TURJE
www.turje.org
Volume: 8 Issue: 3
Turkish Journal of Education

DOI: 10.19128/turje.453383
Research Article
Received 14.08.2018
Accepted 13.07.2019

Implications of between-school tracking for Turkish students

Wenke Niehues
Koç University, Department of Psychology, Istanbul, Turkey, wniehues14@ku.edu.tr
Leibniz Institute for Educational Trajectories, Bamberg, Germany, wenke.niehues@lifbi.de
Yasemin Kisbu-Sakarya
Koç University, Department of Psychology, Istanbul, Turkey, ykisbu@ku.edu.tr
Bilge Selçuk
Koç University, Department of Psychology, Istanbul, Turkey, bselcuk@ku.edu.tr

ABSTRACT Previous multilevel analyses for Turkey show that performance differences of students vary more between schools than within schools. These school-disparities might be associated with Turkey's tracking system and related differences in student body and learning environments of school tracks. Since it is not known how Turkey's low-performing vocational, low-performing academic, and high-performing academic school tracks differ regarding students' family background, motivational and behavioral engagement of students, and schools' learning environments, we analyzed the PISA 2012 data to examine these differences. Results indicate that Turkish students which attend high-performing academic schools are more likely to have higher socio-economic status, display higher confidence in their math ability, are less engaged during class and are exposed to a richer learning environment than students attending low-performing academic schools. Policy implications of each finding are discussed in detail.

Keywords: *Between-school tracking, Socio-economic status (SES), Turkish students, Motivational and behavioral engagement, Learning environment*

Türk öğrenciler için okullar arası izleme uygulamaları

ÖZ Çok düzeyli analizler Türkiye'deki okullar arası öğrenci performansı farklılıklarının okul içi performans farklılıklarından daha fazla olduğunu göstermiştir. Bu durum, okullara giriş sistemi ve buna bağlı olarak öğrenci profillerindeki ve de okulların öğrenme ortamlarındaki farklılıklardan kaynaklanabilmektedir. Türkiye'deki düşük performanslı meslek okullarına, düşük performanslı akademik okullara ve yüksek performanslı akademik okullara devam eden öğrencilerin aile geçmişleri, motivasyonel ve davranışsal katılımları ve okulların öğrenme ortamları arasındaki farklar yeteri kadar incelenmemiş olduğundan, bu çalışmada PISA 2012 verisi bu farklılıkları tespit etme amacı ile analiz edilmiştir. Sonuçlar, düşük performanslı akademik okullara giden öğrencilere kıyasla, yüksek performanslı akademik okullardaki Türk öğrencilerinin daha yüksek sosyo-ekonomik statüye sahip olduklarını, matematik becerilerine daha çok güvendiklerini, ders sırasında daha az katılım gösterdiklerini ve daha zengin bir öğrenme ortamına maruz kaldıklarını göstermiştir. Bulgular eğitim politikaları kapsamında tartışılmıştır.

Anahtar Kelimeler: *Okullar arası izleme, Sosyo-ekonomik durum (SED), Türk öğrenciler, Motivasyonel ve davranışsal ilişki, Öğrenme ortamı*

Citation: Niehues, W., Kisbu-Sakarya, Y., & Selcuk, B. (2019). Implications of between-school tracking for Turkish students. *Turkish Journal of Education, 8*(3), 196-216. DOI: 10.19128/turje.453383

INTRODUCTION

Inequality in education is perceived as legitimate in meritocratic societies as long as there is equity in education. Equity in education is present when the academic success of an individual is not associated with their social origin, but with their effort and skills. While many nations aim for equity within their education systems, large-scale international studies show that countries differ greatly in their ability to obtain this goal (OECD, 2013; Özel, Özel, & Thompson, 2013). Turkey, for example, is a developing country with a fast changing and expanding education system which aims to provide high quality formal education for its growing young population (Özdemir, 2016). While the upper-secondary school (i.e., high school) attendance rate in Turkey has increased within the last decade, Turkey is struggling with large performance and socioeconomic status (SES) differences between its upper-secondary schools and students, as well as overall low performance levels in reading, math, and science compared to other OECD countries (Dincer & Uysal, 2010; OECD, 2013). This implies that the current education system in Turkey is not able to ensure equity and high quality education for its whole student population (Özel et al., 2013).

The high performance and SES disparities among Turkish schools are likely to be associated with Turkey's tracking system at the transition to upper-secondary school and college (Maaz, Trautwein, Lüdtke, & Baumert, 2008; Özdemir, 2016). Turkish students compete in a national standardized exam for the admission to a limited number of high-performing upper-secondary schools and colleges (Yavuz, 2009). This selection practice has led to a highly stratified and elite school system within Turkey, in which average school SES and performance level have been associated with Turkish students' general academic performance (Alacaci & Erbas, 2010) and performance on the even more important national university entrance exam (Caner & Okten, 2013). In light of these long term implications of school track attendance for students' later academic career, there is lots of pressure on Turkish students to gain access to one of the scarce prestigious upper-secondary schools in Turkey.

While SES and performance differences between upper-secondary schools in Turkey are well established, until today there is very limited knowledge about how school track attendance in Turkey relates to a wider range of student and school features. The large performance and SES differences between students and schools imply that school track attendance in Turkey does not only relate to students' academic performance, but also to further factors such as SES and possibly also students' motivation, engagement and learning environment at school. To our knowledge, no study yet has examined whether students coming from economically more advantaged families are more likely to attend high-performing schools in Turkey and what role parents' education-related beliefs play in the choosing of upper-secondary school tracks. Moreover, we do not know whether students at high-performing schools are more motivated and exceed more effort during their classes at school. We also do not know how learning environments differ between school tracks in Turkey. Do students at high-performing schools get offered more learning opportunities in terms of a richer offer of extra-curricular activities and a better disciplinary climate during class? Or do high-performing schools have more resources at their disposal to meet the needs of their student body?

Examining differences in school track attendance will help to identify reasons for the large performance differences between schools in Turkey. This is important in order to formulate future policy approaches that aim to dampen performance disparities between schools, and lift academic performance standards particularly for students attending low-performing schools. Furthermore, study results may help to identify which differences between school tracks are important for students' learning in Turkey and which features should be taken into account in future studies examining individual differences in academic achievement of students. Since results help to better understand how students and parents navigate in a highly selective school systems and illustrate the consequences for schools and students of

establishing a strict between-school tracking system, findings might also be important for other school systems with similar tracking policies such as in Germany, Austria, Belgium, or France.

The following section gives information about the Turkish education system and the transition process from lower-secondary (i.e., middle school/Ortaokul) to upper-secondary (i.e., high school/lise) school in Turkey. This is followed by a literature review of how family background, students' motivational and behavioral engagement, as well as schools' learning environments may relate to students' school track attendance and choice.

Education in Turkey

Turkey's education system underwent several reforms in the last two decades. One major structural reform was the introduction of the so called "4+4+4"-system in 2012. The "4+4+4"-reform prolonged compulsory education from eight to 12 years in Turkey, since then Turkish students are expected to attend four years each of primary, lower-secondary, and upper-secondary school education. In the public school sector, primary and lower-secondary school admittance takes place according to students' place of residence. At the lower-secondary level students may choose between general and religious schools, and at the upper-secondary level students may choose between different types of schools such as vocational schools with specializations in electricity, accounting, tourism, religion or others and academic-oriented schools such as science, social science, or general upper-secondary schools (Özdemir, 2016). Vocational schools focus on applied skills and assume that their students will start working after graduation. Academic-oriented schools prepare their students for the transition to college with a higher number of academic-oriented classes (Özdemir, 2016). Performance levels between schools differ, with higher performing students often attending academic-oriented schools.

