



## The Impact of School Tracking on Secondary Vocational Education and Training in Turkey

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Article Information	ABSTRACT
Received: 03.01.2021	<p>School tracking has been a structural characteristic of education systems for many years. School tracking is generally implemented at the high school level, where students are divided into academic and vocational education groups. It is important to examine the effects of school tracking because the effect of tracking may vary between education types. The present study examines the effects of tracking on VET in Turkey over the past decade. For this purpose, the socioeconomic characteristics of all students tracked into VET high schools over the past ten years were compared with those placed in other types of high schools. This method aimed to determine the effects of tracking on the academic achievement of the VET students. Student population data at 12<sup>th</sup> grade between 2010 and 2019 is analyzed in study. The predictive power of secondary school achievement and socioeconomic status is examined with multiple regression analysis. The results indicated that VET high school students from all socioeconomic backgrounds have been in a disadvantaged position for the past decade. The research identified that the education level of fathers caused the greatest disadvantage for VET high school students, compared with their peers studying in other high schools. As the percentage of students placed in different schools increased by tracking, the prediction power of students' early academic performance and socioeconomic levels on academic achievement also increased. Considering the socioeconomic disadvantage of VET students, this result indicates that when the level of tracking increases, inequality also increases. The results show that the disadvantage caused by tracking in VET has continued at a similar level over the last decade, and that this disadvantage has grown in the years when the scale of tracking increases.</p> <p><b>Keywords:</b> Vocational education and training, school tracking, socioeconomic characteristics, academic achievement, inequality</p>
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## 1. INTRODUCTION

Education systems have many structural characteristics, and each of these features shapes the outputs of the system (Carbonaro, 2005). *School tracking* is one of the most important structural elements that impacts the outputs of an education system (Biewen & Tapalaga, 2017; Carbonaro, 2005). Tracking, which is defined as the grouping of students in schools or school types based on their academic performance, has become a frequently discussed issue over the past few decades (Ozer, 2020a; Slavin, 1987). Due to its impact on the human resources trained by countries, school tracking is often considered an important practice in political, educational, and economic discussions.

The methods and time frame for such tracking differs between countries (Hanushek & Woessmann, 2006). In some countries, such as Austria, Germany, and Slovakia, students are grouped into different school types according to their various characteristics, especially their academic performance, at an early age (around the age of 10) (Ozer, 2020a; Woessman, 2009). On the other hand, countries such as Japan, Norway, and Canada continue inclusive education for a longer time, delaying tracking to later ages (Hanushek & Woessmann, 2006). Tracking can also be carried out in different ways. In some countries, students are grouped into different types of schools, while in some countries, students can be grouped into schools or classes determined according to their performance (Meier & Schütz, 2007). Therefore, tracking is implemented not only between school types, but sometimes according to different groupings within the same school. The fact that countries follow different methodologies prompts many debates about the effects of tracking on educational performance and equality (Meier & Schütz, 2007; Ozer & Perc, 2020; Raffe, 2008).

The main purpose of tracking is to create groups of students at a similar level (homogeneous) of academic performance and to increase their performance by creating an appropriate educational environment (Guill et al., 2017; Oakes, 1985; Page, 1991). It

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is advantageous in many ways to train student groups with greater homogeneity of academic performance. In a classroom consisting of students with similar academic skills, students' pace of learning are similar, as well as the possible problems that they might face—because the major problems arising from the difference between fast and slow learners in heterogeneous classes are rarely seen in homogeneous classes (Mamary & Rowe, 1985). Clustering homogenous students in classrooms also makes it easier to find common solutions to students' problems (Mamary & Rowe, 1985). Moreover, grouping students into homogeneous groups is seen as an economically beneficial practice, because students are first divided into homogeneous groups, then special educational environments are prepared for these groups, thus increasing average efficiency across the class (Meier & Schütz, 2007). Increasing average efficiency also increases the economic return obtained from unit manpower in the economy. Therefore, tracking has been seen as a useful tool in educational and economic contexts for many years.

However, tracking also causes many unintended consequences beyond its intended benefits (Brunello & Checchi, 2007; Dustman, 2004; Hanushek & Woessmann, 2006; Ozer & Perc, 2020). The most critical problem created by tracking is that it deepens inequalities in education (Ozer, 2020a, 2020b; Reichelt et al., 2019; Suna et al., 2020a). First, tracking groups students with lower academic skills are grouped into the same environment, which leads to an increase in their disadvantage. Multiple factors combine to lead to this disadvantage: the effect of peer education decreases among students with lower academic skills, teachers have lower expectations for these students, and students suffer from the psychological pressures of being in a lower achieving group (Heltemes, 2009; Rosenthal & Jacobson, 1968; Slavin & Braddock, 1993). Therefore, tracking results in lower performing students who have decreased access to and make less use of many educational resources, especially teachers. Since the 1960s, many OECD countries have either postponed tracking to later ages or canceled tracking practices entirely, due to the negativities that tracking creates in terms of equality in education (Meier & Schütz, 2007).

In many countries, the accompaniment of grouping students with lower academic skills with the classification of students from lower socioeconomic levels adds a social dimension to this problem. Such tracking can perpetuate educational inequities for students with socioeconomic disadvantages. Social reproduction, as expressed by Bourdieu (1973), also functions as an important instrument in this context, since tracking supports the continuity of socioeconomic levels in society through education (Bourdieu & Passeron, 1990). As a result, tracking has an effect that increases inequality in education due to its potential to reproduce current inequalities in society. Moreover, not all types of education are affected at the same level by the inequalities that tracking deepens. While elite schools with high performing students maintain their position with the student flow provided by tracking, schools where low performing students are grouped experience diverse and enhanced negative consequences (Korthals, 2015; Piopiunik, 2013).

Vocational education and training (VET) is the type of education where the effect of tracking is felt the most. Tracking reinforces the flow of students from lower socioeconomic statuses and performance levels to VET institutions in many countries. This situation is clearly indicated by the data demonstrating that low achievement students are grouped into VET high schools in a significant portion of OECD countries (Meier & Schütz, 2007). In such cases, VET is established as a type of education for low achieving students, and becomes associated with high rates of disciplinary problems and dropout rates (Ozer, 2020a). Moreover, the perception of VET in society changes negatively over time, further distancing high performing students from vocational programs and career fields. Therefore, tracking continues to negatively affect the quality and perception of VET by channeling students with lower academic skills into VET in many countries.

Despite increased research attention on the effects of the tracking, the effects of tracking on VET in Turkey have been under-theorized and under-studied. Therefore, this study examines the socioeconomic background of Turkish students placed in VET high schools after tracking, as well as evaluating the impact of socioeconomic status and early school performance on the academic achievement of high school students. To understand the impact of tracking on educational equity and long-term outcomes, this research compares the socioeconomic background of VET high school students with students studying in other types of schools across Turkey. This comparison enables the evaluation of the predictive power of students' socioeconomic level and early performance on high school achievement. In this sense, the present study has two unique characteristics. First, this work measures, for the first time in Turkey, VET high school students' socio-economic disadvantage compared to that of other high school students. An accurate reflection of the Turkish student population is ensured here through consideration of sampling errors and representation. Second, this study represents the first comparative analysis of the socioeconomic levels of VET high school students and the effects of their early performance on high school achievement. This research examines the predictive power of early performance and socioeconomic level, while also evaluating students' achievement in Turkish language and mathematics courses in addition to their general high school performance. Thus, the effects of tracking on student achievement are discussed with a wide data set and broad perspective.

