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Do Student Characteristics Affecting School Dropout Risk Differ from One School to Another? *

Osman Zorbaz [1], Arif Özer [2]

Abstract

This study assessed the predictive power of variables at school-level and student-level on the risk of school dropout within the framework of the Ecological Theory. A predictive correlational research model was used, and the participants were selected by employing a two-stage sampling procedure. Participants were 1.851 students from 30 different high schools in the central districts of Ankara studying during the 2016/17 school year. According to the findings of two-level hierarchical linear regression analysis; the average of the highest school at the risk of school dropout is almost twice that of the lowest school. The effect of the environmental risk perception on school dropout in schools with high dropout is higher than schools where the risk of dropout is low. Academic achievement, environmental security, and non-antisocial behaviors reduce the likelihood of early school leaving at the schools with a higher risk of dropout than lower-ones. The probability of dropout of upper grades in schools comprising student clubs and students with high academic achievement in schools with High School Entrance Exam success is less. It was also concluded that the effects of gender, class repetition, having a sibling who left school early, teacher participation, punishment, absenteeism and motivation may have been mediated by other variables in the regression equation.

Keywords

High school students
The risk of school dropout
Early school leaving
School opportunities
Ecological theory
Factors at student-school levels
Hierarchical linear model

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[1] Ministry of Justice, Ankara 4'th Juvenile Court, Turkey, osmanzorbaz07@gmail.com
[2] Hacettepe University, Faculty of Education, Department of Educational Sciences, Turkey, arifozer@hacettepe.edu.tr

Introduction

One of the challenges of education systems in many countries is that students leave school without graduating (OECD, 2017). Therefore, identifying the factors that affect school dropout and conducting prevention studies are considered as an urgent need for most countries. For example; with the prevention programs implemented in the USA in the early 1990s, school dropout rates gradually decreased from 12% to 7% (National Center for Education Statistics [NCES], 2015). In Europe, school dropout rates vary by country. According to data EUROSTAT (2019) the average of the individuals leaving school between 18-24 in the European Union was reported as 10.6%, this ratio was 31% in Turkey. While Iceland with 21.5% and Spain with 17.9% was following Turkey, the country with lowest dropout rate is Croatia with 3.3%. These rates show that Turkey is in a very disadvantageous position among countries in early school leaving. Indeed, UNICEF (2015), based on the results of projects carried out by the study of children out of school, where a five year old child, two out of every three of education in Turkey; low income of the family, being in need of special education and being a girl increase being out of education and there are significant differences in school dropout rates among provinces.

School dropout is a phenomenon which has various negative consequences on both the individual and the society (OECD, 2017). Lack of educational qualifications required to access the labor market (Kaufman, Alt, & Chapman, 2004), working in low-income jobs (Taylı, 2008) and the tentation (Na, 2017) are among the individualistic negative consequences of dropout, while problematic family relationships (Afia, Diona, Dupere, Archambault, & Toste, 2019), adaptation problems (Taylı, 2008), the 'wasted' education expenditure for those leaving school early (Uysal, 2008) and the fact that these individuals have less contributions to the economies of countries due to lack of adequate education can be considered as social consequences of dropout. Therefore, school dropout is a social problem that affects other related structures of a society as well as the individual. On the grounds that it's being so extensive, school dropout requires to be examined from a wider perspective. For this reason the dropout was handled within the framework of the Ecological Approach proposed by Bronfenbrenner (1994).

Theoretical Perspective: Ecological Theory

The ecological approach deals with some systems surrounding the individual and the effect of these systems' interaction on the individual's development (Bronfenbrenner & Morris, 1998). According to this approach, four systems can be mentioned. The first is the microsystem composed of the variables with whom individuals are in close contact such as school, family, peers, and teachers. The second is mesosystem including the relationships among the microsystems, in which children are in close contact such as family participation and school-family cooperation. The third is the exosystem surrounding the mesosystem and including the variables that affect the individual indirectly such as law, education, and educational policies. The outermost one is the macrosystem, which covers culture and values, etc.

Ecological Perspective on School Dropout

In the context of the ecological approach, school dropout can be predicted by individual and microsystem elements, school and familial reasons. Individual reasons include of gender's being male (Borgna & Struffolino, 2017; Sneyers & De Witte, 2017), academic failure (Fortin, Marcotte, Diallo, Potvin, & Royer, 2013; Franklin & Trouard, 2016), high absenteeism rate (Rumberger, 1995), working in wage-earning employments to support the family (Bridgeland, 2010), class repetition (McMillen & Kaufman, 1997), class level (Franklin & Trouard, 2016; Yorğun, 2014), antisocial behaviors (Özer, Gençtanırım, & Ergene, 2011) and substance usage(addiction) (Robison, Jaggers, Rhodes, Blackmon, & Church, 2017). The fact that none of these variables is solely responsible for school dropout (Rumberger & Lim, 2008) and the fact that often successful students and dropout students are at a similar level in these variables reveal the complexity of the decision of school leaving early and make it difficult to prevent.