The number of academic-oriented, high-performing, upper-secondary schools is limited in Turkey. Students compete in national standardized tests for the admittance to their school of choice (Özdemir, 2016). If students and parents decide not to take the admission exam or do not obtain sufficient points during the exam for their school of choice, then they get centrally distributed to non-selective schools. These non-selective schools are often vocational or general schools with lower performance levels (Özdemir, 2016). As such, Turkey employs a strict between-school tracking policy in which students get sorted based on their prior academic performance. National high-stake testing also takes place at the transition to college in Turkey and test results are accompanied by a nationwide ranking of students.

Family Background and Transition to Secondary School

Research indicates that SES-related disparities in education systems get amplified at transition points within school systems (Schnabel, Alfeld, Eccles, Köller, & Baumert, 2002). The underlying mechanisms can be traced back to (a) SES-related differences in educational decisions within families and (b) to SES-related differences in students' academic achievement, motivation, and engagement (Maaz et al., 2008).

Studies using the Wisconsin-Modell for status attainment confirm that SES relates to parents' educational decision making. These studies found that lower-SES parents are more employment- and less academically-oriented; thus they tend to send their children to vocational instead of academic schools (Becker, 2010). Additional, research found that higher-SES parents get more actively involved in their child's school choice (Groos, 2016), they possess more knowledge about the education system (Weininger & Lareau, 2003), and they contact teachers more frequently while organizing their child's transition to secondary school (Kleine, 2014). Hence, higher-SES parents seem to be better equipped to manage and ensure a positive outcome of the transition process to secondary school for their children.

Moreover, research found that academic achievement relates to students' SES (Alacaci & Erbas, 2010). Thus, in school systems with between-school tracking based on prior achievement, particularly higher performing, socio-economically advantaged kids are more likely to gain access to more selective schools

(Özdemir, 2016). Additionally, according to the widely used Expectancy-Value-Theory (EVT), a reason why family background relates to students' achievement level is that students develop their education-related beliefs and in turn their academic performance within their sociocultural milieu (Simpkins, Fredericks, & Eccles, 2015). That is, EVT proposes that students coming from more advantaged families will have parents who value academic achievement more. During the socialization process, children are likely to internalize these positive parental education-related beliefs, which in turn is supposed to foster children's academic engagement, achievement and choices, so that these students are more likely to work hard for and apply to more challenging and advanced academic classes and schools (Simpkins et al., 2015).

The positive link between students' motivational beliefs such as value assigned to academic tasks (i.e., academic task value beliefs) and beliefs about one's ability to successfully complete a task (i.e., academic competence beliefs) and students' behavioral engagement and academic achievement as well as choice is well established by EVT-studies (Eccles & Wigfield, 2002). Guo and colleagues (2015) found, for example, that Australian youth who assigned higher value to math and were more confident about their math ability were more likely to choose advanced math classes at upper-secondary school and study Science, Technology, Engineering, and Mathematics (STEM) related subjects at college.

Overall these findings suggest that family background and students' motivational and behavioral engagement patterns will positively relate to students' school track attendance such that students coming from higher-SES families and families which value academic achievement more for their children, as well as more motivationally and behaviorally engaged students will attend more academic-oriented and higher performing schools.

Student Body Characteristics Associated with School Track Attendance

The previous section discussed the possibility that family background is, directly or indirectly via students' motivational beliefs, engagement and performance, positively associated with students' school track attendance. However, it is also possible that, besides family background, school factors shape students' motivational beliefs and engagement. This might be particularly true in highly selective school systems, since a strict between-school tracking policy is likely to foster homogeneous learning groups with similar characteristics of the student and teacher body within schools (Maaz et al., 2008). Studies found, for example, higher levels of disruptive behaviors in schools with a concentration of disadvantaged students. These higher levels of disruptive behaviors negatively reflected on behavioral engagement patterns and the motivation of fellow classmates in these studies (Murphy, 2010; Thomas, Hierman, Thompson, & Powers, 2008). Moreover, at low-performing schools compared to high-performing schools, teachers are found to hold lower academic expectations for their students (Gamoran, 2004). Students from low-performing school tracks may adopt these lower performance standards of their teachers and schools, and thus display lower academic expectations and effort (Gamoran, 2004).

Despite this, studies investigating the "Big Fish Little Pond Effect" found that the average performance level of the learning group at school has a dampening effect on students' competence beliefs (Marsh & Hau, 2003). That is, despite comparable academic ability, students in better performing learning groups hold lower competence beliefs in math due to social comparison mechanism with their peers (Marsh & Hau, 2003). However, in highly selective school systems, such as in Turkey, for their social comparison with their peers, students may not refer to their close learning group at school, but rather to their nationwide standing. Turkish students may have information about their nationwide standing due to their school track admittance and ranking on the national admittance test for upper-secondary school. This would be in line with findings from Mann, Legewie, and DiPrete (2015) that, in selective school systems, students' competence beliefs are related to their school admission. Thus, overall it is likely that Turkish students' motivational and behavioral engagement are associated with their school track attendance over and above their SES and parental beliefs.

School Learning Environment and School Track Attendance

Moreover, school tracks are not only likely to differ in terms of characteristics of their student body, but also in terms of the learning environment that they offer to their students. This is important since differences in learning environments are associated with the academic development of students (Maaz et al., 2008). Academically oriented, high-performing schools are supposed to offer a more challenging and cognitively stimulating learning environment to their students than lower-performing or vocational schools (OECD, 2012). In comparison to vocational schools, academic schools implement a more challenging academic curriculum which may result in a higher number of academically oriented classes or extra-curricular activities at school and thus, foster greater familiarization with more demanding academic tasks (Giersch, 2016). Additionally, in high-performing schools, the disciplinary climate during classes is found to be greater than in low-performing schools, which resulted in prolonged instructional time and thus prolonged practice time for students at high-performing schools (Murphy, 2010). Furthermore, research indicates that low-performing schools are less well-equipped than high-performing schools (Roeser, Urdan, & Stephens, 2009). A lack of resources such as deprived facilities, insufficient heating, cooling or number of classrooms is found to be negatively associated with students' achievement levels when it is below a minimum standard (Eccles & Roeser, 2011). In sum, these findings suggest that students may benefit academically from their attendance of academic and high-performing schools due to enhanced learning environments at these schools.

Present Study

Large-scale international data indicates that Turkey is one of the few OECD countries in which the achievement gap between schools is greater than within schools, and in which schools differ greatly in the SES-composition of their student body (OECD, 2013). This puts a threat to equity in Turkey. These disparities among schools are likely to be reinforced by Turkey's selective school system such as its between-school tracking and national high-stake testing policy (Maaz et al., 2008; Özdemir, 2016). Furthermore, the large performance and SES-differences between schools imply that school track attendance in Turkey may not only relate to Turkish students' academic performance, but also to further student characteristics such as SES or possibly also other student and school factors such as student motivation or engagement as well as schools' learning environments.

While performance and SES differences between schools are well researched in Turkey, it is not well understood how school track attendance in Turkey is associated with a wider range of student body and school factors. To our knowledge, no study in Turkey has examined how school track attendance relates to further student body (i.e., math achievement, SES, parental valuing of math, students' motivational and behavioral engagement in math) and school (i.e., disciplinary climate during math classes, extra-curricular activities offered at school, quality of school facilities) characteristics yet. Thus, in order to address this gap in the literature, our study focused on features related to school track attendance in Turkey. Our study did not aim to explain individual differences in Turkish students' academic achievement as such, yet study results may help to identify influential school factors associated with Turkish students learning. Hence, study results may provide information to future studies which aim to examine individual differences in Turkish students' academic achievement by including school factors in their analyses. To our knowledge, studies which include school besides individual factors while explaining individual differences in Turkish students' academic achievement are still very limited.