### **1.1. Vocational Education and Training, Tracking and Achievement Gap in Turkey**

The Turkish system of Vocational and Educational Training has roots dating back to the Ottoman Empire. In the past, VET was based on the master-apprentice relationship, taking place as a type of education separate from the academic system in the Republic. Government programs have consistently highlighted the importance of VET for Turkey's economic development, and specific targets for improving VET have been established through the nation's Development Plans. Especially in the 2000s, important projects were designed to take steps to harmonize VET with the EU (Canbal et al., 2020; MEB, 2018; Ozer, 2018, 2019a, 2019b; Ozer et al., 2011).

The coefficient regulation, which restricted the transition of Turkish VET high school students into higher education for more than a decade after 1999 (Ozer et al., 2011), as well as the practice of placing all students in high schools based on their exam performances between 2014 and 2017 (Bölükbaşı & Gür, 2020), negatively affected VET across the country. These practices gradually distanced high performing students who wanted to continue higher education from VET, homogenized the student profile in VET high schools, and led to a clustering of low performing students in VET institutions. Eventually as a result of these phenomena, the quality of VET decreased, the problems of absenteeism and dropout increased, teachers' expectations for students declined, and eventually VET developed a negative reputation both within the labor market and Turkish society writ large (Ozer, 2019b, 2020a).

Students' transition to VET in Turkey occurs through tracking in the final year of secondary school (8th grade). In this process, students (who typically complete secondary school by age 14) are placed in high schools aligned with their preferences, academic performance, and career goals. Different systems have been used over the years in Turkey to place students in high schools. Over the last ten years, students have been subjected to different levels of tracking through three different systems: the SBS (Level Specifying Exam), TEOG (Transition from Middle School to High School Exam), and LGS (Transition to High School Exam). Approximately 42% of the students in the SBS system, all of the students in the TEOG, and 10% in the LGS were placed in high schools according to their academic performance. Therefore, school tracking was used in all secondary education transition systems over this decade-long period, but the level of tracking varied significantly from one system to another. For the purposes of the present study, the SBS system, in which approximately 42% of the students were subject to tracking, is defined as "low tracking"; while the TEOG system, in which all the students were subject to tracking, is defined as "high tracking". The LGS system has been excluded from the scope of this research, since the students who were placed in high schools according to this system have not yet graduated from high school.

The impact of tracking on VET in Turkey is especially apparent in the achievement gap between school types. Many national and international studies conducted in Turkey show that VET students perform lower than those in other high school types (Alacacı & Erbaş, 2010; Aşıcı et al., 2012; Berberoğlu & Kalender, 2005). The achievement gap in Turkey appears to be considerably higher than those in other OECD countries. The PISA 2003 study found that the variance in academic performance explained by the school differences reached extreme levels in Turkey (OECD, 2004). In fact, according to these PISA results, the difference between the science high schools, where the highest performing students are clustered in Turkey, and VET high schools was equal to two full years of education (OECD, 2004). Suna et al. (2020) investigated the rates of students demonstrating basic and advanced competence levels across school types in all of the PISA cycles since 2003. The findings showed that the percentage of VET high school students reaching basic competence levels was relatively low across all three fields. Moreover, in recent PISA cycles, the rate of those reaching advanced competency levels among VET high school students has been below 1%. The low performance of VET graduates continues in the transition to higher education: the rate of VET high school graduates placed in higher education programs is significantly lower than that of other high school students (ÖSYM, 2018, 2019).

The achievement gap in Turkey also shows itself in debates on inequality in education. Ataç (2017) reviewed the inequalities within the scope of transition to higher education, revealing that the social and economic characteristics of the society are key determinants in the transition to higher education. Ferreira and Gignoux (2010) showed that family characteristics can predict many features surrounding participation in education and transition to higher education in Turkey. Similarly, research has shown that socioeconomic characteristics are effective predictors of high schools placement (ERG, 2014; Suna et al., 2020b). A recent study revealed that the placement of all students in high schools by tracking has negative consequences in terms of peer effect, disciplinary problems, and changes in expectations (Bölükbaşı & Gür, 2020). Another study by Suna et al. (2020a) showed that socioeconomic level significantly affects the academic performance of middle school students, and this effect reaches the highest level when all students are placed in schools based on their examination results.

## 1.2. Aim of Study

The aim of this study is to describe the socioeconomic background of the students placed in VET high schools in Turkey via tracking between 2010 and 2019, and examine the effect of socioeconomic level and early performance on high school achievement. In line with this general purpose, the following questions were sought:

### 1.2.1. Research questions

1. How does the socioeconomic distribution of students in VET high schools between 2010 and 2019 change compared to those in other high schools?
2. How do the predictive power of students' socioeconomic level and early performance on high school achievement change at different levels of tracking?

## 2. METHODOLOGY

### 2.1. Research Design

The study was designed as a casual comparative research. The studies designed with a casual comparative approach examine the effect of an intervention or an action which was occurred in the past (Creswell, 2014). Based on the fact that the school tracking practices were implemented between 2010 and 2019, this study focus on their effect through the student characteristics.

### 2.2. Population

The student population for this study consisted of a total of 2,859,457 VET high school students who were in the 12th grade between the 2010–2019 academic years. All the student population data without the missing data on socioeconomic variables are included in study. To answer the first research question, the data gathered from these students were compared with the data gathered from 4,238,878 students enrolled in other high school types who were in the 12th grade between 2010–2019. In Table 1, the number of VET high school students responding to particular demographic questions in each academic year is displayed.

Table 1.  
*Number of Students in the Research Population by Years*

Academic Year	Family Income Status	Mother Education Level	Father Education Level	Family Occupational Status
2010	95,283	87,912	90,035	96,735
2011	198,700	112,674	116,080	124,851
2012	233,294	121,880	126,717	136,713
2013	237,640	96,302	102,384	111,928
2014	256,547	89,533	94,511	107,014
2015	276,134	79,547	83,722	93,779
2016	300,562	77,374	81,209	85,959
2017	301,794	72,056	76,041	81,595
2018	131,196	86,720	92,271	97,282
2019	265,752	89,413	95,277	104,687
<b>Total</b>	<b>2,296,902</b>	<b>913,411</b>	<b>958,247</b>	<b>1,040,543</b>

As seen in Table 1, the number of VET high school students in the population varies by socioeconomic variables and years. The reason for this is that data were collected from different numbers of students on the variables of family income, education levels of the parents, and family occupational status in different years. In this context, 2,296,902 students with data on family income in the last ten years, 913,411 students with mother education level data, 958,247 students with father education level data, and 1,040,543 students with family employment status data were included in the analysis.

