Factors Affecting Success Of High School Students In Turkey

Türkiyede Lise Öğrencilerinin Başarısını Etkileyen Faktörler

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ABSTRACT

This paper analyses the success of high school students in Denizli/Turkey who aim to access the quantitative departments of universities such as department of mathematics etc. Depending on the relevant literature, the dependent variable is the student scores in the university access exam, while the explanatory variables collection of the characteristics of the student, their family, and the school. For this research, the space was 1793 students. Our final sample size is 944 questionnaires that fulfilled the requirements of a scientific study. Some key explanatory variables are used one by one to estimate the students' success. Subsequently, the different success models were estimated using multiple explanatory variables covering aspects of the student, their family, their school, and their environment. The results confirm that supportive education, income, parents' educational level, and the family's social and cultural status positively influence a student's success. School specific factors are usually not significant. Each part of the education system can apply the results from this study to reorganize the structure of syllabuses of the courses and to understand better family and school related factors' effect on the students' success.

Key words: Student success, high school, exam

ÖZET

Bu çalışma Denizli/Türkiye'de Matematik Bölümü gibi sayısal alanlarda üniversiteye girmeyi amaçlayan lise öğrencilerinin başarılarını analiz etmektedir. İlgili literature dayalı olarak, baımsız değişkenler öğrencinin, ailesinin ve okulun karakteristiklerinden oluşurken bağımlı değişken öğrencinin üniversite giriş sınavındaki almış olduğu puandır. Bu çalışmada ana kitle 1793 öğrencidir. Nihai örneklem ise 944 anket olup bilimsel bir çalışmanın gereklerini karşılamaktadır. Bazı kritik bağımsız değişkenler öğrenci başarısını tahmin etmek için tek tek kullanılmıştır. Daha sonra farklı başarı modelleri öğrenci, öğrencinin ailesi, okul ve çevresine ait birden fazla değişken kullanılarak tahmin edilmiştir. Sonuçlar destekleyici eğitim, gelir, ebeveynlerin eğitim durumu ve ailenin sosyal ve kültürel statüsünün öğrenci başarısı olumlu etkilediğini doğrulamıştır. Okula ait değişkenler genellikle anlamlı çıkmamıştır. Eğitim sisteminin bütün parçası sonuçları derslerin müfredatlarını tekrar organize etmek ve öğrenci başarısı üzerindeki aile ve okulla ilişkili faktörlerin en uygun olanlarını belirlemek için kullanabilirler.

Key words: Öğrenci başarısı, lise, sınav

1. INTRODUCTION

The appropriate use of resources is very important in the education sector as well as in other sectors. The appropriate use of resources and the identification of the determinants of students' academic success are crucially linked to each other, both explicitly and implicitly. If the factors that influence students' academic success are known, academic success can then be increased without requiring any more resources (Yesilyurt, 2008).

The factors affecting academic success range from students' characteristics to their environment.

Furthermore, factors that do not affect adults may affect students because of their youth and vulnerability, and students need more help and care than adults do. This structure directly affects the quality of education that is delivered to students and the efficient use of the resources dedicated to education. Therefore, the determinants of academic success have represented an interesting area in the educational economics literature since the Coleman Report (1966), the ground-breaking study on this topic. Since this report, many studies have analysed and tested various factors, from the personal features

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of students to the investment in education, to identify the determinants of student success (Hanushek 1971 and 1986, Beiker and Anschek 1973, Murnane 1975, Armor et al. 1976, Armor et al. 1976; Boardman et al. 1977, Murnane and Phillips 1981, Chakborty and Poggio 2006, Lavy and Kohtaro 2008, Heck 2009, Kalender and Berberoglu, 2009, Gunes et al. 2012, Davidson and Bangs, 2013, Yesilyurt et al. 2014).

Following this stream of literature, we aim to identify the determinants of academic success of students, the main actors in the educational system. The main research questions are if financial and social factors of families effect the student's success, if the school specific factors effects on student's success and lastly if environmental factors effect on student success. We also aim to analyse how quality and performance will increase in the educational system. If the factors affecting the academic performance of students can be determined, appropriate policies can then be put into practice to use resources efficiently. The current study will therefore contribute to the literature in two ways. First, the data sets for the study cover an entire province and therefore should provide additional evidence in support of previous studies (such as Koc et al. 2004; Altınkurt 2008) about Turkey. Second, some variables that have not been considered together in the literature like TV, BOOK, MEDICINE and HANDICAPE[2] in a sample as much as the sample we used, and novel perspectives and links between variables are investigated.

To achieve these pragmatic aims, senior students of high school in Denizli Province, Turkey were selected as the target group. The performance criteria used to measure students' academic success are their results from one of the nationwide university entrance exam that all students take to attend university in Turkey. The factors that are explored to determine and explain the exam results are the students' families, environmental factors, school and teachers. A regression analysis is used to estimate the factors, their direction and their level of significance.

