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The Effect of Socioeconomic Level on Academic Achievement: Evidence from PISA*

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ABSTRACT: This research aims to examine the predictive relationship between the economic, social, and cultural status index (ESCS) and academic achievement in the context of PISA 2018 Turkey sample. The research used secondary data analysis, a quantitative research method. In this regard, advanced analyses were carried out in line with the new and different research questions on the data set obtained for the Turkish sample within the scope of PISA 2018. The research sample consists of 186 schools representing 12 regions and 6890 students representing these schools, which were selected in two stages by random stratified sampling from students in the 15-year-old age group continuing formal education in 2018. The findings revealed that the ESCS index is a significant predictor of students' reading, mathematics, and science literacy scores in terms of both public and private schools. According to the findings, ESCS index explains greater variance in terms of academic achievement within the sample of private schools. The research also showed that the ICT resources index has emerged as a more effective predictor of academic success than the other ESCS variables, such as the educational resources index, parent education level, and parent-professional level.

Keywords: Educational inequalities, ESCS and academic achievement, home resources, PISA 2018.

ÖZ: Bu araştırmanın amacı PISA 2018 Türkiye örnekleminde ekonomik, sosyal ve kültürel düzey indeksi (ESCS) ile akademik başarı arasındaki yordayıcılık ilişkisini incelemektir. Araştırma nicel araştırma yöntemlerinden ikincil veri analizi yöntemiyle gerçekleştirilmiştir. Bu doğrultuda PISA 2018 uygulaması kapsamında Türkiye örneklemine ilişkin elde edilmiş veri seti üzerinden yeni ve farklı araştırma soruları bağlamında ileri analizler yürütülmüştür. Araştırmanın örneklemini Türkiye'de 2018 yılında 15 yaş grubu içerisinde yer alan ve örgün eğitime devam eden öğrencilerden seçkisiz tabakalı örnekleme yoluyla iki aşamalı olarak seçilen, 12 bölgeyi temsil eden 186 okul ve bu okulları temsil eden 6890 öğrenci oluşturmaktadır. Araştırmadan elde edilen bulgularda ESCS indeksinin hem devlet okul hem de özel okullar bağlamında öğrencilerin okuma, matematik ve fen okuryazarlığı puanlarının istatistiksel olarak anlamlı bir yordayıcısı olduğu tespit edilmiştir. Elde edilen bulgulara göre ESCS indeksi özel okullar bağlamında devlet okullarına göre akademik başarının daha etkili bir yordayıcısıdır. ESCS değişkenleri açısından bilişim kaynakları indeksinin üç puan türünde de akademik başarının anlamlı bir yordayıcısı olduğu görülmüştür. Bilişim kaynakları indeksinin diğer ESCS değişkenleri olan eğitim kaynakları indeksi, ebeveyn eğitim düzeyi ve ebeveyn mesleki düzeyine kıyasla akademik başarının açılanmasında daha etkili bir yordayıcı olarak ortaya çıkması araştırmadan elde edilen önemli bulgular arasındadır.

Anahtar kelimeler: Eğitim eşitsizlikleri, ESCS ve akademik başarı, ev kaynakları, PISA 2018.

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Educational inequalities caused by social, cultural, economic, geographic, and anthropological factors are still a point of controversy in education systems. Although countries have been attempting to eliminate educational inequalities resulting from these structural characteristics and promote equal education opportunities by incorporating technological advancements into education systems, progress remains limited. Equality of opportunity is a liberal principle that allows all people to compete within their abilities and skills regardless of their economic, social, or political circumstances. Educational equality means that the results of education are independent of socioeconomic conditions, rather than the equalization of educational goods, results, resources, or opportunities (Ferreria & Gignoux, 2010; TEDMEM, 2021). According to Roemer (1998), in order to ensure equal opportunity in a society, conditions should not be divisive in the process of accessing advantages. Roemer, who coined the term "advantage" to characterize the product or outcomes obtained after a process, referred to the determinants of advantage based on an individual's will as "efforts" and those that are independent of the individual as "conditions."

Coleman (1967) revealed that one of the main factors causing inequalities in academic achievement in the context of the United States was the family environment and socioeconomic status. According to Coleman (1967), even if all inputs and processes are equalized based on school facilities, teacher qualifications, and educational programs, the additional resources, and activities that middle and upper-socioeconomic-class families provide to their children might lead to serious inequalities in the products of education (Coleman, 1967). In the same way, Rawls (1971) addressed the problem using the concept of a social lottery, meaning that the child's economic, social, and cultural background plays a distinctive role in the development of knowledge and skills.

Bourdieu (1986) explains these inequalities based on three types of capital: economic, cultural, and social. Economic capital refers to wealth and assets, while cultural capital refers to knowledge and skills. Social capital involves individuals' networks and relationships, which can provide opportunities, resources, emotional support, and validation. Bourdieu (1974) asserted that existing social and cultural inequalities are reproduced through schools and that 'cultural capital' and 'habitus,' which are transferred from family and environment to students, play a significant role in this process. Cultural capital can take on three forms: first, as a person's internalized habits and behaviors; second, as tangible cultural objects such as books and machines that reflect cultural knowledge; and third, as established cultural practices within institutions (Bourdieu, 1986). He argued that individuals enter the classroom with varying levels of cultural capital and habitus as a result of the formal or informal experiences with their families and social environments, and the benefit they receive from education is strongly attributable to their cultural capital.