Overall, the main aim of our study was to better understand the implications of Turkey's tracking policy in order to identify much needed policies that might help to dampen its negative effects (Özel et al., 2013). More specifically, we wanted to learn what kind of students are likely to attend which upper-secondary school track. This would provide us with information about which students are likely to prevail and which students are likely to stay behind in the tough competition for the limited seats at academically successful upper-secondary schools in Turkey. Additionally, we wanted to investigate how students' motivation and engagement levels differ between school tracks, and whether students at high performing schools are more likely to be motivated and engaged as implied by EVT. This would inform

us about whether future policies in Turkey should focus on individual factors such as elevating students' motivation and engagement levels in order to combat educational inequalities. Moreover, we wanted to learn how the learning environment between school tracks differ in Turkey, in order to comprehend what kind of learning context and opportunities are offered to students at each attended school track. This information might hold important information for future studies assessing which school factors relate to students' academic achievement in highly selective school systems such as the one found in Turkey. Since the literature indicates that students' academic choices, motivation, and engagement changes with the subject domain, we only focused on one subject in our study, namely mathematics (Guo et al., 2015).

Based on the literature reviewed above and in regard to family and student body characteristics, we hypothesized that students who come from socio-economically more advantaged families, students with parents who value math more, and students who are motivationally and behaviorally more engaged during their math classes would be more likely to attend high-performing and academic-oriented schools than low-performing and vocational schools. In regard to school characteristics, we predicted that classroom-climates in math would be more disciplined, extra-curricular math activities would be offered more, and school facilities would be better at high-performing and academic-oriented schools compared to low-performing and vocational schools.

METHODOLOGY

Participants

Participants were drawn from the Turkish PISA 2012 data-set collected by the OECD. The data is cross-sectional, designed to be representative of 15-year-old students in Turkey, and has a hierarchical structure with students nested within schools. We excluded schools with 10 or fewer students in order to prevent estimation errors for nested data (McNeish & Stapleton, 2016; see Appendix 1 for results of main analyses including all study participants). This resulted in a final sample of 4,742 Turkish students from 152 schools with a mean age of 15.8 years (*SD* = .28) and 49% female participants.

Measures

All measures were collected by the PISA 2012 consortium and were either student or school principal reports. Most scale scores in the data-set (except the categorization into school tracks and parental education-related beliefs) were computed, coded, internationally validated and tested for reliability by the PISA consortium (for more information on the scales please see OECD, 2014). Since the focal point of analysis for PISA 2012 was students' math achievement, the majority of measures were math-specific which was in line with our focus on the math domain.

School Tracks

Based on two measures we categorized schools into four tracks: (1) school's curriculum-orientation (academic-versus vocational-oriented curriculum) and (2) school's average proficiency level in math (low- versus high-proficiency level in math). School principals reported on the curriculum-orientation of their school by indicating whether their school followed a vocational or academic curriculum. Schools with a vocational curriculum emphasized applied, employment-related skills in their teaching. Schools that followed an academic curriculum focused on academic skills.

Based on the performance of students during a standardized math test, the PISA consortium distinguished between seven proficiency levels ranging from 0 to 6 for students' math achievement. The

PISA consortium defined the necessary points on the standardized math test for each proficiency level (OECD, 2014). According to this definition, until level 2 (420.1 to 482.3 points on the standardized math test), students are only capable of making a literal interpretation of math tasks, and starting from level 3 (482.4 to 544.7 points on the standardized math test) students are able to reason and apply problem-solving strategies to math tasks (OECD, 2014). Thus, beginning with level 3 students are able to autonomously apply their math skills to solve basic everyday math tasks. In order to identify schools in which students on average possessed these applied problem-solving skills, in our study we classified schools with an average student performance level in math at or below level 2 as "low-performing", and schools with an average student performance level above level 2 as "high-performing schools". Hence, schools with an average score of 482.3 or lower were classified as low-performing schools, and schools with an average score of 482.4 or higher on PISA's standardized math test were classified as high-performing schools. Since no student in our sample attended high-performing vocational schools, in this study only three school tracks were investigated: Low-performing vocational schools (n = 1,859) (hereafter referred to as vocational schools), low-performing academic schools (n = 1,630), high-performing academic schools (n = 1,253).

Math Achievement

Students took part in a standardized math test. To scale students' test scores, PISA used a Rasch model. To account for any uncertainty during the Rasch scaling process, PISA provided five estimates (i.e., five plausible values) for each students' math achievement instead of a single-point estimate. Any analysis including students' math achievement had to combine estimations across all five plausible values (see OECD, 2009 for information on the use of plausible values). The PISA consortium normed students' math achievement with 500 points corresponding to the OECD average (SD = 100; OECD, 2014).

Family Background

Family background was measured via students' SES and parents' education-related math beliefs. Students' SES was measured by an index including parents' education level, parents' occupational status, and household possessions. The three indices were combined by a principal component analysis by the PISA consortium with an OECD average of 0 (SD = 1; OECD, 2014).

Parents' education-related math beliefs were measured via students' perception of their parents' math norms. On three items, using a 4-point Likert scale (1 = strongly agree, 4 = strongly disagree), students indicated how important their math achievement is for their parents (e.g., "My parents believe it is important for me to study mathematics."). Our analysis on the Turkish data set revealed acceptable reliability (α = .73) for the three items measuring parents' education-related beliefs, thus the three standardized items were averaged to obtain parents' education-related beliefs. We reverse coded the three items so that higher scores indicate more positive parental beliefs.

Motivational Engagement

Students' motivational engagement was measured via students' task value and academic ability beliefs as suggested by EVT (Eccles & Wigfield, 2002). Students' valuing of academic tasks was operationalized via students' instrumental motivation (i.e., utility value) for math and students' interest and enjoyment in math. To measure students' instrumental motivation, students reported on four items (e.g., "Making an effort in mathematics is worth it because it will help me in the work that I want to do later on.") whether they think that math achievement is important for their future career. To capture students' interest and enjoyment in math, students specified how much interested they are in math (e.g., "I am interested in the things I learn in mathematics.") on three items. Both measures used a 4-point Likert scale (1 = strongly agree, 4 = strongly disagree), were Rasch scaled by the PISA consortium with an OECD average of 0 (SD = 1), and had good reliability in our sample (α = .87, α = .89, respectively).

Students' math ability beliefs were operationalized via students' math self-concept and math self-efficacy. While self-concept tapped into students' self-evaluation about their general academic capability in math, students' self-efficacy beliefs referred to their task-specific competence beliefs in math. Since the two concepts tapped into different aspects of students' ability beliefs, both measures were included in the study. Students' math self-concept was captured via five items (e.g., "I learn mathematics quickly.") on a 4-point Likert scale (1 = strongly agree, 4 = strongly disagree). To measure math self-efficacy, students reported their feelings of competence on carrying out eight different math tasks such as "calculating how much cheaper a TV would be after a 30% discount" on a 4-point Likert scale (1 = very confident, 4 = not at all confident). Both indices were Rasch scaled by the PISA consortium with an OECD average of 0 (*SD* = 1) and had good reliability for the Turkish data (α = .84, α = .82, respectively).