### 2.3. Data Analysis

The data in the study was used with the permission number 65968543/622.01-E.16394481 of the Ministry of National Education Information Technology Department. There was no need for sampling in this study, because data from the entire Turkish student population was used. However, for the purposes of answering the first research question, students without socioeconomic data were excluded from the analysis. Similarly, for the second research question, students without central examination scores were excluded from analysis.

During the data analysis process, the socioeconomic level variables were redesigned. The family income level was sorted into three groups: “low”, “medium”, and “high”. In original data set, family income was clustered as “very low”, “low”, “medium”, “high” and “very high” and these level represented the students’ perceptions and teacher observations. In Turkey, family income level is recorded in the e-School system with the declaration of the students and the approval of the teacher. For the variables of mothers’ and fathers’ level of education, parents who graduated from primary school and had lower education levels are grouped as “low”, while parents who graduated from middle or high school were grouped as “medium”, and parents who graduated from associate’s or higher education levels were grouped as “high”. In the case of family occupation status, the working status of the parents was grouped as both working/retired, one is working/retired, or neither working/retired.

To address the first research question, the student percentages calculated for VET high schools were compared with those of other high school types. Statistical significance tests were not carried out because the entire national student population was incorporated into the study sample.

To address the second research question, students' high school GPA, achievement scores in mathematics and Turkish language courses, central examination scores, and socioeconomic levels were taken into consideration. In order to emphasize that middle school examination scores were obtained before tracking, these scores were considered as "early achievement" for the purposes of this study. The following regression model was designed to examine the effect of socioeconomic level and early achievement on the students' average high school GPA, as well as their mathematics and Turkish achievement scores.

$$Y'_{GPA} = a + bY_{middle\ school} + c.SES + \epsilon$$

$Y'_{GPA}$  = Predicted high school GPA

$Y_{middle\ school}$  = Central examination score in middle school

SES = Socioeconomic status index

a = Regression constant

$\epsilon$  = Error term

The high school GPA is considered as predicted variable (dependent variable), and early achievement and SES are considered as predictors (independent variables) in regression model. In this way, the predictability of students' academic achievement (high school achievement score) after tracking by students' early achievement (central exam score in secondary school) and socioeconomic status was examined. The increase in the variance ( $r^2$ ) explained by the model means that early achievement and socioeconomic level together are more determinant on students' high school achievement. In this context, the explained variances in the low tracking levels between 2014-2017 were compared with the explained variances in the high tracking levels in 2018 and 2019. Students in the 12th grade between 2014 and 2017 were placed through SBS, where relatively low tracking level was implemented, and the students in the 12th grade in 2018 and 2019 were placed in high schools with the TEOG system in which all students were tracked. The differences between the calculated values in these years show the results caused by the change in the level of tracking.

As an indicator of the academic achievement of the students in high school, the GPA, and the final score of mathematics and Turkish courses are considered. High school GPA is used as a measure of students' performance in all high school courses. Mathematics and Turkish courses are common courses taken by all students and it was also examined whether the achievement in these two main courses was affected by tracking. First of all, the significance of the regression model is examined through student population and the coefficients were determined. Then, the analysis is replicated separately for the years in which low tracking and high tracking. The results show how the effect of students' early achievements and socioeconomic levels change as the level of tracking increases.

Before the regression analysis, the assumptions of multiple linear regression are tested with the data. The first of these assumptions is that there are significant and linear relationships between predictor and predicted variables (Osborne, 2002). The second is that there is a significant and linear relationship between predictor variables. However, much stronger relationships (i.e.  $r > 0.80$ ) between predictors lead to the multi-collinearity problem (Tabachnick and Fidell, 2013). Assumptions of multiple linear regression are tested and the results are given in Table 2.

Table 2.

*Correlation Matrix of the Variables in the Regression Model*

Academic Year	Predictor Variables		Predicted Variables		
	Socioeconomic Status Index	Early Achievement	High School GPA	Math Course Score	Turkish Course Score
Socioeconomic Status Index	-	0.392*	0.335*	0.221*	0.309*
Early Achievement	0.392*	-	0.627*	0.430*	0.632*
High School GPA	0.335*	0.627*	-	0.708*	0.881*
Maths Course Score	0.221*	0.430*	0.708*	-	0.590*
Turkish Course Score	0.309*	0.632*	0.881*	0.590*	-

As seen in Table 2, there are significant and linear relationships between the predictors and predicted variables in this study. The relationship between predictor variables is also statistically significant and moderate ( $r = 0.309$ ,  $p < 0.05$ ). These results show that the assumptions are met in order to establish a regression model with the data used in the research. Scatterplots also show that the relationships between the predictors and predicted variables are linear. It is also determined that the tolerance and VIF values, which represent the collinearity indexes, change between accepted limits.

The testing of normality is conducted through the skewness and kurtosis indexes of distributions and with histograms. The index values change between -1 and 1 which can be seen in Table 3, and histograms show that the distributions are generally in coherence with normal distribution.

Table 3.

*Distribution Indexes for the Variables of Study*

Academic Year	Socioeconomic Status Index	Early Achievement	High School GPA	Math Course Score	Turkish Course Score
Mean	1,09	333,83	72,43	57,45	68,82
Standard Deviation	0,42	75,05	9,91	17,13	12,87
Skewness	-0,197	0,040	0,250	0,235	0,101
Kurtosis	0,132	-0,700	-0,673	-0,634	-0,721

In order to include socioeconomic characteristics in the regression model, an index was developed through the variables of family income, education, and employment under investigation in the first research question. In the development of socioeconomic status index, socioeconomic variables were subjected to principal component analysis (PCA), and weighting was made according to the factor load value of each variable (Vyas & Kumaranayake, 2006). The weighting made based on the PCA results is shown below.

$$SES_{ind} = 0,578 * \text{Family Income} + 0,815 * \text{Mothers' Level of Education} + 0,796 * \text{Fathers' Level of Education} + 0,450 * \text{Family Occupational Status}$$

### 3. FINDINGS

This section presents the results obtained within the scope of the research in the order of the research questions.

#### 3.1. Family Income

This study first examined the distribution of family income levels of VET high school students and students in other high school types in the academic years from 2010–2019. The results of this analysis are given in Figure 1.