Taking the argument further, Bowles and Gintis (2002) stated that the advantage of social position is one of the most important determinants of academic success. They emphasized in their study that inequalities are reinforced through the unequal education system and that the socioeconomic structure precedes the education system in terms of developing cognitive skills. While the ideology of the dominant, or upper, culture is prominent in schools, students from lower socioeconomic classes deliberately or instinctively demonstrate resistance to the system, increasing their risk of failure

(Apple, 2004). Moreover, economically higher-class parents actively cultivate their children's social and cognitive abilities through a process known as "concerted cultivation". In contrast, lower-class parents engage in a set of activities called the "accomplishment of natural growth," which promotes children's spontaneous rather than planned growth (Lareau, 2002, p. 747). Thus, individuals with socioeconomic advantages become more skilled in knowledge and skills through school.

Taken together, although it may appear impossible to speak of absolute equality of opportunity, eliminating socioeconomic inequalities that arise in the process of gaining social status and roles for individuals, as well as minimizing academic achievement inequalities arising from these conditions, might be expressed as the major goals of equality of opportunity in education. Consequently, the purpose of this research is to address the educational disparities associated with the family's socioeconomic position by using the PISA 2018 results within the context of Turkey.

Current Issues Related to Economic, Social, and Cultural Status (ESCS) in Turkey

The Economic, Social, and Cultural Status (ESCS) index is employed in the Programme for International Student Assessment (PISA) to measure students' economic and social status. Socioeconomic status (SES) is commonly used in scholarly literature to refer to this notion, and ESCS is closely related to SES. Both terms refer to a measure of student access to financial, social, cultural, and human capital (Avvisati, 2020). While the family's economic, social, and cultural status are some of the primary factors leading to educational inequalities (Dronkers & Robert, 2008; Figlio & Stone, 2012), they also contribute to the emergence of advantageous and disadvantageous student groups in the educational system. As reported by the Social Justice Index Report (2019), Turkey is ranked the second lowest of the 41 countries in the EU and OECD countries' social justice index. According to the same report, Turkey is ranked second from the bottom in the income equality ranking and last in the education equality ranking (Hellman et al., 2019). Moreover, according to the OECD (2018) report, 25% of children aged 0-17 in Turkey live in disadvantaged families, which is higher than the OECD average (13.6%). Furthermore, there are significant differences between the regions of Turkey. For example, while the poverty rate is 14% in the Western Anatolia Region, it is 42% in the Southeastern Anatolia Region (Gursel et al., 2013). According to The United Nations Children's Fund (UNICEF) reports, extra efforts should be made in Turkey to promote equal opportunities for children from disadvantaged groups where geographical and socioeconomic disparities impede educational equality (UNICEF, 2018; UNICEF, 2019).

Education expenditures and indicators also reflect Turkey's worrisome income inequality and poverty rates. Turkey is one of the OECD countries with the highest share of private resources in education expenditures, where the ratio of education expenditures to total income is 0.9% in the lowest 20% of income groups, while it rises to 4.4% in the highest 20% (Korlu, 2019; TUIK, 2019). According to the OECD "Child Well Being" indicators, overall, 24.4% of the students do not have access to basic educational needs, such as a "table to study" and a "quiet environment" (OECD, 2021). This rate increases to 47% for low-income families but drops dramatically to 9% for high-income families (OECD, 2021).

A similar problem of inequality exists between public and private school learning environments and educational expenditures. 20% of schools in Turkey are private schools, and 8% of the total student population attends private schools, making Turkey one of the countries where the difference between public and private school enrollment rates is quite considerable (OECD, 2017a). Class sizes and teacher-student ratios in public schools are twice that of private schools (OECD, 2017a). The average class size is 35 in public schools and 22 in private schools, compared to an average of 23 in public schools and 22 in private schools in the OECD average (OECD, 2017a). Above all, while public schools have 16 students and private schools have eight students per teacher, the expenditure per student in private schools in Turkey is four times that of public schools (Korlu, 2019). It is possible to predict that inequality in income and education expenditures might have a domino effect on many school outputs.

The Effects of School Type on Academic Achievement

Studies conducted in different contexts have shown that private schools commonly outperform public schools regarding academic achievement. Dronkers and Robert (2008) compared the variations in 19 OECD nations and discovered that private government-dependent schools exceed public schools in terms of mathematics achievement. Similarly, Figlio and Stone's study (2012) revealed that students enrolled in private schools consistently achieve superior performance on standardized tests and exhibit a higher likelihood of graduating from high school and pursuing higher education when compared to their peers attending public schools. Moreover, a study conducted in India found that private school students have substantially superior learning outcomes in mathematics and reading (Kumar & Choudhury, 2021). According to a study examining the degree to which the curriculum objectives of Turkish, Mathematics, Science and Technology, and Social Studies were met within the Turkish context, the level of achievement of private school students in all four basic areas was approximately one to two standard deviations higher than that of public-school students (İş Güzel et al.,2009). However, utilizing two large-scale databases, Lubienski and Lubienski (2013) revealed that academic achievement in public schools is at least comparable to and often higher than their private school counterparts after controlling the demographics and concluded that the privileged background of the private school students provides enhanced educational support.