In the following sections, the literature is discussed, and the collected data sets are introduced. Next, the structure of education in Turkey is explained. The following section explores the methodology and discusses the findings. Finally, the last section presents the conclusion.

2. THE TURKISH EDUCATION SYSTEM IN BRIEF

There have been many changes in the Turkish Educational System over the last four decades. There are three levels of schooling: Primary school, secondary school and high school. Initially, primary school, which was compulsory, was 5 years; secondary school was 3 years; and high school was 3 years. In 1997, primary school and secondary school were merged together into primary school. Therefore, primary school is currently 8 years and compulsory, whereas secondary school no longer exists. High school is now 4 years. During the 1980s and 1990s, Anatolian High Schools and Science High Schools were very prestigious public schools, and private schools were not common. After the 1990s, Anatolian High Schools, in particular, became widespread at the expense of quality, and several small cities acquired at least one private school. Every university originally provided its own exam to applicants. After 1980, the Higher Education Commission offered one and/or two exams for all students. Students must order their university preferences according to their scores. The more prestigious universities require higher scores on the general exams.

The general exams are a unique aspect of the Turkish Education System, even though their number and content have changed over time. Students who want to attend a prestigious school must receive the highest possible scores on the exams. In Turkey, universities accept students based on the general exams. The first level of exam is "Access to Higher Education" (AHE), and the second and last level is the "University Attendance Exam" (UAE). The first exam selects and ranks students, and the second exam directs students to the appropriate departments depending on their scores using part of the score from the first stage. The results of the second exam are very difficult to obtain because students take the exam after graduation. Therefore, it is generally impossible to collect these scores. Therefore, we used the scores of the first exam. *In fact, both scores represent success.*

This educational structure has created a large and widespread market in Turkey for Supplementary Education Centers and private tutoring for the general exams. In 2000, there were about 1700 of these Education Centers in Turkey, and by 2011, there were about 4000. On the other hands the

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[2]see Table 2 for the abbreviations

current Turkish administration wants to abolish these deterministic exams, and thereby wants to decrease of the influence of the centers.

3. DATA SETS AND THEORETICAL STRUCTURE

The dependent variable and the explanatory variables will be introduced below.

3.1 Data sets

Sample: 42 schools that had science class in Denizli at 2011 and we visited all of them.

In the relevant year, there were 1793 students –our space- continued in the classes in which the students thought the quantitative courses targeted quantitative departments such as the department of engineering or department of mathematics. Some students' classes and their targets might be controversial, and this structure could be the same for all types of classes. Therefore, it can be accepted as normally distributed and approximately 1793 students, who targeted the quantitative departments, can be accepted as the population. We reached 1100 students, and some of them did not have an exam score because they did not take the exam. If a student had not taken the entrance exam, we would not have had the dependent variable. Therefore, the data from the student who did not want to continue university and take the exam is worthless for estimations. The quality of some of the questionnaires was not sufficient for the analysis because of the unanswered and invalid questions, and we used 944 questionnaires -According to the sample theory, our sample is larger than sufficient but not one of the best alternative samples a couple of times given, the confidence level and sample error level and some conditions are given. However, 944 students for data sets seem sufficient for analysis according to sample theory-[2].

Dependent variable: According to the principles determined by the British Committee of Vice-Chancellors and Principals, which have been used widely in the literature, the performance criteria must include the following features (Higgins, 1989):

- They should match the aims of the institute;

- They should be specific, measurable and standardised;
- They should be as simple as possible;
- They should be acceptable and viable (no systematic bias);
- They should be a pathfinder for the area under investigation.

In Turkey, the best proxies for the performance criteria that meet the criteria above are the university entrance exams. These exams are taken by all students at the same time, and all students must answer the same questions. All universities, students, families and communities accept the results of these exams. In short, the exam results are a reasonable measure of success given the aim of the current paper. As a result, the exam result from the AHE is used as the dependent variable in this study.

Although these exams are unique, six different score types are computed from them because every university department requires different qualifications. For example, a department of medicine focuses on the students who took quantitative courses in high school, and the department of history attracts students who took courses in history, geography, etc. Therefore, if a student wants to attend the department of medicine, he/she should answer the quantitative questions on the AHE exam because these questions are more valuable than other questions in terms of university admissions for that student. A similar process exists for students who are interested in other departments.