Behavioral Engagement

The behavioral engagement was measured via students' engagement during math classes and students' openness to problem-solving. To assess students' engagement during math classes, students reported on nine items (e.g., "I pay attention in mathematics class.") whether they are attentive during math classes and complete their class work. A 4-point Likert scale (1 = strongly agree, 4 = strongly disagree) was used for this measure. To measure students' openness to problem-solving, students reported on five items their effort and persistence during tasks (e.g., "When confronted with a problem I give up easily."). A 5-point Likert scale (1 = very much like me, 5 = not at all like me) was used for this measure. Both measures were Rasch scaled by the PISA consortium with an OECD average of 0 (*SD* = 1) and had good reliability in our sample (α = .91, α = .78, respectively).

Learning Environment at School

Three variables measured schools' learning environments: Disciplinary climate during math classes, math-related extra-curricular activities at school, and quality of school facilities. The disciplinary climate during math classes tapped into the quality of the learning environments at the classroom level, while the offer of extra-curricular activities and the quality of school facilities were indices at the school level.

To capture the disciplinary class-climate, students indicated on five items (e.g., "Students don't start working for a long time after the lesson begins.") the degree to which classmates displayed disruptive behaviors during math classes. The index used a 4-point Likert scale (1 = every lesson, 4 = never or hardly ever), was Rasch scaled by the PISA consortium with an OECD average of 0 (*SD* = 1), and had a good reliability in the Turkish data (α = .86).

To assess schools' extra-curricular math activities, school principals reported on four items whether the school offered additional math classes, math/computer clubs, or participation in math competitions. Scores were combined into a composite score of extra-curricular math activities offered at school by the PISA consortium, with higher scale scores indicating an enriched extra-curricular math-related school environment (OECD, 2014). The quality of school facilities was measured by the availability of school building and grounds, heating/cooling and lightening system, and classroom space. School principals evaluated on a 4-point Likert scale (1= not at all, 4 = a lot) and three items (e.g., "Is your school's capacity to provide instructions hindered by any of the following issues? Shortage or inadequacy of school buildings and grounds.") whether their school's facilities are sufficient. The index was Rasch scaled by the PISA consortium with an OECD average of 0 (*SD* = 1) and had an acceptable reliability for the Turkish data (α = .75).

Analytic Strategy

The preliminary analysis examined whether there were mean differences on study variables across school tracks, using low performing academic schools as the reference category. Following

recommendations of the PISA consortium, regressions were conducted with 80 replicate weights using SPSS 22 (OECD, 2009).

In the main analysis, we conducted a multinomial logistic regression via Mplus 7.4 (Muthen & Muthen, 1998-2012) to examine the role of family background, students' motivational and behavioral engagement, and experienced learning environments for school track attendance in Turkey. We incorporated student weights into our analyses to account for the sampling error (OECD, 2014) and used the Mplus "type = complex" option with school ID as the cluster variable in order to account for the hierarchical data structure (i.e., students nested within schools). Thus, we did not estimate a two level model in order to account for the nested data structure, but with using the "type = complex" option of Mplus we employed a design-based approach to correct for reduced standard errors due to the nested data structure (Stapleton, McNeish, & Seung Yang, 2016). The design-based approach as described by Stapleton et al. 2016 allowed us to estimate a model only at the student level while taking the hierarchical data structure into account. This approach is in line with our research question and aim to identify differences in individual students' school track attendance (Stapleton et al., 2016). We chose this approach, since with the multinomial logistic regression we wanted to explain what kind of students are likely to attend which school track and what kind of learning environment students are likely to experience at each school track. Thus, during the multinomial logistic regression, we were not interested in between school differences as such, therefore we did not model them. A logit function and the robust maximum likelihood estimator (MLR) was used for model estimation. For model assessment a robust likelihood-ratio test, the Bayesian information criterion (BIC), McFadden's R^2 and a classification table was used (Agresti, 2007; Satorra & Bentler, 1999; Tabachnick & Fidell, 2007). The equations for the logistic regression were as follows:

$$ln\left(\frac{P\ (vocational\ school\ track)}{P\ (low-performing\ academic\ school\ track)}\right) = b100 + b101(SES) + b102(\text{parent math beliefs}) + b103(\text{student instrumental motivation}) + b104(\text{student interest in math}) + b105(\text{student math self-concept}) + b106(\text{student math self-efficacy}) + b107(\text{student behavioral engagement in math classes}) + b108(\text{student openness to problem solving}) + b109(\text{disciplinary climate during math classes}) + b120(\text{extra-curricular math activities}) + b121(\text{quality of school facilities})$$

$$ln\left(\frac{P\ (high-performing\ academic\ school\ track)}{P\ (low-performing\ academic\ school\ track)}\right) = b200 + b201(SES) + b202(\text{parent math beliefs}) + b203(\text{student instrumental motivation}) + b204(\text{student interest in math}) + b205(\text{student math self-concept}) + b206(\text{student math self-efficacy}) + b207(\text{student behavioral engagement in math classes}) + b208(\text{student openness to problem solving}) + b209(\text{disciplinary climate during math classes}) + b210(\text{extra-curricular math activities}) + b211(\text{quality of school facilities})$$

When collecting data, PISA 2012 used a rotated design for their student questionnaire in order to increase the covered content by the student questionnaire (OECD, 2014). That means that three different booklets with varying items were randomly distributed to students and therefore, most missing data in the data-set was missing by design and missing completely at random (MCAR) (Graham, 2009). Checking for item-level missing data revealed that less than 2% of data was missing on each item. This data can be assumed to be missing at random (MAR) and thus, does not pose any threat to our parameter estimation (Graham, 2009).

RESULTS

Preliminary Analysis

On average Turkish students performed 51 points less than the OECD average on the standardized math test (Table 1). Since the PISA 2012 consortium estimated that on average 41 points in math achievement referred to a learning progress within one school year, Turkish students were behind for over one year of schooling compared to the OECD average (OECD, 2013). Additionally, the SES level in our sample was low. With a mean of -1.44, mean SES of Turkish students was close to one and a half standard deviations below the OECD mean. Turkish students' value beliefs (ranging from M = -.05 to M = .05) were comparable to the value beliefs held by the average OECD student, except for Turkish students' higher interest in math. Turkish students were close to half a standard deviation more interested in math (M = .42), and they also reported higher average engagement levels at school (M = .21 and M = .24) compared to their peers from OECD countries. Regarding the learning environment at school, Turkish students reported a slightly lower level of disciplinary classroom climate (M = -.09) than the average OECD student. And Turkish school principals indicated poorer quality of school facilities (M = -.24) compared to the OECD average.

Table 1.
Descriptive statistics for study variables

	N	*M*	*SD*	Min	Max
Student math achievement	4,783	449	90.9	175	795
SES	4,742	-1.44	1.09	-4.61	1.94
Parent math beliefs	3,123	0.01	0.80	-2.73	1.14
Student Value Beliefs					
Student instrumental motivation	3,136	0.05	0.99	-2.30	1.59
Student interest in math	3,141	0.42	1.06	-1.78	2.29
Student Ability Beliefs					
Student math self-concept	3,141	-0.05	0.97	-2.18	2.26
Student math self-efficacy	3,146	-0.02	0.93	-3.75	2.27
Student Behavioral Engagement					
Student behavioral engagement in math classes	3,146	0.24	1.12	-3.45	2.72
Student openness to problem solving	3,151	0.21	0.95	-3.63	2.45
School Learning Environment					
Disciplinary climate during math classes	3,137	-0.09	0.91	-2.48	1.85
Extra-curricular math activities offered at school	4,783	1.75	1.32	0.00	5.00
Quality of school facilities	4,783	-0.24	0.97	-2.76	1.31

Preliminary analysis comparing means across school tracks in Turkey revealed more favorable student body characteristics and learning environments for high-performing academic compared to low-performing academic schools (Table 2). On average, students attending high-performing academic schools had significantly higher math achievement, came from more advantaged families, were more motivated and behaviorally more engaged, had parents with higher math beliefs, and reported more favorable learning environments at school than students attending low-performing academic schools. Students from high-performing academic schools in Turkey did not significantly differ from students from low-performing schools in their interest in math and behavioral engagement during math classes (Table 2).