Commonly, the superior performance of private schools is attributed to greater financial resources, smaller class sizes, the selection of more intelligent students, or characteristics of private school students and their families that provide them an advantage over students in public schools (Buckingham, 2000). Ünsal and Çetin (2019) found that teachers in private schools were more committed to the curriculum and utilized more student-centered techniques and methods. However, according to Benviste et al. (2002), the disparity may be attributed to the greater degree of autonomy and flexibility private schools have in their operational procedures, in contrast to public schools that often adhere to a centralized bureaucratic structure and standardized curriculum. Given the situation, the notable disparities in academic achievement and structural variations among these schools prompt inquiry into the influence of socio-economic determinants on these two school types and the comparative resilience of each type in relation to family-related disparities.

Literature Review

The relationship between socioeconomic status (SES) and academic achievement has been a topic of research interest for many years. Many studies have explored the association between SES and academic achievement in different contexts, the extent of this relationship, and the factors that mediate it. Furthermore, multiple research endeavors reveal how families' economic, cultural, and social capital are transmitted through education with significant implications for academic success (Barone, 2006; Lareau, 2002; Yang, 2003).

Research has consistently shown that SES is associated with academic achievement, but the extent of this relationship and the factors that mediate it vary across different contexts. In a meta-analysis study by Sirin (2005) in the U.S.A. context, a moderate relationship was found between SES and academic achievement (r = 0.299). The study revealed that parental education, parental occupation, and income of the family have a moderate relation with academic achievement. Among the SES components, home resources have the highest effect size compared to others. Regarding subject matter, the relation was the highest between SES and mathematics achievement. The study also emphasized that the relationship is stronger for students in suburban schools than rural or urban schools. With similar results to Sirin's research, Liu et al. (2020) found a moderate relationship between SES and academic achievement in a meta-analysis study conducted in the Chinese context (r = 0.243). According to the study, parental education, parental occupation, family income, and family resources are all significantly correlated with academic achievement, respectively, in terms of the SES variable. Contrary to Sirin's study, the study also showed that SES has a stronger correlation with language performance than science and math performance. Moreover, Harwell et al.'s (2017) meta-analysis study found a modest relationship between SES and academic achievement (r = 0.22). It showed that school location, student's grade, and school types are significant moderators of SES-achievement relationships. According to the study, the SES-achievement relationship is higher in urban area schools and public schools compared to suburban and private schools. This SES-achievement relationship decreases as the grade level of students increases.

Several studies have investigated the impact of socioeconomic status and cultural resources on students' academic achievement and socio-emotional development, highlighting the role of factors such as parenting stress, human capital investments, and parental education and occupation levels. In a study on early learning, Crosnoe and Cooper (2010) discovered that the family's economic disadvantage affected math and reading test results. The study emphasized that socioemotional issues, parenting stress, and parents' human capital investments all play a role in mediating the discrepancies. Tramonte and Willms (2010) investigated the cultural capital on students' academic and affective outcomes controlling the socioeconomic factors. They found that cultural capital has significant effects on reading literacy, a sense of belonging at school, and occupational aspirations. The study also showed that parental education level is statistically significant for only reading literacy while parental occupation level is significant for all three outcomes. In his study, Yang (2003) investigated the effect of socioeconomic status on mathematics and science achievement in 17 countries and found that cultural resources had the greatest impact on achievement in most countries. Barone (2006) investigated the effects of cultural resources

comparatively on 25 countries and concluded that a student's social class background may influence their social skills, language use, and attitudes towards teachers and the school curriculum.

Numerous research studies conducted in the national context obtained results that are comparable to those found in the international literature (Aslanargun et al., 2016; Bindak, 2018; Erdem & Kaya, 2021; Karaagac, 2019; Ozkan, 2020; Yolsal, 2016). For example, Aslanargun et al. (2016) showed that parental education level and family income status have a significant effect on academic achievement. Erdem and Kaya's study revealed that SES is the most important predictive variable of academic achievement among the factors such as age, gender, and students' well-being. In another study, Bindak (2018) found that academic success is strongly related to the number of books in the home, parental education level, and the family's wealth. Similarly, Karaagac (2019) revealed that socioeconomic factors account for 38% of the variance in academic achievement. Furthermore, research based on the PISA 2012 and 2018 datasets has found that a student's economic, social, and cultural status is a strong predictor of their reading, math, and science performance (see Erdem & Kaya, 2021; Ozkan, 2020; Yolsal, 2016).