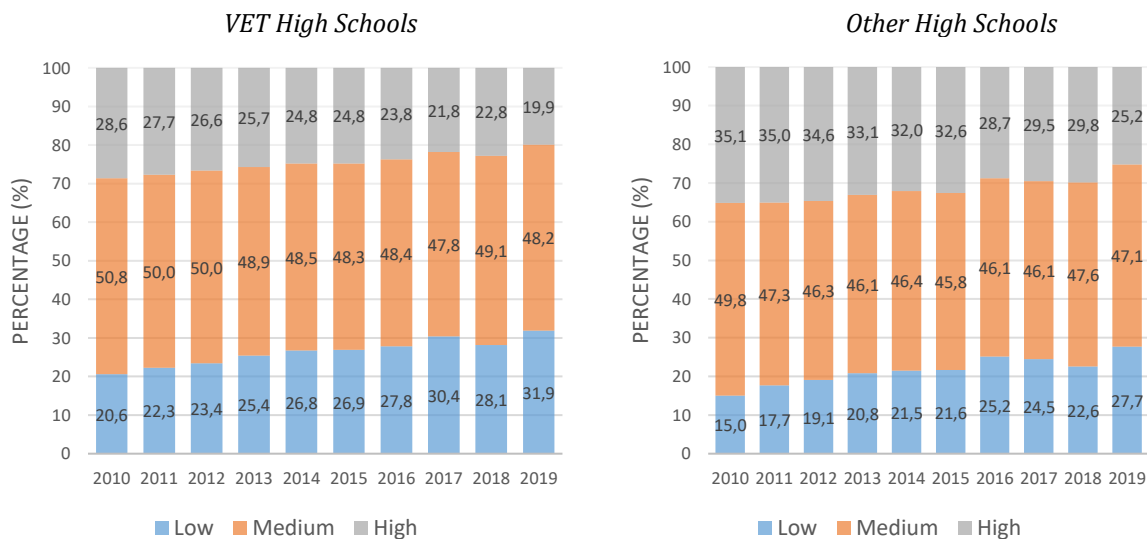


Figure 1. Family Income Distribution of Students in VET High Schools and Other High Schools by Years

As seen in Figure 1, the percentage of students with high family incomes is lower among VET high school students when compared with their peers enrolled in other types of high schools. In 2017, the percentage of students from high-income families in other high school types reached 1.35 times higher than those of students in VET high schools. Additionally, the percentages of students with medium family income levels in VET high schools and other types of high schools are close. Therefore, the percentage of students from low-income families has been higher in VET high schools compared to other high schools during the last decade. In 2010, the percentage of students from low-income families was 1.37 times higher in VET high schools than in other high schools. On the other hand, since 2011, the proportion of both VET high school students and other high school students with low family income has been increasing.

#### 3.2. Education Level of Father

The distribution of fathers' education levels among VET high school students and students in other high school types is given in Figure 2.

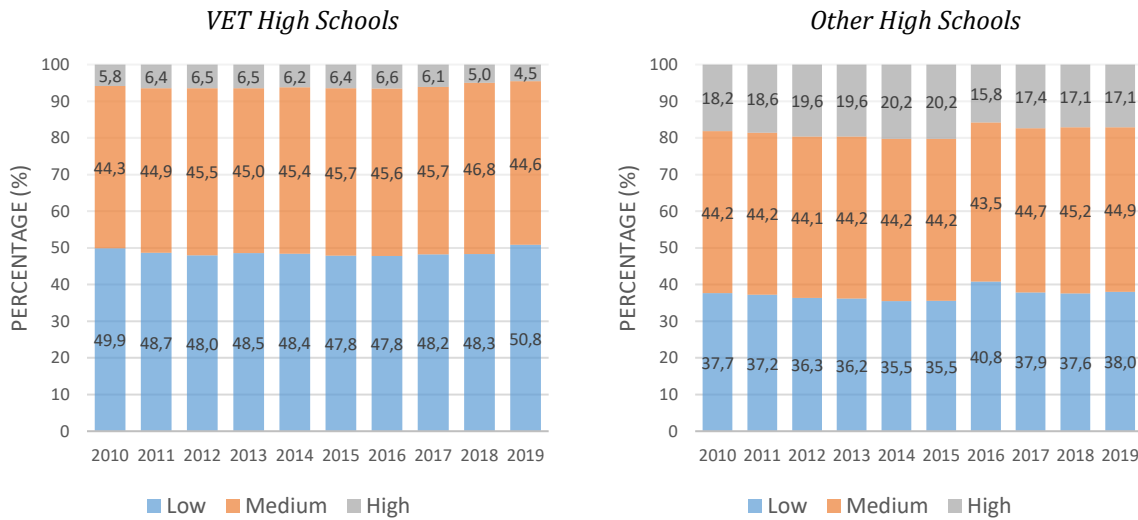


Figure 2. Distribution of Fathers’ Education Level among VET High School Students and Other High School Students by Years

As seen in Figure 2, there are remarkable differences between VET high school students and other types of high school students in terms of fathers’ education level over the last ten years. The biggest gap between the student groups is seen in the ratio of students whose fathers graduated from a higher education level. While the percentage of students whose fathers graduated from higher education range from 4.5% to 6.6% in VET high schools, these percentages range from 15.8% to 20.2% in other high school types. In this context, the number of students from other high schools whose fathers graduated from the higher education has reached three times that of VET high school students in the last decade. The percentages of students whose fathers attained medium education levels level are similar in both types of high schools and have changed similarly over the last decade.

Another disadvantage faced by VET high school students is illustrated through the rates of low father educational levels. While the percentage of students whose fathers graduated from low education levels varies between 47.8% and 50.8% in VET high schools, these percentages vary between 35.5% and 40.8% in other high schools. Therefore, in the last decade, the ratio of VET high school students whose fathers have graduated from a low educational level has reached 1.36 times that of other students. In summary, VET high school students have a significant disadvantage in their fathers’ education level. This disadvantage for VET high schools can also be seen in the numbers of students whose fathers graduated from low and high educational levels when compared with their peers attending other types of educational institutions.

### 3.3. Education Level of Mother

The distribution of the education levels of VET high school students’ mothers, compared with those of other high school students, is given in Figure 3.

Figure 3 shows that there are considerable differences between VET high school students and other high school students in terms of mothers’ education level represented in the data from the past ten years. These differences are particularly heightened in the percentage of students whose mothers graduated from higher education. Among VET high school students, the percentage of those whose mothers graduated from a higher education ranges from 1.6% to 2.1%, while among other high school students, these percentages range from 6.4% to 9.3%. Therefore, among other high school students, the number of students whose mothers graduated from higher education can reach five times that of VET high school students.

Additionally, the proportion of students whose mothers attained medium education levels is higher in other high schools compared with VET high schools. Therefore, among other high school students, the number of those whose mothers graduated from both medium and high levels of education is higher than VET high school students. As a result, the percentage of VET high school students whose mothers graduated from low educational levels has been higher than that of other high school students for ten years. Among VET high school students, the percentage of those whose mothers graduated from a low education level has reached up to 1.22 times that of other high school students. Therefore, the disadvantage of VET high school students can be seen at all levels of mothers’ education.