Of the six different types of exam scores, two are quantitative, two are verbal, and the remaining two are a combination of quantitative and verbal skills. These three score sets, while maintaining a very high correlation of approximately 0.95 within themselves, may not be comparable between each other because of their varying content, so students with high quantitative scores may not be adequately compared to students with high verbal scores, and so on. To analyse the academic success of students, each area should be considered separately. Therefore, we focused on students who wanted to attend departments requiring quantitative scores. As a result, the dependent variable in this study is the
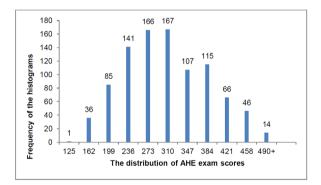
[3]At the beginning of the study, we planned to collect the data sets from all students. Targeting this aim, we tried to collect the data sets as much as possible. However, if we had worked with the sample from the population, we should have based it on the sample theory. According to the sample theory, not one of the best –but enough for analysis- alternative samples is 156 when the population is 1793. *Because the 0.95 confidence level and 0.075 sampling error and some conditions are given*, which created homogeneity in terms of the education types in similar classes and the students in the classrooms, who aimed at similar departments, *the number of students would be 156*. However, there are 944 student data sets, which is sufficient for analysis according to the sample theory. We think that with our data set collection of 944 students, the sample can be used to get confident estimates.

quantitative score from the AHE. This score is an index and reflects students' success. For example, a student who obtains a score of 410 on this exam is more successful than a student who obtains a 390.

According to the sample, the average, median, standard deviation, minimum and maximum values of AHE exam scores of the students are 289, 285, 79, 125 and 490, respectively.

Table 1: The Distribution for the dependent variable

Intervals	Frequency	Percentage
125<=	1	0.00
125<score<=162	36	0.04
162<score<=199	85	0.09
199<score<=236	141	0.15
236<score<=273	166	0.18
273<score<=310	167	0.18
310<score<=347	107	0.11
347<score<=384	115	0.12
384<score<=421	66	0.07
421<score<=458	46	0.05
458<score<=490+	14	0.01

Graph 1: The distribution of the dependent variable

Table 1 and Figure 1 show that the dependent variable does not seem to be distributed normally but is very close to the normal distribution. Table 1 shows the intervals and the frequency and percentages associated with the intervals.

Explanatory variables: The explanatory variables to measure academic performance or success are also determined according to the literature. According to Hanushek (1979), Link (1991) and Akerhielm (1995), the explanatory variables to estimate academic success must meet the following criteria:

- They should reflect the characteristics of students, their families and their environment;
- They should reflect the characteristics of the teacher;
- They should reflect the characteristics of the schools.

Therefore, three questionnaires were used to collect the data for the explanatory variables from senior students. The data sets were collected along with the questionnaire forms one week after the exam results from the AHE were publicised. As mentioned, some students were not in attendance because they were continuing the supplementary courses instead of the school. We visited the schools several times to collect the data, but some students were not at school at all.

We tested 27 different variables from the data sets that reflect the features of the students, the students' families, the school and the teachers. The descriptive statistics are presented in Table 2. The table provides the average value and standard deviation of the data series. The dummy variables for the students are coded as 0 and 1. The number of books at home except textbooks, the educational level of the mother, and the educational level of the father were coded along a scale from 1 to 5 by the student. One was the lowest level, and 5 was the highest level for every question. Some students were not able to answer these questions precisely; therefore, this structure was helpful for student to answer the questions.

Instruments of questionnaires

Three types of source were used to collect data. First one is questionnaires for students and it covers 40 questions. These questions were determined with experts who worked for provincial directorate of national education by benefiting previous questionnaires. There are different types of questions like yes/no or, multiple choice questions, open ended questions. Second one is questionnaires for teachers and it covers 18 questions. Third one is questionnaires for schools and it covers 13 questions.

Table 2: Descriptive statistics of Data Sets

Variables and their short descriptions	Abbreviation	Mean	Standard deviation
AHE exam score	AHE	289.10	79.47
Class size	SIZE	25.07	6.47
Number of TVs at home	TV	2.65	0.85
Number of books except textbook	BOOK	2.52	1.07
Educational level of mother	MOTHER	1.50	0.78
Educational level of father	FATHER	1.8	0.89
Days of nonattendance	NATTEND	13.03	5.63
Family income (in Turkish Lira)	INCOME	1880.88	2316.39
The number of students at school	NSTUDENT	697.39	453.64
The age of the school	SCHLAGE	18.51	13.33
The number of teachers at school	NTEACHER	51.47	55.09
The previous year's AHE score	PAHE	238.53	65.42
If student is boy, coded 1 otherwise 0	SEX	461	
If student takes to supplementary courses coded 1, otherwise 0	SUPP	866	
If student takes private tutoring coded 1, otherwise 0	TUTOR	136	
If student has a handicap coded 1, otherwise 0	HANDICAPE	12	
If student takes medicine daily coded 1otherwise 0	MEDICINE	85	
If student has cell phone coded 1, otherwise 0	CPHONE	875	
If student has an internet connection via cell phone coded 1, otherwise 0	CNET	368	
If student has his own room at home coded 1, otherwise 0	ROOM	800	
If student has a scholarship coded 1, otherwise 0	SCHLAR	122	
If student has his own computer at home coded 1, otherwise 0	COMP	706	
If student connects to the internet from home coded 1, otherwise 0	INTERNET	577	
I the parents of student buy a newspaper coded 1, otherwise 0	NEWS	300	
If the student has a nuclear family coded 1, otherwise 0	NUCFAM	634	
If school is an Anatolian high school or Science School coded 1, otherwise 0	SCHLTYPE	593	
If the student's school offers all science laboratory coded 1, otherwise 0	LABS	878	
If the student's school has a gym coded 1, otherwise 0	SPOR	420	