As well as how academic achievement is correlated with SES and what factors moderate this relationship, the studies have shown how parents' socioeconomic status is transferred to their children through education. Children from low socioeconomic status households have significantly less developmental capital, such as a lack of a healthy home educational environment, and thus have relatively less access to educational resources, experiences, and social capital necessary for children's academic growth to succeed (Early et al., 2020; Miller et al., 2015; Yeung et al., 2002). Lower levels of socioeconomic status have also been associated with lower learning motivation (Akram & Ghani, 2013), lower self-efficacy (Artelt et al., 2003), school absence (Mooney et al., 2023) and consequently lower academic achievement (Sirin, 2005)

On the other hand, children who grow up in families with a wide social environment and cultural resources are more interested in reading, make more effort, and are more successful (Chiu & Chow, 2010), while families in a high socioeconomic class allocate more budget to educational resources and create richer learning environments (Chiu, 2010). Students with a high family income can afford learning activities after school, build important social networks (Lareau, 2002), and have easier access to information resources associated with cognitive development and academic success (Aslanargun et al., 2016; Daoud et al., 2020; Johnson, 2010; Kolikant, 2009; Lie & Zhou, 2012; Pagani et al., 2016). Studies highlight that, despite the educational reforms to provide equal educational opportunities, educational outcomes have been overshadowed by the family's socioeconomic status.

Current Study

The relationship between socioeconomic factors and academic achievement has been addressed in various ways in both international and national studies. Despite the interest in ESCS and academic achievement, previous studies have failed to address how the ESCS index works in the context of public and private schools in PISA exams and which variables construct the ESCS index as more effective in academic achievement. This paper, therefore, is expected to provide new insights into the

relationship between economic, social, and cultural resources and academic achievement across school types (public and private) and the ESCS variables and contribute to the body of knowledge in the existing literature. This research aims to examine the predictive relationship between economic, social, and cultural resources and academic achievement across the Turkey PISA 2018 sample. In accordance with this goal, the research attempts to answer the following research questions:

1) What is the predictive relationship between the economic, social, and cultural level index [ESCS] and students' reading, mathematics, and science literacy scores?

2) Is the predictive relationship between ESCS and students' reading, mathematics, and science literacy scores influenced by school type?

3) What is the predictive relationship between information resources, educational resources, parents' highest professional and highest education levels, and the students' reading, mathematics, and science literacy scores?

Method

Research Model

This study is a secondary data analysis that investigates the predictive role of ESCS and its components academic achievement across the Turkey sample using the dataset available in the PISA 2018 database. Secondary data analysis refers to the analysis of a dataset that has already been collected for other purposes in order to seek answers to new questions in different research (Devine, 2003; Johnston, 2014). This quantitative correlational study focused on simple and multiple regression analyses on the PISA 2018 Turkey data set to examine the relationship between ESCS, ESCS variables, and students' academic achievement within the context of secondary data analysis. One advantage of secondary data analysis is that it allows for the expansion of original research findings or the examination of questions not addressed in the original research on the same dataset (Hakim, 1982, as cited in Johnston, 2014). The current study conducted secondary data analysis in four phases: developing the research questions, defining the dataset, performing the analysis, and reporting the results (Johnston, 2014).

Sampling

The OECD team conducted the population and sample selection processes for this study independently of the authors of this paper. The PISA 2018 study population consists of 15-year-old students enrolled in formal education in the 2018 academic year. The sample from Turkey was determined in two stages (OECD, 2019). The first stage involved determining which schools would be included in the study using a random stratified sampling method. Four distinct variables were used to stratify the schools: school type, Turkey Statistical Regional Units Classification, administrative style of the schools, and gender. Following this, students were randomly picked from each school participating in the study. As a result, 186 schools and 6890 students representing 12 regions in Turkey took part in the PISA 2018 study (Table 1).

Table 1

PISA 2018 Turkey Sample Stratification Variables and Student Distributions (Ministry of National Education [MoNE], 2019)

Stratification Variables	Stratifications	Student Distribution Rates (%)
School Type	Anatolian High School	43.7
	Vocational and Technical High School	31.1
	Anatolian Imam Hatip High School	13.7
	Science High School	4.2
	Multi-Program Anatolian High School	4
	Social Sciences High School	2.4
	Anatolian Fine Arts High School	0.6
	Middle School	0.3
Statistical Regional Units Classification	İstanbul	20.2
	West Anatolia	13.3
	Aegean	12.5
	Mediterranean	12.4
	Southeastern Anatolia	10.4
	East Marmara	8.1
	West Black Sea	5.2
	Middle Anatolia	5.1
	Middle East Anatolia	5.1
	East Black Sea	3.8
	Northeast Anatolia	2.3
	West Marmara	1.6
School Administration Type	State School	87
	Private School	13
Gender	Female	50.4
	Male	49.6

Data Collection Tools

The data for this study was gathered through reading, mathematics, and science tests, as well as questionnaires administered to students and school administrators as part of PISA 2018. The achievement scores related to reading, mathematics, and science in the study were collected through computer-based achievement tests that lasted two hours (OECD, 2019). Questions on the tests were constructed by evaluating cognitive processes relevant to each field to assess student performance in reading, mathematics, and science (OECD, 2019).