Low-performing academic schools did not differ from vocational schools in terms of students' math achievement, SES, instrumental math motivation, and extra-curricular school activities. Students attending low-performing academic schools in Turkey reported higher interest in math, higher ability beliefs, higher behavioral engagement, higher disciplinary class-climate, better-equipped school facilities, and their parents had more positive school-related beliefs compared to those attending vocational schools (Table 2).

Table 2.
Means and mean differences across school tracks with low-performing-academic school track as the reference category

	Low-performing academic track (n = 1,630)	Vocational track (n = 1,859)			High-performing academic track (n = 1,253)		
	M(SD)	*M(SD)*	$M_{difference}$	95% CI	*M(SD)*	$M_{difference}$	95% CI
Student math achievement	415(65.0)	409(64.6)	-5.51	[-15.3,4.32]	555(66.9)	141*	[125,156]
SES	-1.65(1.03)	-1.70(.90)	-.05	[-.18,.08]	-.77(1.17)	.88*	[.71,1.06]
Parent math beliefs	.00(.84)	-.10(.82)	-.10*	[-.17,-.02]	.18(.69)	.18*	[.09,.27]
Student Value Beliefs							
Student instrumental motivation	.04(1.00)	-.02(.95)	-.05	[-.14,.03]	.16(1.02)	.13*	[.02,.23]
Student interest in math	.47(1.10)	.32(1.04)	-.15*	[-.25,-.04]	.53(1.01)	.07	[-.04,.18]
Student Ability Beliefs							
Student math self-concept	-.09(.98)	-.18(.92)	-.10*	[-.18,-.02]	.18(.98)	.26*	[.15,.37]
Student math self-efficacy	-.16(.86)	-.28(.88)	-.12*	[-.20,-.04]	.53(.86)	.69*	[.57,.81]
Student Behavioral Engagement							
Student behavioral engagement in math classes	.30(1.16)	.15(1.15)	-.15*	[-.20,-.05]	.32(1.01)	.02	[-.09,.13]
Student openness to problem solving	.22(.98)	.08(.99)	-.15*	[-.22,-.07]	.39(.83)	.16*	[.07,.27]
School Learning Environment							
Disciplinary climate during math classes	-.16(.89)	-.25(.91)	-.09*	[-.18,-.00]	.24(.86)	.40*	[.28,.52]
Extra-curricular math activities offered at school	1.48(1.18)	1.46(1.09)	-.02	[-.51,.47]	2.58(1.47)	1.10*	[.57,1.63]
Quality of school facilities	-.17(.90)	-.60(.96)	-.43*	[-.78,-.07]	.19(.89)	.36*	[.05,.68]

Note. Results of regression analyses with 80 replicate weights. $M_{difference}$ = Difference between means for vocational/high-performing-academic track versus low-performing-academic track. 95% CI = 95% Confidence interval for the mean difference. *p < .05.

Main Analysis

In preparation for the logistic regression, we tested for multi-collinearity, screened for possible outliers and assessed linearity. Across all independent variables students' interest in math (tolerance = 0.29, VIF = 3.44) had the lowest tolerance and highest variance inflation factor (VIF). Since none of the tolerance values were below 0.25 and none of the VIFs were above 5.00, we concluded that no problematic multi-collinearity issues existed (Urban & Mayerl, 2006). The screening for outliers revealed that nine students reported lower math self-efficacy beliefs and additionally five students reported lower openness to problem solving scores than 3.29 standard deviations units away from the mean of the respective variables. Since for these students no unusual response pattern on further study variables could be detected, we refrained from deleting these cases from our dataset. The linearity in the logit was assessed with the Box-Tidwell (1962) procedure. Results indicated that only the relationship between the quality of the school building and the logit transformation of the dependent variable might not be linear. Yet, since alternative modelling of the relationship between the quality of the school building and the dependent variable did not result in any better fit, we kept the linear modelling for the final model.

In order to examine what kind of students are likely to attend which school track and what kind of learning environment students are likely to experience at each school track in Turkey, we estimated a multinomial logistic regression with school tracks (i.e., vocational, low-performing academic, high-performing academic schools) as the dependent variable. Low-performing academic schools were used as the reference category in our estimations. For student body characteristics, SES, parents' education-related math beliefs, students' valuing of math, students' math-competence beliefs, and their behavioral engagement were predictor variables in the logistic regression. For school factors, disciplinary climate during math classes, extra-curricular activities, and quality of school facilities served as predictor variables in the logistic regression. A significant likelihood-ratio test indicated that the addition of the predictors to an intercept only model significantly improved the fit between model and data, $\chi 2(22, N = 1507) = 187.14$, $p < .001$. Moreover, results showed that the variance accounted for by school track attendance in the final model was satisfactory (McFadden's $R^2 = .19$). When a cut-off value of .5 was applied, the classification table indicated that our model predicted 54.6% of cases precisely, compared to 33.6% in the original data (Table 3).

Table 3.
Classification for the multi-nominal logistic regression

Observed	Predicted			
	Vocational track	Low-performing academic track	High-performing academic track	Percent correct
Vocational track	405	158	25	68.9%
Low-performing academic track	243	213	50	42.1%
High-performing academic track	120	75	218	52.8%
Overall Percentage	51.0%	27.2%	21.8%	54.6%

Overall, the logistic regression indicates that vocational and low-performing academic schools are similar in their student body characteristics. When comparing vocational with low-performing academic school tracks, only parental educational beliefs, students' math self-concept, quality of school facilities, and classroom environment were significant predictors of school track attendance (Table 4). Yet, students' SES, instrumental motivation, interest in math, math self-efficacy beliefs, behavioral engagement, and extra-curricular activities at school were non-significant predictors in the logistic regression. Specifically, given a one-unit increase in parental academic beliefs, disciplinary classroom-climate, and quality of school facilities, the odds of attending a vocational school relative to a low-performing academic school decreased by .77, .84, and .60 times, respectively. Given a one-unit increase in math self-concept scores, the odds of attending a vocational school relative to a low-performing academic school were 1.29 times more likely.

Comparing low-performing academic to high-performing academic school track attendance, students' SES, math self-efficacy, behavioral engagement, students' classroom environment and extra-curricular math activities at school were significant predictors, while parental math beliefs, students' valuing of academic tasks, students' math self-concept, and school resources were non-significant predictors. That is, given a one-unit increase in students' SES, math self-efficacy beliefs, classroom-climate, and extra-curricular school activities, the odds of attending a high-performing academic school relative to attending a low-performing academic school, were 1.90, 2.30, 1.47, and 1.73 times more likely, respectively. On the other hand, given a one-unit increase in students' math engagement and persistence in problem-solving, the odds of attending a high-performing academic school relative to attending a low-performing academic school were reduced by .78 and .74 times, respectively.