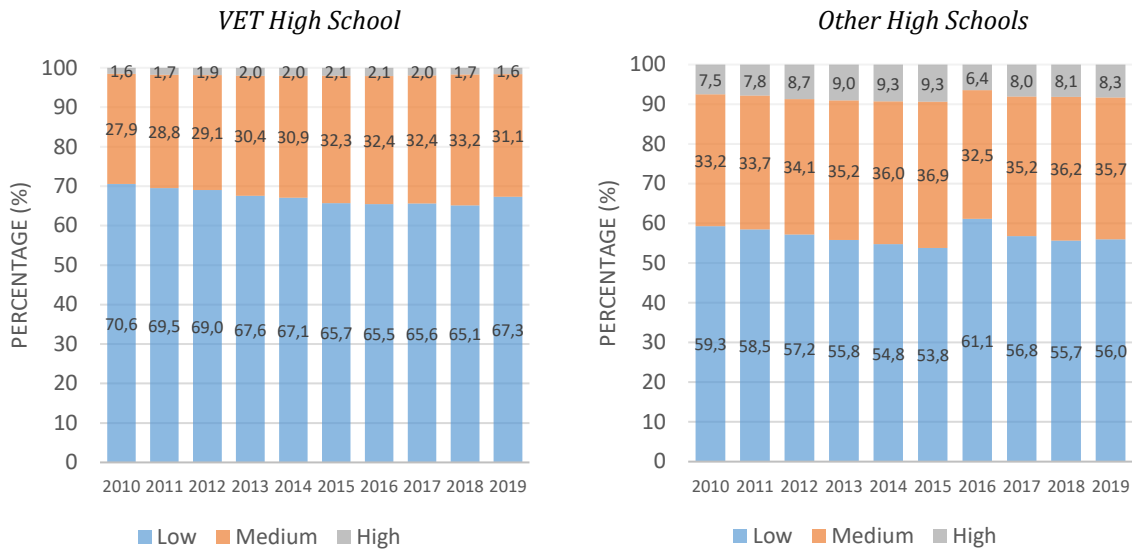


Figure 3. Distribution of Mothers' Education Level among VET High School Students and Other High School Students by Years

### 3.4. Family Employment Status

The distribution of the family employment status of VET high school students and the students from other high school types is given in Figure 4.

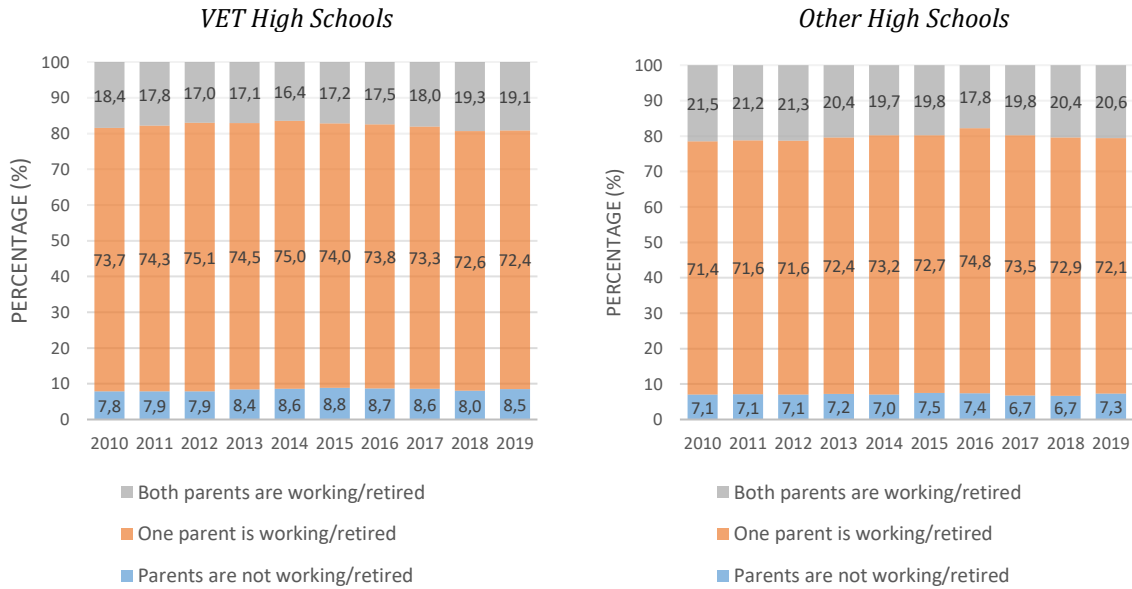


Figure 4. Distribution of the Family Employment Status of the Parents of the Students of Vocational High Schools and Other High Schools by Years

As seen in Figure 4, the distribution of family employment status for VET high school and other high school students has been similar over the last ten years. The percentage of students with both parents working is the only area where there is a small difference between the two student groups. In other words, among the students in other high schools, the percentage of students who have two parents who are either employed or retired is somewhat higher than that of VET high school students. Therefore, the ratio of students whose parents do not work or who have least one parent who is employed/retired are at a similar level in VET and other high schools. In short, compared to other socioeconomic factors, the students in both groups have a more similar distribution in family employment status.

### 3.5. The Effect of Socioeconomic Factors on Students' Performance

Second, this research aimed to determine the predictive power of students' socioeconomic level and early achievement on their high school achievement at different levels of tracking. The results of the regression model—including high school GPA, early achievement, and socioeconomic status—are provided in Table 4.

Table 4.

*Regression Model Results Explaining Students' High School Achievement through Early Academic Achievement and Socioeconomic Level*

*4.a. ANOVA Results of the Regression Model*

Predicted Variable	Source	Sum of Squares	df	Mean of Squares	F	p
High School GPA	Regression	36221582,300	2	18110791,150	308650,761	.000
	Residual	53736547,689	915798	58,677		
	Total	89958129,989	915800			
Mathematics Score	Regression	50678982,150	2	25339491,075	106291,577	.000
	Residual	218266354,847	915562	238,396		
	Total	268945336,997	915564			
Turkish Language Score	Regression	61353056,331	2	30676528,165	310695,581	.000
	Residual	90414996,292	915734	98,735		
	Total	151768052,623	915736			

*4.b. Coefficients in Regression Models*

Predicted Variable	Coefficient	Unstandardized Coefficients		Standardized Coefficients	t	p
		B	St. Error	Beta		
High School GPA	Constant	43,872	.037		1176.884	.000
	Early Achievement	,077	.000	.586	667.557	.000
	SES	2,494	.021	.105	119.264	.000
Mathematics Score	Constant	23,712	.075		315.514	.000
	Early Achievement	,093	.000	.406	396.532	.000
	SES	2,565	.042	.062	60.857	.000
Turkish Language Score	Constant	31,795	.048		657.430	.000
	Early Achievement	,104	.000	.604	688.687	.000
	SES	2,241	.027	.072	82.631	.000

As seen in Table 4, the regression models which include high school GPA, mathematics and Turkish language scores as predicted variables and early achievement and SES as predictors are statistically significant. Additionally, it is shown that the early achievement and SES are significant predictors in all regression models. It is also found that the predictive power early achievement is higher than SES in all regression models in Table 4.