Although teachers attribute the risk of dropout to students' irregular/insufficient study and the lack of support by their parents (Gökşen, Cemalcılar, & Gürlesel, 2006), research shows that many reasons for dropout are related to school and their educational experiences. In addition to individual reasons such as academic failure, class level, absenteeism, class repetition, factors such as the structure and atmosphere of the school and the quality of education affect the risk of dropout. In other words, the

cultural structure and opportunities of schools are associated with school dropout. Especially in schools where the rules are uncertain, the school atmosphere turns into a negative social environment (Kronick, 1994). Therefore, negative experiences such as disciplinary problems experienced by students, negative relations with teachers, problems with peers, inability to adapt to school life and escape from school also play an important role in increasing the risk of school leaving early (Shuger, 2012). Moreoever, the large number of students at school, the lack of academic support of teachers, the school administrators to rule with a rod of iron, unfair and ineffective punishment transactions increase the risk of dropout (McNeal Jr, 1997; Reschly & Christenson, 2006). Students' inadequate learning experiences may also be effective in the risk of school leaving. For example, the fact that the lessons and extracurricular activities in the school aren't not found attractive by the students (Carley, 1994), the lack of perceptions about the importance of the lessons or the thought that the things learned in the school will be not useful in social life (Townsend, Flisher, Chikobvu, Lombard, & King, 2008; Yadav, Kalakoti, & Ahmad, 2010). On the other hand, the rate of winning the university entrance exam, the educational materials in the school and the cultural opportunities such as sports, arts, one-to-one support to the students who are at risk of dropping out, and the fact that the social environment in which the school is located is supportive of educational experiences reduces the risk of leaving early (French & Conrad, 2001).

In the context of ecological approach, families are another environmental cause of school dropout. Rumberger (1983) lists the familial reasons for leaving school early as parents' drop out, low level of parents' education, participation in school activities and low educational expectations from their children. Other familial factors leading to school dropout are problematic relationships in the family (Gamier, Stein, & Jacobs, 1997), to have a single parent (Carpenter & Ramirez, 2008), to care of his/her siblings (Bridgeland, 2010; Yadav et al., 2010), to work out of the school hours to support the family (Şirin, Özdemir, & Sezgin, 2009) and to have a poor family (Franklin & Trouard, 2016; Marphatia, Reid, & Yajnik, 2019).

Consequently, in the above studies, it is observed that school dropout is related to individualistic, school based and familial reasons, and in most of these studies, only a few of the reasons mentioned are examined. However, even if a regression model with 40 risk factors is used to identify the students with the highest risk, it is indicated that 60% of the students predicted to drop out successfully graduated (Dynarski & Gleason, 1998). Therefore, no single reason may not lead to dropout; it can be argued that the interaction between the individual, the family and school characteristics should be considered on school dropout.

In this research, these interactions are examined on a large number of variables in three categories (individual, family, and school). No previous studies have been come across. It can be stated that the results of the study without considering the interactions between the levels will be improper in testing the validity of the ecological approach. In this respect, it can be considered that addressing the problem in this way is also appropriate to the perspective of the ecological approach. In addition, the fact that the most substantial reasons among a large number of dropouts are identified in a large sample group contributes to the generalizability of the results. The findings of the study are expected to contribute to the effective use of school resources by educators working on the risk of dropout. In the scope of these reasons, the research focuses on how the relationships between student and family characteristics and dropout risk vary according to school characteristics. In this context, the following questions were sought:

1. Are the intercepts of schools statistically different? (Model 1)

2.a. What is the average intercept and slope of schools? (Model 2)

2.b. How much do schools' intercepts and slopes vary from one school to another? (Model 2)

3. Is there a correlation between in-school slope means and the means intercept among the schools?

4.a. Do the second level variables predict the intercept? (Model 3)

4.b. Do the second-level variables predict in-school slopes? (Model 3)

4.c. To what extent do the second level variables explain the change in intercept and slopes?

Method

Participants

The two-stage sampling procedure was used in the data collection process. Before collecting any data, all necessary permissions were obtained from the Ethics Committee of the university where the study was conducted and from the Ankara Provincial Directorate of National Education. 30 high schools in Ankara, Turkey's capital, were randomly selected among 162 high schools in the 2016/17 school year and measurement tools were administrated to the 9th, 10th and 11th-grade students (one class from each grade). In this way, data was collected from a total of 1851 students from 30 high schools. Out of the high school students who participated in this study, 1,102 were female (59.5%) and 749 were male (40.5%). 636 (34.4%) students were in the ninth grade, 637 (34.4%) were in the tenth grade and 578 (31.2%) were in the eleventh grade. Information about the characteristics of the schools was obtained from the school principals.

Measures

In the study, we used seven scales focusing on high school students and two information forms about the characteristics of students and schools. The scales were administered by the first researcher during the class hours. Before that, the participants were given parent/ student consent forms.