The data relating to the ESCS, which is the independent variable in this study, were collected through questionnaires that include questions related to the educational level and occupational status of parents, information and communication technologies (ICT) resources, educational resources, and cultural resources available (OECD, 2019). The International Standard Classification of Education (ISCED) was used to classify parental education levels, and each parent's education period was coded numerically on a yearly basis with the highest value standardized. In a similar way, occupations were coded according to their prestige scores using the International Standard Classification of Occupations (ISCO-2008), and an occupational status socioeconomic index (ISEI) was obtained for each parent. The highest of these scores for the student's family was standardized and included in the computation of ESCS. The information about the existence or number of the home possessions was collected through several questions; "Which of the following are in your home?", "How many of these are there at your home?", and "How many books are there in your home?" (OECD, 2020). Students were given the following options for answering the first question: "a desk to study at, a room of your own, a quiet place to study, a computer you can use for school work, educational software, a link to the internet, classic literature, books of poetry, works of art, books to help with your school work, technical reference books, a dictionary, books on art, music, or design, a heating-cooling system, a TV subscription, and at least a one week vacation per year" (OECD, 2020, p.11). In response to the second question, students were provided with the options: "televisions, cars, rooms with a bath or shower, cell phones with internet access, computers, tablet computers, electronic book readers, musical instruments" (OECD, 2020, p.12). Finally, six options were presented in response to the last question: "0-10, 11-25, 26-100, 101-200, 201-500, and more than 500" (OECD, 2020, p.13). The educational resources index used as a predictor variable in the study was based on home possessions, such as a desk to study at, a quiet place to study, a computer you can use for schoolwork, educational software, books to help with your schoolwork, technical reference books, and dictionary. On the other hand, the computation of the ICT resources index includes educational software, internet connection, cell phone with internet access, computers, tablet computers, and e-book readers (OECD, 2017b).

Analysis of Data

To address the first question of the study, a simple linear regression analysis was conducted to explore the predictive relationship between the economic, social, and cultural level index (ESCS) and the students' reading, mathematics, and science literacy scores, as well as how this relationship varies by school type. The study utilized Plausible Value 1 in regard to students' achievement scores to perform regression analyses. The PISA Data Analysis Manual states that using a single plausible data in a sample as large as 6400 does not reveal a significant difference in mean and standard error calculations (OECD, 2009). Since the sample size in this analysis was 6890, the analyses were conducted using a single plausible value. The analyses were performed using SPSS version 24.0. To this end, the authors checked whether the data met the assumptions required for simple linear regression analysis. In this regard, the authors examined scatter plots to check the linearity between the predictor and predicted variables and examined scatter plots for residuals to check whether the differences between the predicted values and the observed values were normally distributed. After

confirming that the data met the assumptions, a simple linear regression analysis was performed to examine the link between the ESCS index and performance scores. The analysis was carried out in all schools and separately in the samples of public and private schools.

To address the second question of the study, a multiple linear regression analysis was conducted using Plausible Value 1 to reveal the predictive relationship between information resources [ICTRES], educational resources [HEDRES], parents' highest professional level [HISEI], parents' highest education level [PAREDINT], and the students' reading, mathematics, and science literacy scores. Before the analysis, the authors checked whether the data met the assumptions required for multiple linear regression analysis. At this point, the authors examined a scatter plot of standardized values (Z-predicted) and standardized residuals (Z-residuals) and whether the residual values are normally distributed. In addition, Durbin-Watson values were checked to test whether the error terms were independent, and the Mahalanobis distance for each observation was calculated based on predictive variables. After calculating the Mahalanobis values, the Mahalanobis values of a predictor variable that deviated significantly from the mean of the variables ($p < .001$) were excluded from the analysis by using the CDF.CHISQ(quant, df) function in SPSS (Tabachnick & Fidell, 2014). Based on the analyses performed, the data met the assumptions required for multiple regression analysis. In the analysis, ICT and educational resource indexes were used as continuous variables in the study, while the variables of the parent's highest education level and highest professional level were used as dummy variables. In this regard, while the highest education level of the parents was recoded as to whether or not they graduated from higher education, their professional prestige score was recoded based on whether they were above the average or not.

Results

The Relationship Between the ESCS Index and Students' Achievement Scores

Related to the first research question of the study, on the data obtained from the PISA 2018 database, a simple regression analysis was conducted in order to reveal the predictive relationship between the ESCS index and students' reading, mathematics, and science literacy scores using the SPSS program. As presented in Table 2, there was a moderate correlation between the ESCS index and students' reading, mathematics, and science literacy scores with a correlation of .33,.32, and .31, respectively.

Table 2

Predictive Relationship Between ESCS Index and Reading, Mathematics, and Science Literacy Scores (All Schools)

	R	R^2	F	p	*B*
Reading	.33	.10	829.273	.001	24.379
Mathematics	.32	.10	802.945	.001	23.753
Science	.31	.09	745.662	.001	21.975

Table 2 shows that the ESCS index is a significant predictor of reading, mathematics, and science literacy scores (p<.01) and explains 10% of the variance in reading and mathematics scores and 9% in science scores. When the non-standardized regression coefficient is considered, an increase in the ESCS index of one unit is expected to increase the reading score by 24.379, the math score by 23.753, and the science score by 21.975. In other words, the findings assert that as the parental educational status, professional prestige scores, and the number of educational, ICT, or cultural resources increase, students may get higher scores and be more successful in reading, mathematics, and science tests offered in the PISA exams. As a result, it is noteworthy that the increase in the performance score depending on the ESCS level is significant.