3.2 Theoretical Structure

According to the literature, student success factors can be categorised into four primary groups, as shown below. Given this structure, the basic form is determined based on Hanushek (1979), Todd and Wolpin (2003), Heck (2009):

$SS = f\ (STD,\ FAM,\ SCH,\ ENV).$

In the equation, SS represents student success and is represented by AHE. STD, FAM, SCH and ENV represent aspects of the student, the student's family, the student's school and the student's environment, respectively. The primary factors on the right-hand side of the equation represent more than one variable. The variable names and their abbreviations are given in the section data sets because different variables were used from the data sets to obtain the best model.

4. RESULTS

An estimation process was applied under the consideration of the literature. According to the literature, the key variables, which were INCOME, SIZE, SUPP, TUTOR, NATTEND, MOTHER, FATHER, NEWS, BOOK, NUCFAM and HANDICAP in this study, are used one by one to estimate a student's success. Subsequently, the different success models were estimated using multiple explanatory variables covering aspects of the student and the student's family, school and environment. The least squares estimator was used to estimate the equations. Some models suffered from heteroscedasticity. Therefore, the

White correction was applied to resolve any heteroscedasticity, after which the significance of some coefficients changed. As a result, depending on the economic and econometric theory, the best models were determined. The findings, which indicate suggestive correlation, are presented in Tables 3, 4 and 5. The R square is in the range of 0.24 to 0.27. This range is given as reasonable in the literature (Dayıoğlu et al. 2009)

Table 3: The Estimations Results (1)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
C	5.64 (60.9)	5.29 (170.62)	5.61 (563.26)	5.51 (132.93)	5.56 (510.5)	5.53 (448.0)	5.59 (506.77)	5.43 (236.6)	4.59 (49.92)	5.55 (346.88)	5.62 (600.4)
LOG(SIZE)	-0.00 (-0.13)										
SUPP		*0.36* *(11.25)*									
TUTOr			*0.12* *(4.63)*								
LOG(NATTEND)				*0.05* *(2.93)*							
MOTHER					*0.19* *(9.54)*						
FATHER						*0.20* *(10.8)*					
NEWS							*0.13* *(6.75)*				
BOOK								*0.08* *(9.52)*			
LOG(INCOME)									*0.14* *(11.39)*		
NUCFAM										*0.11* *(5.63)*	
HANDICAPE											0.02 (0.21)
R-squared	0.00	0.12	0.02	0.00	0.09	0.11	0.05	0.09	0.12	0.03	0.00
F-statistic	0.02	126.72	21.47	8.56	90.93	116.48	45.37	90.67	129.697	31.74	0.04
Prob(F-statistic)	0.9	0	0	0	0	0	0	0	0	0	0.84

Bold and italic values imply significant results at least five percent in all tables. t-statistics are in the parentheses.

Table 4: The Estimations Results (2)