Table 4.
Results of multinomial logistic regression predicting school track attendance with low-performing academic school track as reference category (N = 1,507)

	Vocational track			High-performing academic track		
	B(SE)	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*
SES	.08(.09)	1.08	.411	.64(.09)	1.90	<.001
Parent math beliefs	-.27(.08)	.77	.001	-.05(.11)	.95	.640
Student value beliefs						
Student instrumental motivation	.02(.12)	1.02	.883	-.01(.12)	1.00	.967
Student interest in math	-.08(.12)	.92	.510	-.08(.13)	.93	.572
Student ability beliefs						
Student math self-concept	.26(.10)	1.29	.014	.03(.13)	1.03	.802
Student math self-efficacy	-.15(.10)	.86	.117	.83(.12)	2.30	<.001
School behavioral engagement						
Student behavioral engagement in math classes	-.05(.09)	.95	.581	-.25(.10)	.78	.015
Student openness to problem solving	-.10(.07)	.91	.179	-.30(.09)	.74	.001
School learning environment						
Disciplinary climate during math classes	-.17(.09)	.84	.044	.38(.13)	1.47	.003
Extra-curricular math activities offered at school	.03(.16)	1.03	.846	.55(.19)	1.73	.004
Quality of school facilities	-.51(.21)	.60	.018	.17(.29)	1.18	.565
Log-likelihood	-1,325					
Likelihood-ratio $\chi 2(22)$	187		<.001			
BIC	2,825					
McFadden's R^2	.19					

Note. $n_{low\text{-}performing\ academic\ school\ track}$ = 506, $n_{vocational\ school\ track}$ = 588, $n_{high\text{-}performing\ academic\ school\ track}$ = 413.

DISCUSSION

With the aim to understand implications of Turkey's tracking system and to identify policy approaches to dampen its negative implications, the current study assessed how school track attendance related to (1) student and family as well as (2) school characteristics in Turkey. For our estimations, we used the PISA 2012 data which provided us with a large representative sample of 15-year-old students from 152 different schools throughout Turkey. Our results confirmed that Turkish students coming from economically more advantaged families were more likely to attend high-performing schools. At high-performing schools, Turkish students were more likely to trust their own math ability and experience more favorable learning environments compared to students at low-performing academic schools. Contrary to our expectations, students at high-performing schools were just as much likely to value math and were less likely to be behaviorally engaged during their math classes as their peers from low-performing academic schools. Learning environments were likely to be particularly poor at vocational schools. For lower-SES students, school track attendance was associated with parental beliefs instead of SES. That is, when students reported that their parents assign a higher value to their math abilities, then students were more likely to attend low-performing academic schools instead of vocational schools. Overall, the analyses highlighted the importance of school track attendance in Turkey's selective school system. Implications of each finding are discussed in more detail below.

Social Segregation between School Tracks

In line with previous research (Alacaci & Erbas, 2010; Dincer & Uysal, 2010), our results documented a channeling of higher-SES students into high-performing academic schools in Turkey. Lower-SES students concentrated in Turkey's low-performing academic or low-performing vocational schools. While previous studies on Turkey already documented high social and academic disparities among Turkish schools, our study is the first to verify the increased likelihood of higher-SES students attending high-performing upper-secondary schools in Turkey. This is an interesting finding, since it implies that the admission process to Turkish upper-secondary schools is socially biased, despite being mostly based on test results from a national standardized exam. That is, students coming from more advantaged families are more likely to be successful during the admission process to high-performing upper-secondary schools in Turkey. This finding confirms our expectations and is in line with other studies from Turkey or France indicating the positive association between standardized admission exam results and SES (Caner & Okten, 2013; OECD, 2012; Özdemir, 2016). It is also in line with studies suggesting that SES-related educational differences are likely to increase at transition points in selective school systems such as between-school tracking (Schnabel et al., 2002).

Different reasons exist why students coming from economically more advantaged families are more likely to prevail in the tough competition to gain access to high-performing upper-secondary schools in Turkey. Higher-SES students are, for example, found to have more resources at their disposal in order to prepare themselves for the admission process (e.g., by taking extra classes in preparation for standardized exams; Caner & Okten, 2013; Özdemir, 2016). It is also possible that higher-SES students perform better on the admission exams since their overall academic achievement relates to their SES (Alacaci & Erbas, 2010). Another reason might be that higher-SES parents are more successful in navigating their child through the admission process, since higher-SES parents are found to possess more knowledge about the education system, get more actively involved during transition times and more frequently contact teachers during transition times (Groos, 2016; Kleine, 2014; Weininger & Lareau, 2003). Overall, our results support the findings that between-school tracking, even when placement is mostly based on standardized test results, is likely to increase social segregation among upper-secondary schools in Turkey, and thus, it is likely to put a threat to equity in education in Turkey.

Moreover, interestingly, while SES mattered for the access to high-performing instead of low-performing academic schools in Turkey, SES did not matter for the access to low-performing schools

in our study. Comparing low-performing school track attendance with each other (i.e., vocational versus low-performing academic school track attendance) revealed that academic-oriented parents would send their child to an academic instead of a vocational low-performing school. It is possible that children of these education-oriented parents actually tried to gain access to better performing schools, but due to the high competition within the Turkish education system they were not able to, and thus, they attended low-performing academic schools. In line with studies on school choice, these results underscore the importance of parental cognitions besides SES for students' school track choice (Becker, 2010). Moreover, these results highlight variation in parents' education-related beliefs among lower-SES Turkish parents. This is important, since school track attendance is likely to hold important implications for students' future academic development, with students attending vocational schools being less likely to attend college (Caner & Okten, 2013; Özdemir, 2016). Furthermore, these results are important, since they suggest that there is variation and possibly room for modification of education-related parental beliefs of lower-SES parents in Turkey. Thus, interventions, which aim to tackle SES-related disparities in school track attendance in Turkey, may also take family characteristics such as education-related beliefs of parents into account.

Comparable Task Value, Lower Ability Beliefs, and Higher Behavioral Engagement Levels at Low-performing Academic Schools

The EVT posits that more positive motivational beliefs result in higher achievement and engagement levels of students, as well as their enrolment into more challenging academic classes and school tracks (Eccles & Wigfield, 2002). Thus, we expected that motivational beliefs and engagement levels would be highest among students attending high-performing schools. However, contrary to our expectations from EVT, the results of the logistic regression revealed that school track attendance was not associated with students' interest and instrumental motivation (i.e., value beliefs), but with their confidence in their academic abilities and behavioral engagement.

Surprisingly, students at low-achieving academic schools were less likely to trust their own math ability, but put in more effort during their math classes than students from high-performing schools. Hence, it is possible that students at low-performing academic schools may not be able to benefit academically from their enhanced work for their math classes in Turkey. At the same time, Turkish students' higher academic performance and higher confidence in their math ability at high-performing academic schools is not likely to be associated with more effort of these students. Higher performance and confidence beliefs of students at high-performing academic schools might rather be due to school factors, such as the learning environment at school.