The Effect of School Type on the Relationship Between ESCS and Students' Achievement Scores

In order to reveal how the predictive relationship between the economic, social, and cultural level index and the students' reading, mathematics, and science literacy scores changes according to the private or public school environment, the data set was filtered by school type and simple regression analyses were performed separately on the public school and private school samples (Table 3).

Table 3

Predictive Relationship Between ESCS Index and Reading, Mathematics, and Science Literacy Scores

		R	R^2	F	p	*B*
Public Schools	Reading	.32	.10	726.138	.001	24.939
	Mathematics	.31	.10	680.122	.001	23.956
	Science	.31	.09	667.674	.001	22.628
Private Schools	Reading	.48	.23	221.670	.001	39.03
	Mathematics	.49	.24	231.885	.001	39.03
	Science	.48	.23	213.073	.001	37.195

Table 3 shows that there is a moderate correlation between the ESCS index and reading, mathematics, and science literacy scores in the public school sample (r >.30). While the ESCS index explains 10% of the variation in the fields of reading and mathematics in public schools, it explains 9% of the variance in science scores. Accordingly, a one-unit increase in the ESCS index in public schools is expected to boost the reading score by 24.939 points, the math score by 23.956 points, and the science score by 22.628 points. It is clear from the findings that the relationships between the ESCS index and the scores in each of the three competency areas are statistically significant. Considering this, an increase of approximately three units in the ESCS index in the context of public schools is expected to move the student to a higher level of proficiency in all three competence areas. This finding reveals that the ESCS index is an important factor in explaining student achievement in public schools.

In the sample of private schools, the correlations between the ESCS index and the reading, mathematics, and science score types were moderate and higher than in the public school sample. Regarding private schools, while the ESCS index explains .23 of the variances in reading and science literacy scores, it explains .24 in mathematics scores. If the ESCS index rises by one unit in the private school sample, the reading and mathematics scores are expected to increase by 39.03 points, while the science score is expected to rise by 37.195 points. As the findings assert, the anticipated score increases in private schools based on the ESCS index are at least 15 points higher than in public schools. Regarding PISA proficiency levels, an increase of approximately two units in the ESCS index is estimated, which moves students to a higher level in all three proficiency areas. Based on the findings, it is clear that the ESCS index is a more distinguishing factor in terms of academic achievement in the setting of private schools when compared to public schools.

The Relationship Between Variables of the ESCS Index and Students' Achievement Scores

To answer the second research question of the study, a multiple linear regression analysis was performed to examine the predictive relationships between ICT resources, educational resources, the occupational status and education level of the parents, and students' reading, mathematics, and science literacy scores. According to the findings, ICT resources, educational resources, parents' occupational status, and parents' educational level together are statistically significant predictor of reading, mathematics, and science literacy scores (p<.01). As Table 4 demonstrates, these four predictor variables together have a moderate relationship with reading, mathematics, and science literacy scores (r >.30). The total variance explained by the model as a whole was 12% for reading and science literacy scores, 11% for mathematics scores. Based on the standardized regression coefficients (ß), the relative order of importance of the predictor variables on the reading score is ICT resources (ß=.226), occupational level of the parents (ß=.194), educational resources (ß=.017) and educational level of the parents (ß=.004). The t-test results for the significance of the regression coefficients show that ICT resources and parental occupational status are significant predictors of reading scores (p<.001). Standardized regression coefficients show that the order of relative importance of predictor variables on mathematics and science literacy scores, respectively, were occupational status ($ß_{[Math]}$=.197, $ß_{[Science]}$=.190), ICT resources ($ß_{[Math]}$=.151, $ß_{[Science]}$=.186), educational resources ($ß_{[Math]}$=.067, $ß_{[Science]}$=.065) and educational level ($ß_{[Math]}$=.023, $ß_{[Science]}$=-.007). According to t-test results related to significance of regression coefficients, ICT resources, educational resources, and parental occupational status are significant predictors of academic achievement in mathematics and science (p<.001).