	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
C	4.97 (36.73)	4.97 (18.26)	4.93 (18.29)	**4.99 (38.63)**	**4.98 (38.43)**	**5.03 (41.22)**	**5.04 (41.04)**	**5.04 (41.19)**	**5.05 (41.61)**
Log(SIZE)	-0.02 (-0.9)	-0.02 (-0.9)	-0.02 (-0.85)	-0.02 (-0.83)	-0.02 (-0.91)	-0.03 (-1.01)	-0.02 (-0.97)	-0.03 (-0.97)	-0.02 (-0.72)
SUPP	*0.33 (10.8)*	*0.33 (10.77)*	*0.33 (10.81)*	*0.33 (10.8)*	*0.33 (10.81)*	*0.32 (10.35)*	*0.32 (10.35)*	*0.32 (10.35)*	*0.33 (10.73)*
TUTOR	0.04 (1.4)	0.04 (1.4)	0.04 (1.44)	0.03 (1.39)	0.04 (1.4)	0.03 (1.2)	0.03 (1.23)	**0.03 (1.2)**	0.04 (1.41)
LOG(NATTEND)	*0.01 (3.95)*	*0.01 (3.93)*	*0.01 (3.98)*	*0.01 (4.02)*	*0.01 (3.95)*	*0.01 (3.86)*	*0.01 (3.86)*	*0.01 (3.87)*	*0.01 (4.04)*
MOTHER	*0.03 (2.29)*	*0.03 (2.29)*	*0.03 (2.31)*	*0.03 (2.29)*	*0.03 (2.31)*	*0.03 (2.03)*	*0.03 (2.06)*	*0.03 (2.04)*	*0.03 (2.33)*
FATHER	*0.07 (6.29)*	*0.07 (6.28)*	*0.07 (6.3)*	*0.07 (6.28)*	*0.07 (6.3)*	*0.07 (5.87)*	*0.07 (5.89)*	*0.07 (5.87)*	*0.07 (6.29)*
TYPE	0.00 (-0.1)	0.00 (-0.09)	-0.02 (-0.87)	0.00 (-0.07)	0.00 (-0.15)	-0.02 (-0.95)	-0.02 (-0.96)	-0.02 (-0.98)	-0.02 (-0.94)
LOG(NSTUDENT)	0.00 (-0.21)	0.00 (-0.2)	-0.01 (-0.31)	0.00 (-0.09)	-0.01 (-0.29)	-0.01 (-0.57)	-0.01 (-0.58)	-0.01 (-0.55)	-0.01 (-0.32)
LOG(NTEACHER)	0.03 (1.71)	0.03 (1.71)	0.03 (1.77)	0.03 (1.58)	0.03 (1.73)	*0.03 (1.90)*	*0.03 (1.92)*	*0.03 (1.9)*	0.03 (1.69)
LOG(SCHLAGE)	0.01 (1.07)	0.01 (1.01)		0.02 (1.33)	0.01 (1.07)				
SPOR	0.00 (-0.18)	0.00 (-0.18)	0.00 (-0.24)						
LABS	0.05 (1.4)	0.05 (1.4)	0.05 (1.59)	0.05 (1.4)					
LOG(PAHE)		0.00 (0.01)	0.02 (0.37)						
CPHONE						0.05 (1.39)	0.05 (1.42)	0.05 (1.41)	
CNET						-0.01 (-0.49)	-0.01 (-0.46)	-0.01 (-0.48)	
COMP						**0.05 (1.8)**	*0.05 (1.84)*	*0.05 (1.84)*	
INTERNET						0.02 (0.86)	0.02 (0.89)	0.02 (0.89)	
TV							-0.01 (-0.53)		
ROOM								-0.01 (-0.55)	0.00 (0.06)
R-squared	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.24	0.23
F-statistic	23.89	22.03		28.47	26.09	22.96	21.32	21.32	28.24
Prob(F-statistic)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00

Bold and italic values imply significant results at least five percent in all tables. t-statistics are in the parentheses.

Table 5: The Estimations Results (3)