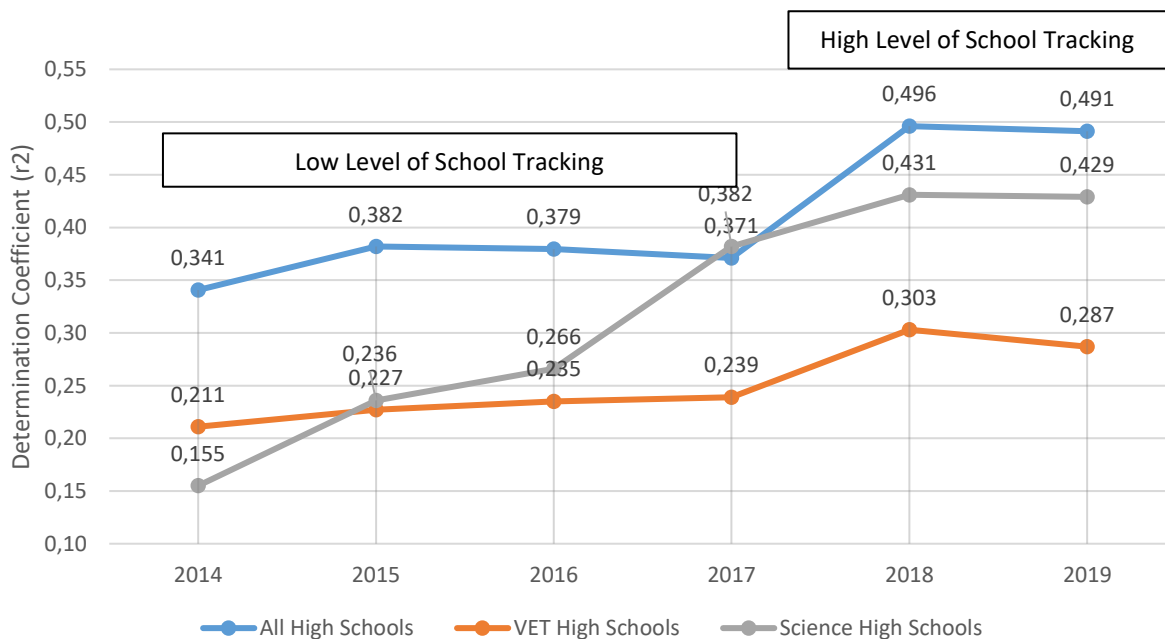
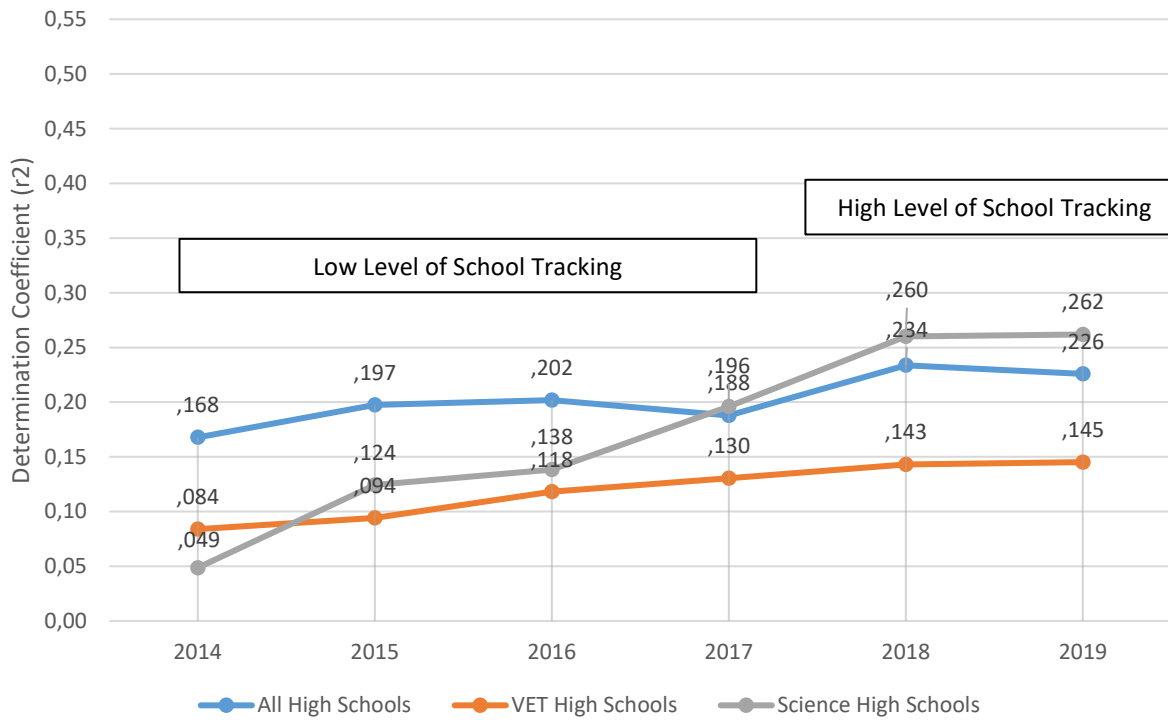
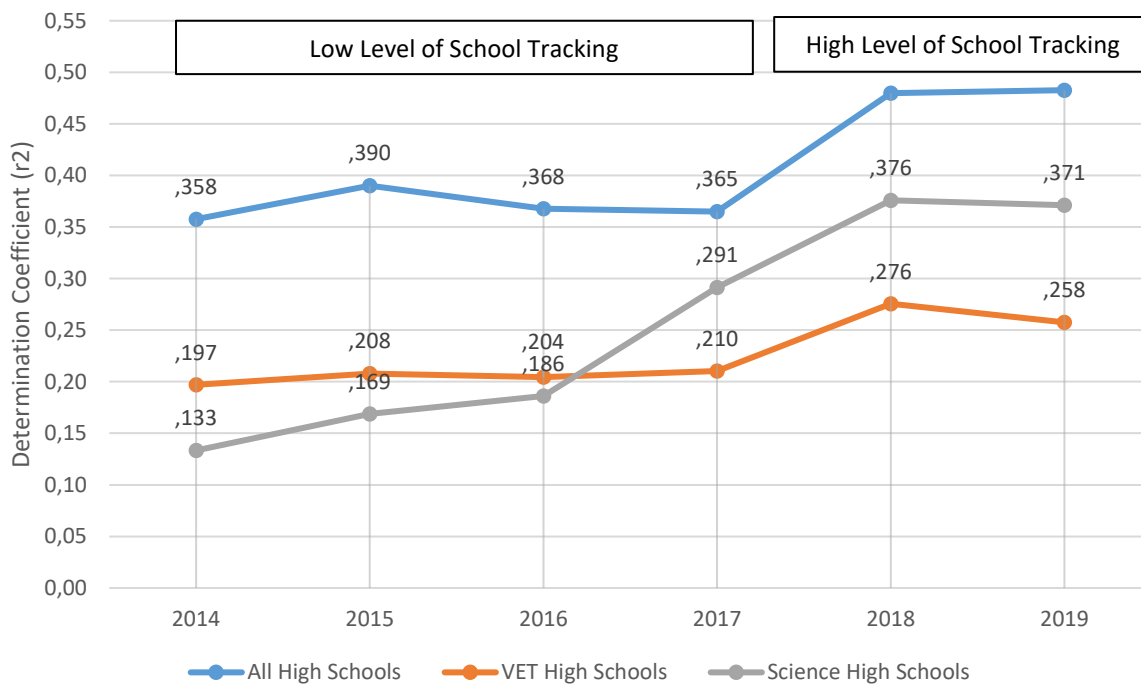


Figure 4.a. The Predictive Power of Early Achievement and Socioeconomic Characteristics on High School Achievement



#### 4.b. The Predictive Power of Early Achievement and Socioeconomic Characteristics on Mathematics Achievement



#### 4.c. The Predictive Power of Early Achievement and Socioeconomic Characteristics on Turkish Language Achievement

As seen in Figure 4, students' early achievement and socioeconomic status significantly predict their high school achievement, and this predictive power varies based on school type and tracking level. According to Figure 4.a, the effect of students' early achievement and socioeconomic status on their overall academic performance in high school increases as the level of tracking increases. In the years when high tracking was implemented (2018–2019), students' early achievement and socioeconomic status explain the variance in high school achievement up to 1.46 times the prediction rate of these variables in low tracking years (2014–2017). These results show that as the number of students placed in high schools based on their central examination scores increases, the determination of students' early achievement and socioeconomic status on their high school achievement also increases.