Also surprisingly, students attending low-performing academic schools were likely to hold lower ability beliefs than students from vocational or high-performing academic schools. A possible explanation for these low ability beliefs of students at low-performing academic schools is that in Turkey's selective school system, students' competence beliefs get shaped by (1) school admittance and (2) students' personal standards. Admission to selective upper-secondary schools in Turkey is regulated by test scores from a national examination. Students attending low-achieving academic schools are likely to have been aiming to attend better schools, but due to their low exam scores, they got assigned to less successful schools. Based on this admission and their exam scores, their ability beliefs might have suffered. This would be in line with findings from Mann and colleagues (2015) who argue that in selective school systems students' ability beliefs are associated with students' school admission. Moreover, students from low-performing academic schools were more likely to hold lower ability beliefs than students at vocational schools. This might be because students at vocational schools did not strive to attend prestigious upper-secondary schools. Thus, their ability beliefs did not suffer from their admission to non-prestigious vocational schools. Other studies from Turkey also indicate that rather than students' value beliefs and behavioral engagement, particularly students' competence beliefs and school track attendance are important for their academic development (Özel, Caglak, & Erdogan, 2013; Senler & Sungur, 2009). Yildirim (2012), for example, found in a mediational model for 15-year-old Turkish students that, while students' task value beliefs predicted their learning-related behavior, the learning-

related behavior in turn was not significantly associated with students' science achievement. The author found that only students' ability beliefs predicted their academic performance. These findings hold important implications for future studies aiming to explain individual differences in Turkish students' achievement as well as EVT, since it highlights the associations between school track attendance and competence beliefs in the Turkish education system. Thus, in addition to the family background, as suggested by EVT, also features of the school system, in such selective school systems as the one found in Turkey, are likely to shape students' competence beliefs and consequently also their academic achievement (Mann et al. 2015, Simpkins et al., 2015). Thus, future studies explaining individual differences in competence beliefs and academic achievement in Turkey should take features of the school system such as the performance level of schools into account.

Enhanced Learning Environments at High-performing Schools

In line with our hypothesis, results of the present study indicated that students at high-performing compared to low-performing academic schools experienced a more favorable learning environment with more positive disciplinary classroom-climates and a richer offer of extra-curricular math activities at school. These features of high-performing academic schools may result in prolonged instructional and practice time, and thus pronounced cognitive stimulation and self-efficacy beliefs for students at high-performing compared to low-performing schools in Turkey (OECD, 2012). This effect may be reinforced by an overall more academically demanding curriculum in high-performing compared to low-performing academic or vocational schools in Turkey (Giersch, 2016).

Additionally, study results emphasized that vocational schools are particularly disadvantaged in Turkey: These schools had the lowest disciplinary climate during math classes and poor resources. This is in line with previous findings that low-performing schools are often poorly equipped but are attended by students with the highest needs (Muijs, Harris, Chapman, Stoll, & Russ, 2004). Hence, researchers are calling for a relocation of resources towards these schools in order to enable them to meet the high needs of their student body (OECD, 2012; Windle, 2014).

To sum up, study results suggest that, in Turkey, admittance to high-performing academic schools and the associated experience of a more stimulating learning environment at school may supersede the positive effect of individual students' interest, instrumental motivation and behavioral engagement on their performance. This implies that in order to foster students' academic achievement, policies should focus on enhancing learning environments and students' academic confidence, especially at low-performing schools in Turkey, instead of focusing on fostering students' valuing of academic tasks or effort (OECD, 2012; Murphy, 2010). Particularly, vocational schools seem to be poorly equipped to meet the needs of its often disadvantaged students.

Moreover, our results imply that ability beliefs of students are sensitive to competition within the school system and the attainment of personal goals (Mann et al., 2015). For the Turkish school system this means that its between-school tracking has detrimental effects on students' competence beliefs with unrealized goals. In regard to EVT, it means that in addition to family background also the school system has the potential to shape students' ability beliefs, particular in countries with highly selective school systems.

LIMITATIONS and CONCLUSION

The results should be evaluated in the context of some limitations. First, the PISA data-set is cross-sectional. Therefore, no inferences about causality can be made. It is possible that the present findings reflect a self-selection bias of students with high achievement and ability beliefs into high-performing

academic schools, that high-performing academic schools foster subsequent student characteristics, or that there are reciprocal effects between students' school track attendance, student body, and school characteristics. In order to disentangle these effects, longitudinal studies are needed. Another limitation of the present study is that most measures were student-reports and math-specific, which may reduce the generalizability of the results. Thus, future studies should employ additional methods of assessment such as teacher report, parent report or observational measures, and include additional academic domains.

Despite these limitations, the present study has a host of strengths. It uses a large, representative sample including a large number of schools. Moreover, it extends the literature by estimating school-track attendance in a highly selective school system such as the one found in Turkey. To our knowledge studies that take school features into account are still very scarce in Turkey. This focus on school tracks allowed us to reveal three key findings with important implications for Turkey's selective school system: First, our study is the first to confirm that lower-SES students get channeled into low-performing schools in Turkey. Thus, the Turkish between-school tracking system with its allocation system via standardized national exams to prestigious upper-secondary schools is likely to reinforce socio-economic inequalities and puts a threat to equity. Therefore, future school allocation policies should aim to combat the social segregation between upper-secondary schools in Turkey. Second, Turkish students at high-performing schools are likely to benefit from enriched learning environments at their schools and less so from enhanced behavioral engagement patterns or interest and instrumental motivation of students. Thus, in order to enhance student achievement in Turkey, educational policies should aim to improve learning environments, especially at low-performing schools in Turkey. Moreover, how school features related to gains in students' academic achievement is an important question for further longitudinal studies in Turkey. Third, ability beliefs of students are likely to be sensitive to personal goal settings and features of the school system. Hence, ability beliefs are likely to suffer for students with disappointed ambitions in selective school systems. These results suggest that besides family factors, as proposed by EVT, features of the school system, such as tracking, are also associated with students' motivational beliefs. Overall, findings of this study are likely to be applicable to other countries with between-school tracking based on prior achievement, yet, further research in other countries with such selective school systems is needed.

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APPENDIX 1.

Results of multinomial logistic regression predicting school track attendance with low-performing academic school track as reference category including schools with less than 10 students (N = 1,520)

	Vocational track			High-performing academic track		
	B(SE)	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*
SES	.10(.09)	1.10	.261	.67(.09)	1.97	<.001
Parent math beliefs	-.27(.08)	.77	.001	-.06(.11)	.94	.584
Student value beliefs						
Student instrumental motivation	.02(.11)	1.02	.863	-.01(.12)	1.00	.981
Student interest in math	-.10(.12)	.90	.404	-.10(.13)	.91	.455
Student ability beliefs						
Student math self-concept	.28(.10)	1.32	.008	.06(.13)	1.06	.638
Student math self-efficacy	-.16(.10)	.85	.084	.82(.12)	2.27	<.001
School behavioral engagement						
Student behavioral engagement in math classes	-.07(.09)	.93	.441	-.27(.10)	.77	.009
Student openness to problem solving	-.08(.07)	.93	.286	-.28(.09)	.76	.003
School learning environment						
Disciplinary climate during math classes	-.17(.08)	.84	.038	.39(.13)	1.47	.003
Extra-curricular math activities offered at school	.01(.16)	1.01	.962	.52(.19)	1.69	.006
Quality of school facilities	-.49(.21)	.61	.019	.18(.29)	1.20	.531
Log-likelihood	-1,337					
Likelihood-ratio $\chi 2(22)$	189		<.001			
BIC	2,894					
McFadden's R^2	.19					

Note. $n_{low\text{-}performing\ academic\ school\ track}$ = 519, $n_{vocational\ school\ track}$ = 588, $n_{high\text{-}performing\ academic\ school\ track}$ = 413.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Türkiye'deki okulların performans açısından değerlendirme çalışmaları yapılmış olsa da öğrenmeyi arttırmak için sağladıkları imkanlar ve bünyelerindeki öğrenci profilleri açısından farklılıklar yeterince incelenmemiştir. Bu makalede, okul merkezli bir yaklaşım izlenerek ve PISA 2012 verileri incelenerek, Türkiye'deki nispeten düşük performanslı mesleki ve akademik okullar ile yüksek performanslı okullar, öğrencilerin aile geçmişleri, motivasyonları ve okulun öğrencilere sağladığı imkanlar göz önünde bulundurularak incelenmiştir.