Variable	Model 21	Model 22	Model 23	Model 24	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 31	Model 33	Model 34
C	**5.02 (42.72)**	**5.01 (42.08)**	**5.00 (36.96)**	**5.08 (25.36)**	**5.13 (56.65)**	**5.12 (56.86)**	**5.12 (56.66)**	**5.12 (56.79)**	**5.13 (56.68)**	**4.69 (39.65)**	**4.58 (38.95)**	**4.55 (38.55)**	**4.50 (38.47)**	**4.55 (39.6)**
Log(SIZE)	-0.01 (-0.25)	-0.01 (-0.34)	-0.02 (-0.84)	-0.02 (-0.77)	-0.02 (-0.8)	-0.02 (-0.79)	-0.02 (-0.76)	-0.02 (-0.81)	-0.02 (-0.81)	-0.02 (-0.89)	-0.02 (-0.7)	-0.03 (-1.01)	-0.02 (-0.67)	-0.02 (-0.89)
SUPP	**0.31 (10.07)**	**0.31 (10.40)**	**0.33 (10.8)**	**0.33 (10.73)**	**0.33 (10.68)**	**0.33 (10.75)**	**0.33 (10.64)**	**0.33 (10.74)**	**0.33 (10.68)**	**0.30 (9.66)**	**0.30 (9.69)**	**0.32 (10.31)**	**0.31 (9.89)**	**0.29 (9.56)**
TUTOR	**0.04 (1.75)**	**0.04 (1.74)**	0.03 (1.38)	0.04 (1.56)	0.04 (1.51)	0.04 (1.53)	0.04 (1.54)	0.04 (1.53)	0.04 (1.52)	0.02 (0.93)	**0.06 (2.42)**	**0.06 (2.38)**	**0.06 (2.46)**	**0.06 (2.38)**
LOG (NATTEND)	**0.01 (3.66)**	**0.01 (3.69)**	**0.01 (4.02)**	**0.01 (4.03)**	**0.01 (4.01)**	**0.01 (4.07)**	**0.01 (4.05)**	**0.01 (4.07)**	**0.01 (4.1)**	**0.01 (3.67)**	**0.00 (3.93)**	**0.00 (3.22)**	**0.00 (3.28)**	**0.00 (2.91)**
MOTHER	**0.04 (2.87)**	**0.04 (2.89)**	**0.03 (2.29)**	**0.03 (2.35)**	**0.03 (2.38)**	**0.03 (2.38)**	**0.03 (2.36)**	**0.03 (2.41)**	**0.03 (2.41)**	0.02 (1.6)				
FATHER	**0.07 (5.76)**	**0.07 (5.74)**	**0.07 (6.28)**	**0.07 (6.31)**	**0.08 (6.35)**	**0.07 (6.32)**	**0.07 (6.34)**	**0.07 (6.29)**	**0.07 (6.23)**	**0.06 (4.7)**				
TYPE	-0.02 (-0.93)	-0.01 (-0.84)	0.00 (-0.12)											
LOG (NSTUDENT)	0.00 (-0.15)	0.00 (0.04)	0.00 (-0.15)											
LOG (NTEACHER)	0.03 (1.61)	0.02 (1.42)												
LOG (SCHLAGE)			0.02 (1.32)											
LOG (PAHE)					0.01 (0.2)									
SPOR				0.00 (0.17)										
SCHLAR	**0.15 (6.36)**	**0.15 (6.34)**												
INTERNET				0.03 (1.59)										
LOG (INCOME)										**0.07 (4.75)**	**0.09 (7.22)**	**0.11 (8.68)**	**0.11 (8.34)**	**0.09 (6.08)**
SEX	**-0.13 (-2.55)**				-0.01 (-0.56)		-0.01 (-0.58)	-0.01 (-0.57)		-0.01 (-0.32)	0.00 (0.08)	-0.01 (-0.42)	0.00 (0.03)	0.00 (0.24)
HANDICAPE					-0.05 (-0.73)	-0.06 (-0.75)		-0.05 (-0.7)	-0.05 (-0.68)	-0.04 (-0.53)	-0.02 (-0.23)	-0.04 (-0.57)	-0.03 (-0.35)	0.00 (0.03)
MEDICINE								-0.01 (-0.5)	-0.01 (-0.51)	-0.02 (-0.75)	-0.03 (-1.06)	-0.02 (-0.71)	-0.02 (-0.81)	-0.03 (-0.94)
NUCFAM										**0.08 (4.74)**	**0.08 (4.06)**		**0.08 (4.54)**	**0.08 (4.33)**
BOOK														**0.05 (6.33)**
NEWS												**0.07 (4.06)**		
R-squared	0.27	0.26	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.27	0.25	0.22	0.23	0.27
F-statistic	31.20	33.47	25.86	39.78	34.91	39.88	39.84	34.90	31.03	30.77	30.63	32.51	31.68	33.70
Prob (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Bold and italic values imply significant results at least five percent in all tables. t-statistics are in the parentheses.

The data sets allow us to investigate the link between success and its determinants at a specific point of time (e.g., McLoyd 1989; Conger et al. 2002). In other words, the hypothesis is that the influence of variables becomes effective at a point in time rather than over time. The results of some variables are also evaluated using both a sociological perspective and a physiological perspective. Economic factors are also considered.

The first group of variables reflects income status. Many variables can define the income status of a family, such as total income or family salary, home ownership, and the number of cars. Total income, however, is the most direct variable for explaining income status. The positive results are expected and supported by the majority of the literature (Duncan et al. 1994; Stipek 1998). In the literature, this result is usually explained using a socio-economic interaction process. However, other factors, such as genes or physiological factors, are affected by poverty and must not be neglected as an explanation for sources of success. According to behavioural geneticists, behaviour stems from a combination of genes and environment, and DNA accounts for 30%–50% of human behaviour, whereas the remaining 50%–70% of behaviour is explained by other variables (Saudino 2005; Jensen 2009). For example, deficits in nutrition prevent the production of new brain cells, alter the path of maturation, and rework the healthy neural circuitry in children's brains. Additionally, in many poor households, parental education levels are low enough that parents cannot contribute to the success of their children (Jensen 2009). Total income produces significantly positive results not only for estimations in which total income is used as a unique explanatory variable but also for estimations in which it is used an explanatory variable among other variables. As a result, the effect of income status on student success is also strongly confirmed in our sample.

Eight additional variables are tested in the same or different models for a robustness check for the effect of income. They are TV, ROOM, NUCFAM, SCHLAR, CPHONE, CNET, COMP, and INTERNET. It should be noted that some of the variables, TV, ROOM, CPHONE, CNET, COMP and INTERNET, are multidirectional and used to test other effects, such as whether they distract students from their studies. These variables, except NUCFAM, TV and ROOM, are also used to explain whether a mobile or electronic learning effect exists. Of these, NUCFAM is significantly positive. In Turkey, more than one family often lives in a house. For example, two or three brothers, their parents, and their wives and children may all share a house because of poverty or for cultural reasons, such as togetherness or strength. Some estimations found evidence that the larger the size of the family, the lower the student's success. The non-NUCFAM family may result in an effect similar to the size effect