The change in predictive power according to school types indicates that school tracking has different outcomes based on achievement level. Because, similar to the general trend, as the number of students subjected to tracking in VET high schools increases, the impact of students' early achievement and socioeconomic status on high school achievement also increases.

However, the homogenization of students in terms of achievement and socioeconomic characteristics after tracking also plays an important role in shaping the lower coefficients in VET high schools. In the case of high level tracking, students' early achievement and socioeconomic levels explain the variation in high school achievement up to 1.44 times that of low level tracking cases.

The results from science high schools are important in terms of showing how the effects of tracking change according to the level of student achievement, because all students placed in science high schools across the ten years of data for this study sample were tracked according to their academic performance. In this context, although the ratio of students placed in science high schools according to their academic performance did not change over the years, the effect of early achievement and socioeconomic characteristics has constantly strengthened. Therefore, student achievement in science high schools, where high achieving and socioeconomically advantaged students are grouped, becomes increasingly dependent on early achievement and socioeconomic level.

Figure 4.b shows that the effect of students' early achievement and socioeconomic status on mathematics achievement in high school varies according to tracking level. The power of early achievement and socioeconomic status to predict high school mathematics achievement varies between 16.8% and 20.2% in the years with low level tracking. In years when high level tracking was implemented, the prediction power of these variables to explain the variation in mathematics achievement increased up to 1.39 times. The analyses for VET high schools showed that the variance explained by early achievement and socioeconomic status expanded from 8.4% to 14.5% over the years, thus increasing up to 1.72 times. In this respect, as the level of tracking increases in VET high schools, the predictive power of these characteristics increases, but the level of increase is lower than in other high schools. When this change is examined in science high schools, it is seen that the predictive power of early achievement and socioeconomic status has increased more than fourfold over the years, from 4.9% to 26.2%. This result shows that channeling the highest performing students into science high schools also increases the impact of early achievement and socioeconomic status in mathematics achievement for those students.

Figure 4.c shows that the effect of students' early achievement and socioeconomic status on Turkish language scores in high school varies according to school types and levels of tracking. The predictive power of students' early achievement and socioeconomic status to explain the variation in Turkish grades varies between 35.8% and 39% in low level tracking years. In the years when high level tracking was implemented, these rates varied between 48% and 48.3%. These results show that as the number of students placed in schools by tracking increases, early achievement and socioeconomic status become more determining factors in students' Turkish language scores in high school. As the level of tracking increases in VET high schools, the effect of early achievement and socioeconomic status on Turkish achievement also increases. The ratio of explained variance in Turkish course achievement in low tracking years ranged between 19.7% and 21%, while in high tracking years it ranged between 25.8% and 27.6%. The results for the science high schools show that early achievement and socioeconomic status have become greater determinants of Turkish language achievement in high school over time.

The results show that as tracking increases, inequality that depends on the differences in socioeconomic status also increases. As the level of tracking increases, early achievement and socioeconomic differences among students play a greater role in their long-term achievement. The fact that the VET students already have a socio-economic disadvantage, combined with their homogenization after tracking, caused a partial decrease in the effect of socioeconomic status and earlier achievement on high school achievement. However, the findings indicate that VET, which is already disadvantaged in a number of ways, is the school type most adversely affected by increased tracking.

#### 4. RESULTS and DISCUSSION

The way that education systems are structured can have a variety of effects on the quality of education and equality in education. For example, tracking, which is a structural characteristic, aims to make the education process more efficient by grouping students into homogeneous groups based on their academic performance. The assumptions that this practice will increase achievement even more by fostering competition in high achievement groups and that it will provide economic benefit have encouraged countries to use tracking for many years. On the other hand, studies have shown that inequalities between students increase significantly after tracking, and that tracking does not always increase students' average performance (Hanushek & Woessman, 2006; Martinkova et al., 2020). Considering the social implications of these findings, tracking has been postponed to later ages or cancelled entirely in many OECD countries. The steps that many countries have taken to encourage inclusive education in recent years is another indicator of this situation (Leschinsky & Mayer, 1990; Piopiunik, 2013).

To limit the function of education to reproduce inequalities in society and to reduce current inequalities, it is critical to implement educational policies that promote equity for students and their families. In order to achieve this goal, the structural characteristics of education systems should be redesigned when necessary, to support egalitarian policies. For this reason, the effects of the structural characteristics of education systems are regularly monitored and educational researchers track their changes over time.

Tracking has been implemented in Turkey for many years at the secondary level, though it is known to sustain the differences between types of schools by channeling students into these types based on socio-economic characteristics (Bölükbaş & Gür,

2020; Önder & Güçlü, 2014; Özdemir, 2016; Suna et al., 2020, 2020a). As a result of tracking, the school types where the highest performing students are grouped, such as science high schools, constantly attract high performing students. On the other hand, VET high schools are persistently becoming educational institutions where students from low socioeconomic backgrounds and who exhibit lower levels of achievement are grouped. Therefore, VET constitutes the type of education where the inequalities increased by tracking are felt the most.

In this study, the effects of tracking on vocational secondary education in Turkey were examined using student population data. For this purpose, the socioeconomic characteristics of VET high school students from the last ten years were compared with those of other high school students during the same time period. In order to examine the effects of tracking in detail, the predictive power of students' early achievement and their socioeconomic status on high school achievement was determined. The results were interpreted comparatively, at two levels of tracking (low and high), as well as across different school types. Thus, the socioeconomic disadvantage of VET high school students and the effect of this disadvantage on student achievement is clearly demonstrated based on the data.

Firstly, the socioeconomic characteristics of VET high school students in Turkey over the last decade were compared with those of other high school students. The results show that VET high school students are at varying degrees of disadvantage in terms of all socioeconomic characteristics, including family income, parents' education levels, and family employment status. The analysis determined that the most disadvantaged socioeconomic characteristic of the VET high school students is the education level of the father. The socioeconomic variable with the highest similarity between VET high school and other high school students was family employment status. In terms of family income, while the percentages of low-income students increased in all school types over time, these percentages were consistently higher among VET high school students when compared with their peers attending other types of high schools. A remarkable result about socioeconomic disadvantage is that the disadvantage of VET high school students in all socioeconomic characteristics continues across the ten years represented in the study sample. This result is important because it indicates that tracking regularly promotes socioeconomic disadvantage in VET high schools.