Araştırmalar ailelerin sosyo-ekonomik durumlarının öğrencilerin başarı ve motivasyon seviyelerini etkilediğini ortaya koymuştur. Düşük gelirli aileler mesleki okulları tercih ederken, yüksek gelirli olanlar çocuklarının akademik başarısı yüksek olan liselere devam etmeleri için çaba sarf etmeyi tercih etmektedirler. Aynı zamanda yüksek sosyo-ekonomik durumdaki aileler ülkedeki eğitim ve sınav sistemi ile ilgili daha fazla bilgi sahibi olmakta ve okul ile daha sıkı iletişim kurmaktadırlar. Bu ailelerin çocukları da düşük gelirlilere kıyasla daha başarılı ve daha motive olmaktadır. Beklenti-değer teorisine göre çocukların eğitime bakış açıları yetiştikleri ortamdan etkilenmektedir. Okul başarısını özendiren ve buna değer veren ailelerin çocukları, yüksek kalitede eğitim almak için daha motive olmaktadırlar.

Aile etkisi dışında, okulların sağladıkları ve sundukları da öğrencilerin başarı ve motivasyon seviyelerini ve kararlarını etkileyen bir diğer faktördür. Okulların fiziki ortamları ve örneğin matematik eğitimine olan bakış açıları öğrencilere sunulan imkanları ve dolayısıyla başarılarını etkilemektedir. PISA sonuçlarına göre başarılı olan okullarda daha yoğun bir akademik eğitim görülmekte ve fiziksel şartlar genel olarak daha iyi olmaktadır. Öğrencilere ayrılan okul-sonrası aktiviteler daha çeşitlidir. Verilen ödev ve görevler daha zorlayıcı olabilmektedir.

Bu araştırma okullar arasında öğrenci performansına etki edecek farklılıkları incelemek amacıyla öğrenci (matematik başarısı, ailenin matematik algısı, sosyo-ekonomik durum, vb.) ve okul (matematik dersi esnasındaki atmosfer, imkanların kalitesi ve çeşitliliği, vb.) alt başlıkları altındaki değişkenleri incelemektedir. Hangi profildeki okullarda hangi profildeki öğrencinin olduğu araştırmanın odak noktasıdır. Bu seçimlerdeki farklılıklar ve sebepleri daha iyi anlaşıldıkça, genel başarıyı ve motivasyonu yükseltecek gerek bireysel gerekse toplumsal adımlar atılmasında önemli bir yer tutar.

Araştırma OECD tarafından yapılan PISA 2012 Türkiye örneklemi verisini kullanmaktadır. 10 veya daha az öğrenciden veri elde edilmiş okullar analizlere dahil edilmemiştir. Analizlerin gerçekleştirildiği örneklem ortalama 15.8 yaşında ve %49'u kız olmak üzere 4742 öğrenciden oluşmaktadır.

Verdikleri müfredata ve PISA matematik başarılarına göre okullar kategorize edilmiş ve düşük başarılı mesleki, düşük başarılı akademik ve yüksek başarılı akademik olarak üçe ayrılmıştır. Matematik skoruna göre yüksek başarılı mesleki okullar bulunmadığı için o kategori değerlendirmeye alınmamıştır. Başarı seviyeleri PISA değerlendirmesine göre 0'dan 6'ya kadardır. Seviye 3'ten itibaren problem çözme becerisi dahil olur. Bu çalışmada seviye 2 ve altı düşük, seviye 2 üstü yüksek başarılı olarak adlandırılmıştır.

Türkiye ve OECD ülkeleri ortalamaları karşılaştırıldığında, Türkiye'deki öğrenciler OECD ortalamasına kıyasla matematik testinde 51 puan geride kalmışlardır. Türkiye'deki ailelerin sosyo-ekonomik durumları da ortalamanın yaklaşık 1.5 standart sapma altındadır. Türk öğrenciler OECD ortalamasına kıyasla matematik alanına daha fazla ilgi duyarken, dersteki disiplin atmosferini değerlendirdiklerinde OECD ortalamasına yakın cevaplar vermişlerdir. Okul müdürlerince değerlendirilen okulların fiziksel koşulları ise OECD ortalamasının altında kalmıştır.

Analiz sonuçları mesleki ve düşük başarılı akademik okulların öğrenci profili bakımından benzer olduğunu göstermektedir. Düşük başarılı akademik okullar mesleki okullar ile karşılaştırıldığında ise, düşük başarılı akademik okullarda matematik derslerindeki disiplin ortamı, okul fiziksel koşulları ve ailelerin eğitimle ilgili görüş değişkenlerindeki skorlar daha yüksektir. Mesleki okullarda ise öğrencilerin matematik benlik algılarının daha yüksek olduğu görülmektedir.

Yüksek başarılı akademik okullar ve düşük başarılı akademik okullar karşılaştırıldığında ise, öğrenci matematik öz-yeterliliği, matematik derslerindeki disiplin ortamı ve okulda ders sonrası matematik aktiviteleri yapılması değişkenlerindeki skorlar daha yüksektir. Fakat öğrencilerin matematiğe ilgisi ve motivasyonu ve okul fiziksel koşulları değişkenleri açısından fark bulunmamıştır. Analizler sosyo-ekonomik olarak daha avantajlı ailelerin çocuklarının yüksek başarılı okullara gitme olasılığının daha fazla olduğunu da doğrulamıştır. Aynı zamanda, bu okullardaki öğrenciler matematik alanında kendilerine daha fazla güvenmektedir ve öğrenme ortamları olumlu yönde farklılıklar göstermektedir. Fakat beklediğimizin aksine öğrencilerin matematik dersine kendini verme değişkeninde okullar arasında anlamlı bir farklılık görülmemiştir. Başarılı okullardaki öğrenciler matematik konusunda kendilerine daha fazla güveniyorken, düşük başarılı okullarda olanlar matematik derslerine kendilerini daha çok vermektedirler.

Bu farklılıklar sistemin yarattığı sıralamanın bir sonucu olabilir. Matematik başarısının hali hazırda düşük olmasının yanı sıra, zaten başarılı bir okulda değilim algısı öğrencinin motivasyonunu ve kendine güvenini etkileyebilir. Örneğin, matematik konusunda en düşük kendine güven meslek okulu öğrencilerindedir. Meslek okulları, matematik dersi işlenişi ve dersteki disiplin seviyesinde de son sırayı almaktadır. Eğitimlerine devam etmeyecekleri düşüncesi de bu durumda etkili olabilir. Düşük sosyo-ekonomik seviyedeki öğrencilerin matematik seviyeleri ailelerinin matematiğe bakışlarından çok etkilenebilmektedir. Matematiğe ve eğitime değer veren ailelerin çocukları meslek okulları yerine genel liseleri tercih edebilmektedir. Sadece okul ortamı değil, ailelerin eğitimle ilgili inanışları da son derece etkileyici olabilmektedir.

Bu bilgilerin ışığında, öğrenciler ve okullar arasındaki bu farklılıkları giderecek, okulları ve öğrenme ortamlarını iyileştirici, imkanları daha ulaşılabilir hale getiren, öğrencilerin ruh sağlığına zarar vermeyen politikalar geliştirmek bizleri eğitim alanında eşitliğe bir adım daha yaklaştıracaktır.