because these households are more crowded (Adli et al. 2010, Çiftçi and Çağlar, 2014). Additionally, in those families, children do not experience clear and direct care from their parents because of crowding. Of course, NUCFAM may also imply a higher income status. Therefore, these results are acceptable. COMP produces significantly positive results. CPHONE does not produce positive results but has relatively high significance, and CNET is similar in estimation to CPHONE. These findings may imply different interactions, such as an effect from income status and its expected support for a student's academic success. Parents worldwide want to connect to their children, and they use cell phones to do so; parents often buy cell phones for their children. CPHONE, therefore, may imply parents' love and interest and can be used as a proxy for these. Additionally, students at this age are influenced by the "snob effect" and want to have popular items, such as CPHONE or COMP. Having these types of items may improve their confidence, their adaptation to the community and the "peer effect" from an income perspective. As a result, all of these factors may improve students' well-being and may thereby improve their success. The significance of CNET, INTERNET, TV, and ROOM are very low. It seems that, at least in our sample, their effects are not clear.

Supplementary education (also known as shadow or hidden education) is another phenomenon in Turkey, although Turkey is not alone in the prevalence of supplementary education. Turkey's universities cannot accommodate all of the students who want to attend. Therefore, the AHE and UAE are held to allocate students to universities. This process leads students to take additional tutoring from different sources.

This type of education is very common in countries such as South Korea, Hong Kong, Japan and Taiwan that have nationwide examinations for transitions to higher levels of schooling (Tansel 2013). Tansel and Bircan (2006) analysed the determinants of private tutoring and expenditure for private tutoring and found that this demand is critical in families' lives.

Supplementary education "has reached such a scale, and has such strong implications for social equity, the knowledge economy, the work of schools, and the lives of children and families, that it must be addressed" (Bray 2011). Supplementary education has "grown to become an absolute necessity" in

Cyprus, is "expanding at an explosive rate" in France, is "in boom" in Italy, and has "grown so much that it is now akin to an epidemic" in Romania (cited by Bray 2011). Furthermore, in some European countries, students need "cramming type" or intensive supplementary education (Bray 2011). Students also use supplementary education to complete their school lessons. According to some research in the UK, supplementary education can be useful for students who represent a minority or who have a knowledge shortage (Maylor et al. 2010). Both types of supplementary education have been expanding, and, unfortunately, this trend is challenging the mainstream system and exposing various limitations. As a result, in Turkey's experience of supplementary education, students who are preparing for national and central examinations are forced into the position of "race horses". Families, students, and the government are unhappy about this situation. To decrease the need for supplementary education, the quality of formal education must increase at every level, courses' syllabuses should be updated, educational opportunities must be expanded, and vacancies in universities should be increased for students associated with different areas of strength. These changes would be difficult but not impossible.

In this study, two different supplementary education variables are used: Supplementary education centres and private tutoring. Supplementary education attempts to teach students the formal topics as well as tactics and techniques to answer questions. Therefore, it was hypothesised that supplementary education may have a substantial effect on student success. However, supplementary education and formal education may not be interchangeable, like public infrastructure investment and private investment. Consequently, the results of this study found evidence in favour of supplementary education for every type of private course, whereas private tutoring produces either insignificantly positive or significantly positive results for several types of estimations. In Turkey, however, private tutoring may overlap with private courses; in our sample, nearly all students who used private tutoring also used supplementary education centres. Additionally, when some variables are dropped, private tutoring shifts to a significant positive result. The variables that are eliminated are mother's educational level, father's educational level and the number of books at home. These variables may

imply a higher social and cultural level for a family, and these types of families may teach at home, capturing some part of private tutoring's effect. Some publications, such as Yaylalı et al. (2006) and Ozer and Demir (2006), found similar results for Turkey, and Kang (2007) found a similar result for Korea. Additionally, Karweit and Slavin (1981) found evidence that supports this finding.

The nonattendance rate's coefficient is significantly positive in every alternative, an interesting but expected result. In particular, senior class students attend private courses (make-up schools) at the expense of nonattendance to obtain higher scores on their university attendance examinations. These three variables confirm one another, but this situation is very problematic for the educational system, and each component of the educational system in Turkey has attempted to find a solution.

In our sample, the estimations imply that the larger the class size is, the lower students' success is. However, all of the estimations are statistically insignificant. Our results can be evaluated in terms of the literature because class size is a commonly investigated variable in the literature. In 1995, Akerhielm (1995) asked, "Does class size matter?" in an attempt to find an explanation for previous controversial evidence. According to that study, the analyses should have been organised better to decrease variation. However, after Akerhielm's work, studies (whether well designed or not) continued to find controversial results. These results are controversial even though the theoretical expectation is in favour of a relatively small class size. For example, according to some theoretical approaches, in a large class, teachers focus on the overall performance of the class at the expense of the individual students. Alternatively, the curriculum may not deliver to students widely, or it may prevent students' social and academic engagement (Shapson et al. 1980, Correa 1993, Blatchford and Mortimore 1994, Averet Finn 2003 and McLennan 2004). It can be inferred from the discussion in the literature that class size affects student success depending on time, location and culture. In Turkey, class sizes tend to be similar with few exceptions. In other words, there is not a large enough bias to significantly affect students' success. Therefore, the results are acceptable and understandable given our sample.