Secondly, the predictive power of students' early achievement and socioeconomic status was examined. Students' central examination scores from the end of middle school were considered as an indicator of their academic achievement before tracking, while high school GPA, mathematics scores, and Turkish language scores were taken into account as indicators of their academic achievement after tracking. Thus, together with students' general performance in high school, the effects of the characteristics under investigation on the performance in these two main courses were evaluated. The results show that early achievement and socio-economic status are determinants of high school GPA, mathematics, and Turkish language achievement. Moreover, it was found that there is a large increase in the impact of early achievement and socioeconomic status in the years when the ratio of tracked students increased. In other words, as the level of tracking increases, early achievement and socio-economic status have a greater impact on high school achievement. This result shows that increasing tracking in education deepens inequalities and increases the effects of non-school factors on achievement. Considering that the socioeconomic levels of students are also effective in their early achievement, this result has another important implication. Thus, socioeconomic level is a factor that affects students' long-term achievement both directly and indirectly through their early achievement.

Increasing inequality in education may lead to additional difficulties for students already disadvantaged by low achievement due to various reasons in the first years of education, as well as those who have difficulties in participating in education in the following periods. Socioeconomically disadvantaged students mostly have limitations to reach educational resources (Thompson, 2018). If the early disadvantages of these students are not addressed, their chances for long-term success decrease. Additionally, increasing the level of tracking means further homogenization of the student profile in schools. Students' chances of interacting with diverse peers in terms of achievement and socioeconomic characteristics decrease. This has many negative consequences, both academic and social, for both higher and lower performance groups. After tracking, lower performing students are negatively affected by being labeled in this way, facing low expectations from their teachers, and experiencing decreased effects of peer education. In higher performance groups, students more frequently experience psychological problems due to increased competition, and they show anxiety about responding to the increased expectations placed on them. In this context, it is possible that the negativities resulting from tracking are observed more frequently in schools across time. The findings from previous research regarding reduced interaction between achievement groups after tracking in Turkey, intensified discipline problems, decreasing motivation and self-esteem in low achievement groups, and friendship turning into competition in high achievement groups (Aldan Karademir, 2007; Bölükbaş & Gür, 2020; Özelçi et al., 2016) all support these results.

The present study found that the early achievement and socioeconomic status of VET high school students are more effective predictors of their high school performance as a result of tracking. Similar to other high school types, as the level of tracking increases, the effect of students' socioeconomic characteristics increases. Considering the findings that VET high school students are socio-economically disadvantaged compared to their peers in other high schools, the tracking contributes to the continuity of these disadvantages. Given that the increasing level of tracking in VET high schools has maintained their socioeconomic disadvantage over the last decade, the predictive power of early achievement and socioeconomic levels on high school achievement has also increased. As a result, students with low socioeconomic status continue to be grouped in VET high schools and this disadvantage has become a bigger obstacle for achievement. These results are important because they indicate the

persistent negative effects of increased tracking on VET high schools (Ozer, 2021). Furthermore, as seen in science high schools, even if the ratio of tracked students does not increase, the effects of tracking on student achievement increase even more over time. Therefore, increasing the level of tracking also increases inequality across all school types.

Another critical finding is that the inequality due to tracking is also seen at the level of high school courses. As the ratio of tracked students increases, their achievement in Turkish language and mathematics becomes more dependent on their early achievement and socioeconomic characteristics. The fact that the effect varies based on the courses shows that inequality can affect students who take different courses in different ways. In this context, the effect of tracking varies and it may lead to systematic inequalities. The results show that the effect of early achievement and socioeconomic level on Turkish language achievement is higher than on mathematics. One of the possible reasons for this result is that the language skills gained in Turkish courses also affect the achievement in all other courses, because the relationship between the learning outcomes in Turkish language courses and other courses is stronger than that with mathematics. The second possible reason is that language skills are significantly correlated with students' home life and parents' education level (Dolean et al., 2019; Gelbal, 2008). Therefore, it is logical that Turkish language achievement more strongly related to socioeconomic status than mathematics achievement.

The disadvantageous position of VET illustrated in the results of this study creates additional difficulties in meeting future expectations. In contemporary VET systems, it is expected that VET graduates will possess general cognitive skills as well as vocational skills, adapt to change, and demonstrate metacognition (Fuller, 2015; Ozer, 2020a; Perc et al., 2019). These competencies are also considered in the skill sets that the labor market expects from VET (Acemoğlu & Restrepo, 2018). In other words, it is expected that VET produce graduates with more academic and soft skills in the future. On the other hand, meeting these expectations becomes progressively more difficult for a VET system that is selected by students from low socioeconomic backgrounds with low achievement levels (Ozer, 2020a).

Due to the increasing expectations for VET and its role in the economy, many studies have been performed around the globe to improve quality of VET systems. Countries have revised and have made structural changes in their VET systems (Fuller, 2015; Solga et al., 2014). Turkey has also taken many concrete steps within the scope of its Education Vision 2023, and seen significant results over just the past two years. Goals reached through these reforms include the enhancing of private sector cooperation, development of new VET high school models preferred by high performing students, creation of trainings in new vocational fields to meet current national workforce needs, establishment of a quality assurance system, updating education programs in VET, and the installation of a more flexible and general vocational training system that focuses on cognitive and generic skills (Canbal et al., 2020; Ozer, 2018, 2019a, 2019b, 2020a). The majority of the problems in VET have been solved, and consequently, VET institutions played a significant role in meeting the needs of Turkey during the COVID-19 pandemic through their production capacity and human resources (Ozer, 2020c, 2020d, 2020e, 2020f). In addition to manufacturing urgently needed products, the Turkish VET system has pioneered the creation of innovative technologies in research and development centers. As a result of these concrete results, VET high schools have become the preference of high performing students in the 2019 and 2020 academic years (MEB, 2019, 2020). Enrollment rates for VET high schools that were opened recently or strengthened within the scope of cooperation with the private sector also increased significantly (MEB, 2019, 2020). All these improvements are important due to their potential to improve the quality of VET in the long term.

Although concrete steps have been taken to improve VET, additional improvements should also be made in the labor markets and higher education systems directly connected to VET, in order to ensure comprehensive and sustainable improvement. These changes will help break the socioeconomic disadvantages faced by VET students shown in this study in the long term. Additionally, more empirical studies are need to show the diverse effects of school tracking on educational outputs Turkish system. In order to reverse the disadvantageous situation of VET and to minimize the achievement gap between schools, suggestions for delaying the tracking of students to later ages should also be taken into consideration.

### **Research and Publication Ethics Statement**

The authors hereby declare that they have not used any sources other than those listed in the references. The authors further declare that they have not submitted this article at any other journal for publication.

### **Contribution of Authors to the Article**

The first author participated the constructing the literature, data controlling, data analysis, findings and discussion stages. The second author also participated the constructing the literature, findings and discussion stages.

### **Statement of Interest**

The authors declare that there is no conflict of interest.

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