Table 4

Results for Multiple Regression Analysis

Score	Variable	*B*	SE	ß	t	p	Bivariate	Partial
Reading Score	Constant	477.328	2.134		223.645	.001		
	ICT Resources	21.392	1.501	.226	14.249	.001	.30	.17
	Educational Resources	1.447	1.334	.017	1.085	.278	.22	.01
	Parents' Occup. Pres. Score (Above the average)	35.839	2.413	.194	14.852	.001	.27	.17
	Graduated From Higher Education (Yes)	.803	2.353	.004	.341	.733	.16	.004
	R = .35	R^2 = .12						
	F = 246.208	p = .001						
Mathematics Score	Constant	457.613	2.102		217.671	.001		
	ICT Resources	13.875	1.454	.151	9.544	.001	.27	.11
	Educational Resources	5.574	1.281	.067	4.353	.001	.22	.05
	Parents' Occup. Pres. Score (Above the average)	36.315	2.417	.197	15.026	.001	.27	.17
	Graduated From Higher Education (Yes)	4.809	2.353	.023	1.738	.082	.17	.02
	R = .33	R^2 = .11						
	F = 219.601	p = .001						
Science Score	Constant	477.258	2.000		238.603	.001		
	ICT Resources	16.332	1.383	.186	11.809	.001	.29	.14
	Educational Resources	5.142	1.218	.065	4.221	.001	.23	.05
	Parents' Occup. Pres. Score (Above the average)	33.303	2.299	.190	14.483	.001	.26	.17
	Graduated From Higher Education (Yes)	-1.147	2.239	-.007	-.512	.608	.15	-.006
	R = .34	R^2 = .12						
	F = 230.633	p = .001						

According to Table 4, a one-unit increase in the ICT resources index results in an increase of 21,392 in the reading score, 13,875 in the mathematics score, and 16,332 in the science score. The findings show that increasing the availability of ICT resources,

such as internet access, computers, and tablets, and their use has a positive and significant impact on performance scores in all three proficiency areas. However, it is also evident from the findings that the increase in educational resources, such as sourcebooks, technical books, and dictionaries, does not affect the performance scores as much as the information resources.

The findings also show that if the parental occupational prestige score is above the average, it is expected to increase 35,839 in the reading score, 36,315 in the mathematics score, and 33,303 in the science score. On the other hand, parents who have graduated from higher education are estimated to increase the reading score by only .803 points and the mathematics score by 4.809 points, while it does not affect the science score at all. Accordingly, it is possible to say that if either parent works in jobs above a certain income level and with a relatively higher occupational reputation, it has a positive effect on the success scores of the students. However, as the findings indicate whether the parents completed higher education does not affect achievement scores.

Discussion and Conclusion

The ESCS Status is Key to Understanding Students' Academic Achievement

According to the study's findings, the ESCS index level is a significant predictor of students' reading, mathematics, and science literacy scores. This finding implies that the ESCS index plays a significant role in explaining academic achievement. It can be inferred from this that the curricula implemented in Turkish schools are insufficient to eliminate the effects of home and family disparities. To put it another way, the current educational system is unable to address inequalities resulting from society's socioeconomic structure properly. Although the effect of the ESCS level on academic achievement has diminished in Turkey since 2003, it is concerning that the ESCS-driven differences still negatively affect equality in the education system. From this perspective, the findings of this study also support conflict theories of education, which claim education systems reinforce class inequalities and contribute to the reproduction of social inequalities by transforming socioeconomic inequalities into academic inequalities. Similar to the findings of the current study, family-based factors (economic, social, and human capital) play a crucial role in explaining educational achievement, as revealed in many research articles focused on educational inequalities in Turkey (see Aslanargun et al., 2016; Bindak, 2018; Karaagac, 2019; Ozkan, 2020; Yolsal, 2016).; These inequalities due to socioeconomic conditions have gained even greater importance with the emergence of distance education, which was a compulsory implementation in response to the COVID-19 pandemic. During the pandemic, when schools were closed, the time students spent with their families at home increased, and the internet infrastructure, ICT resources, educational resources, and educational support from parents became even more important. Studies showed that socioeconomically disadvantaged students experienced more problems and distress than their peers during this period (Engzell et al., 2021; Maldonado & De Witte, 2020). For example, research in the Netherlands discovered that socioeconomically disadvantaged students lost up to 55% more learning than their peers (Engzell et al., 2021), while

another study in Belgium found that these students lost more reading and math skills (Maldonado & De Witte, 2020).

The ESCS Status is More Effective Predictor in Private Schools

Another key finding of this study is that the ESCS index is a better predictor of reading, math, and science literacy scores in private schools than in public schools. It is believed that the family's socioeconomic status, the structure of the curricula, education expenditures, parent involvement in education, and the academic resilience factors of students all contribute to the explanation of this result. First and foremost, compared to private schools, the education-teaching processes in public schools are less distinctive in terms of economic, social, and cultural resources, and so the disparities based on the ESCS index have less of an impact on public schools in terms of academic achievement. As a result of this finding, the impact of teacher credentials, student characteristics, learning environments, and the implemented curricula on coping with socioeconomic differences should be investigated in both public and private schools. In addition, education expenditures might be one of the reasons why the ESCS index is more effective in the context of private schools. According to the report published by the Education Reform Initiative (2019), Turkey is one of the countries with the highest private resource expenditures in education (Korlu, 2019). Research by the Turkish Statistical Institute (TUIK, 2019) shows that the amount allocated to education expenditures increases as the family's income level increases. In Turkey, while households in the lowest 20% of income distribution spend 0.9% of their total budget on education, this proportion rises to 4.4% in the highest 20% (TUIK, 2019). Given that students at private schools have higher socioeconomic levels than students in public schools, it is possible to infer that socioeconomic factors influence those differences in academic achievement more in private schools.