Parental educational level is another important factor in student success (Haveman and Wolfe 1995,

Smith et al. 1997, Nagin and Tremblay 2001, Dearing, McCartney and Taylor 2002, Davis-Kean 2005, RAND 2012, Cumbow, K. W. 2014) and students' educational attainment (Tansel, 2002). This structure depends partly on family process models (e.g., McLoyd, 1989 and Conger et al., 2002), which claim that families' socio-economic status affects students' success. The educational level of the mother and father are added to measure the effect of the intellectual and cultural level of the parents. Every scenario confirms that both variables have a substantial influence on student success because they have significant positive results. It is interesting that the father's educational level has a greater influence on a student's success than the mother's does. This result may be related to the placement of the father and mother in the community. In Turkey, the mother and father are not considered to be equal when the family's social and intellectual statuses are considered; the father starts one step ahead in this competition. Fathers' advantage is particularly pertinent in towns, except for the central town in provinces, because towns usually do not have large institutes of higher education or offices of large companies in which educated women would work. Mothers may not affect student success as much as fathers because of these social circumstances. The mother's effect is significantly positive, but it is lower than the father's. As a result, our results confirm that the family's cultural and intellectual levels influence student success. Two other control variables are used for a robustness check on the effect of social and cultural levels on student's success. The first variable is BOOK, and the second variable is NEWS. Both variables produce significantly positive results.

SCHLAR is a duplex or multidirectional variable. Some institutes and schools support successful and poor students. Therefore, this variable can imply the effect of the student's cleverness and talent on success. However, this variable can also imply the effect of a solution to financial problems. In our analysis, this variable produces significantly positive results in two estimations. It does not matter which effect is considered in its influence on students' success.

The use of MEDICINE and having HANDICAP variables are negative except for the estimation but with insignificant results. These results imply that the effects of these features are not clear in our sample.

The other variable group addresses the school. SCHLTYPE and SCHLAGE have very small coefficients,

and all alternatives are insignificant. SPOR and LABS are the same as the previous variables. Thus, it is not confirmed that school variables have a clear effect on student success. The NTEACHER variable offers significantly positive results at least in some models, which relates to competitions among the schools in our sample. In Turkey, the average score for university entrance is very important to teachers, principals and the provincial director of education. In the other words, the ministry of education pressures the provincial director of education, the provincial director of education pressures the principals, and the principals pressure the teachers to increase the students' success. Therefore, when there are many teachers, they compete with each other to avoid poor evaluations by the principal. This result is thus acceptable for Turkey. PAHE is added to determine the effect of the sustainability of success, but it does not have a clear effect on student success in our sample.

5. CONCLUSIONS

Education can change a nation today and in the future. Each new age presents new conditions and structures, and people may not adapt to these conditions without a good education. Therefore, policy makers and other supportive branches of the community attempt to find an optimal mix between the shortage of resources and the allocation of these resources to education. However, there is an alternative to improve the educational system and student success without new resources. If a community can determine the factors that affect students' success, this information can then contribute significantly to the community.

The study is limited with the province Denizli and the students who are educated in the science class. However, it may extend to the cohorts that have similar features. The sample consists of 1793 students and after dropping some questionnaires the final sample size is 944. The sample has some questionnaires from every town in Denizli and 42 schools that have science class.

In this framework, we address the determinants of student success in Denizli, in Turkey. Nearly every variable that represent wellbeing level has a significant positive effect on student's success, similar to the results from the majority of the literature. This relationship may arise from socio-economic interactions as well as from students' needs. In other

words, income may benefit students socially and psychologically.

The cultural and intellectual level of the parents is another important issue because according to our results mothers and fathers' education levels have a positive link to the student success. These features may improve parents' perspective and vision regarding life, and parents may pass this perspective on to their children.

Supplementary education is a worldwide reality, and it increases student success. However, due to circumstances in Turkey, where there is an imbalance between the supply of vacancies at university and the demand for them, students find it necessary to take supplementary courses. Supplementary education should have a place in the optimal structure. The syllabus in high schools can be updated continuously,

and modern tools can be used more intensively to increase the effect of formal education.

School-specific variables do not have clear effect on student success. It appears that in our sample, the primary factors that increase student success are the variables that address the student's cognitive functions.

The results offer the answers to some questions in the high school education structure in Turkey: Changing in the policies may be useful to improve the student's success if authorities try to improve general knowledge and intellectual level of the community or if the courses' syllabuses revise to cover the information that the student are given in the supplementary courses or if the government fulfils the requirements of the poor students.

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