicate with the student's friends or their parents." "I regularly use Internet sources to collect educational information for the student." "I make sure that the student takes OSLs." "I check what other parents are doing for their children's education." "I forbid the student from reading anything that is not related to school work." The responding parent (or guardian) was asked to rate the level of his or her involvement on a five-point scale for each of the statements above. The value of the "parental involvement" variable is the sum total of the scores given by the parent.
Self-confidence	Due to the unavailability of the necessary survey questions, this variable exists for 2005 only. This is a composite index created from the following survey statements: "I perform very well academically." "I am good at dancing, singing, and sports." "I am a good leader." "I have high aspirations for my future." "My family is doing very well economically." "I have good relationships with my friends." "I am very diligent in my school life." The responding student was asked to rate the level of his or her confidence on a five-point scale for each of the statements above. The value of the "self-confidence" variable is a sum total of the scores given by the student. We should remember that this is the student's subjective assessment of his or her own abilities.

Self-awareness	Due to the unavailability of the necessary survey questions, this variable exists for 2008 only. This is a composite index created from the following survey statements: "I know what I am good at." "I know what I really like to do." "I understand what is really important in life." "I make good decisions." "I can perform my plans well." "I think I am a decent person." The respondent was asked to rate the level of his or her self-awareness on a five-point scale for each of the statements above. The value of the "self-awareness" variable is the sum total of the scores given by the student. We should remember that this is the student's subjective assessment of his or her own self-perception.
Father's/mother's education	A nine-point categorical variable ranging from no education (with the value of 1) to holding a Ph.D. (with the value of 9).
OSL experience	Out-of-school learning experience which includes all types of learning besides a student's regular high school curriculum in a particular subject area. This includes private tutoring, group tutoring, paid long-distance learning, and so on.
OSL expenses	The average monthly OSL expenses for the student for the previous year.
Household income	Average monthly household income for the previous year.
Amount of time spent studying by oneself	The average weekly amount of time the student spends studying by himself or herself.