In addition to education expenditures, another factor that may be effective in the emergence of such a difference between private and public schools is the level of parental participation in education. Studies regarding Turkey show that as parents' socioeconomic levels increase, the education participation rate also increases (see Kocabas, 2016; Tabak, 2020). For example, in the study by Tabak (2020), a significant difference was found in favor of those with high-income levels in terms of communication with the school and the teacher, supporting the child's homework and studies, and socio-cultural development. According to another study, parents of students in private schools gave greater support to learning activities at home and communicated more effectively with the teacher (Kuru Cetin & Taskın, 2016). Furthermore, studies have shown that parents with relatively high education levels can communicate better with students about educational practices and support them better in school-related studies, implying that there is a strong relationship between parental education level and academic success (Akinsaya et al., 2011; Chiu & Chow, 2015; Davis-Kean, 2005; Fantuzzo et al., 2000; Trusty, 1999). In the PISA 2018 data set, the rate of parents who had received undergraduate and graduate education is 34% in the public school sample, while this rate is 62% in the private school sample. Given this fact, ICT, educational, and cultural resources might be used more effectively in educational activities in the context of private schools depending on the parent's education level.

Academic resilience might be another factor explaining why ESCS is more effective in private schools regarding academic achievement. According to OECD studies, students with high academic resilience, which is the ability to achieve good grades despite adversity, are more successful despite their socioeconomic disadvantages (Agasisti et al., 2018; Agasisti & Longobardi, 2017). One report states that students who are successful despite adverse conditions have strong personality traits, such as confidence in academic abilities, determination, disciplined work, high motivation, passion, and ambition (Agasisti et al., 2018). Given the fact that the average academic resilience scores of socioeconomically disadvantaged and advantaged students are expected to be close in the public school sample, the difference is expected to be greater in the private school sample. Nevertheless, according to the PISA 2018 data set, the average academic resilience scores of the two groups were closer in the public school sample than in the private school sample; the difference was two points in the public school sample but four points in the sample of private schools. The fact that this difference is greater in the private school sample could also explain why the ESCS index is more distinctive in the private school sample.

ICT Resources Have a Significant Impact on Students' Performance

A further key finding of this study is that ICT resources are a better predictor of academic achievement than educational resources. Considering that digital transformation has started to spread to every area of our lives today, the result is not surprising. Research on information technology and academic success shows that having access to and using information and communication technologies has a favorable impact on academic achievement (Daoud et al., 2020; Erdogdu & Erdogdu, 2015; Lie & Zhou, 2012; Pagani et al., 2016). For example, in a systematic review study by Daoud et al. (2020), a positive correlation was found between having an internet connection at home or school and academic success in 87% of the studies. Several other studies show that having internet access improves children's high-level thinking skills, such as critical thinking and problem-solving (Cabiness et al., 2013; Furlang & Davies, 2012; Lei & Zhou, 2012). Furthermore, Kolikant (2009) reveals that students with computer and internet access are more autonomous learners and have better study routines than their peers who do not. Moreover, Johnson (2010) discovered a positive correlation between cognitive development and internet availability.

To conclude, this paper shows that the ESCS index is an important predictor of academic success and that the ESCS index has a greater impact on academic success in private schools than in public education institutions. Furthermore, regarding ESCS variables, the study reveals that parental occupational status and ICT resources are important variables in predicting academic achievement. The findings of the study are confined to the data collected during the PISA 2018 exam and the analyses conducted within the study. Considering the findings for the first research question, it is believed that taking economic, social, and cultural factors into account in the development and evaluation of curricula, as well as organizing extra programs for socioeconomically disadvantaged students, are priority measures that should be implemented on a school-by-school basis. Furthermore, among the school-based measures that can be implemented is the identification of the socioeconomic profiles of students enrolled in schools, as well as the learning opportunities at home, and determining the advantaged

and disadvantaged groups. In order to overcome education inequities caused by students' socioeconomic circumstances, policymakers should design education policies that prioritize opportunity above equality and allocate educational resources accordingly. Above all, limiting the share of private resources in education spending and boosting the resources available to public institutions are among the topics that should be prioritized in the battle against educational inequities caused by socioeconomic conditions (Korlu, 2019).

In light of research findings, both in this current paper and other studies, it is critical to identify and resolve issues with internet and information technology access in students' homes to reduce the digital divide and, consequently, inequalities. Furthermore, the students' and parents' capability to use information and communication technologies should be determined, and supportive and mass education activities should be carried out for disadvantaged groups where necessary. Finally, in future research, it is recommended that the impact of ESCS on academic outcomes be examined while taking into account such factors as family involvement in education and academic resilience. In addition, qualitative research methods can be applied to investigate how ICT and educational resources are integrated into education in the context of home resources and how learning environments are created at home.

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The first author is responsible for conceptualization, formal analysis, writing the original draft and visualization in composing the article. The second author is responsible for methodology, validation, writing-review&editing and supervision in composing the article.

Conflicts of Interest

The authors report there are no conflicts of interest to declare.

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