School Experience Scale: The School Experience Scale, developed by Yorğun (2014) based on the Ecological Theory, aims to measure high school students' risk of dropout. The scale was developed with the participation of 454 adolescents who had dropped out of school and continued studying at evening high schools. It is a 3-point Likert-type scale, consisting of 25 items and 7 dimensions, i.e. "low social support", "negative peer relations", "negative attitudes towards school", "withdrawal", "peer group attitudes towards school", "attitudes towards education" and "low self-esteem". Cronbach's Alpha coefficient of the scale is .87. In this study, the School Experience Scale was used to find the total score and the Cronbach's Alpha reliability coefficient for the obtained data was calculated to be .79.

Risk Behaviors Scale: This scale was developed by Gençtanırım and Ergene (2014) measure risk behaviors of high school students. The scale was developed using the data obtained from 485 high school students. It is a 5-point Likert-type scale consisting of 36 items and six dimensions, i.e. "antisocial behaviors", "alcohol use", "smoking", "suicide tendency", "eating habits" and "school dropout". The antisocial behaviors dimension was used in this study. This dimension's Cronbach's Alpha coefficient is .79. Using the data obtained in this study, the Cronbach's Alpha reliability coefficient of the antisocial behaviors dimension of this scale was calculated to be .81.

Neighborhood Risk Scale: This scale developed by Çetinkaya-Yıldız and Hatipoğlu-Sümer (2010) with the participation of high school students aims to measure the neighborhood risks perceived by adolescents. It is a 3-point Likert-type scale consisting of seven items and one dimension. The scale includes questions about how dangerous adolescents perceive the environment they live in and the criminal events and gang activities in their neighborhood. According to the exploratory factor analysis, the total variance explained by this single-factor scale is 23.87% (eigenvalue: 2.40). The Cronbach's Alpha reliability coefficient of the scale is .66. Using the data obtained in this study, the Cronbach's Alpha reliability coefficient of the Neighborhood Risk Scale was calculated to be .80.

Neighborhood Safety Scale: This scale developed by Çetinkaya-Yıldız and Hatipoğlu-Sümer (2010) with the participation of high school students aims to measure how safe adolescents perceive themselves. In this 3-point scale consisting of eight items and one dimension, the total variance explained is 35.75% and the eigenvalue is 3.48. The Cronbach's Alpha reliability coefficient of the scale is .81. Using the data obtained in this study, the Cronbach's Alpha of the scale was calculated to be .86

Perceived School Experiences Scale: The Perceived School Experiences Scale developed by Anderson-Butcher, Amorose, Iachini, and Ball (2012) has been adapted into Turkish by Baytemir, Akin Kösterelioğlu, and Kösterelioğlu (2015). The adaptation of the scale into the Turkish language was carried out using the data obtained from 398 secondary and high school students. It is a five-point Likert-type scale consisting of 14 items and three dimensions, i.e. "academic press", "academic

motivation" and "school connectedness". The Cronbach's Alpha reliability coefficient for the whole scale is .90 and for its dimensions is between .86 and .88. Using the data obtained in this study, we calculated the Cronbach's Alpha of the scale and its dimensions separately. We found it to be .91 for the whole scale, .85 for the Academic Press dimension, .81 for the Academic Motivation dimension and .82 for the School Connectedness dimension.

Student Alienation Scale: The scale was developed by Şimşek, Abuzar, Yegin, Şimşek, and Demir (2015) to measure high school students' alienation feelings using the data obtained from 850 high school students. It is a five-point Likert-type scale consisting of 19 items and four dimensions, i.e. "powerlessness", "normlessness", "meaninglessness" and "social distance". Cronbach's Alpha coefficient for the whole scale is .86. In this study, the Student Alienation Scale was used to find the total score, and the Cronbach's Alpha reliability coefficient for the obtained data was calculated to be .82.

Perceived Parental and Teacher Academic Involvement Scale: This scale developed by Regner, Loose, and Dumas (2009) to measure high school students' perceptions of parental and teacher academic involvement was adapted into Turkish by Dündar (2014) using the data obtained from 503 high school students. It is a five-point Likert-type scale consisting of 16 items and four dimensions including "perceived parental academic monitoring", "perceived parental academic support", "perceived teacher academic monitoring", and "perceived teacher academic support". Cronbach's Alpha coefficient for the whole scale is .93. The Cronbach's Alpha internal consistency coefficients for the dimensions range from .79 to .83. During the analysis process of this study, the dimensions "perceived parental academic monitoring" and "perceived parental academic support" were combined and renamed as "parental involvement" and the dimensions "perceived teacher academic monitoring" and "perceived teacher academic support" were combined and renamed as "teacher involvement." Using the data obtained in this study, we calculated the Cronbach's Alpha to be .92 for the whole scale, .92 for the parental involvement dimension and .91 for the teacher involvement dimension.

Student Demographic Information Form: Some of the variables at the student level (gender, grade, academic performance, absenteeism, grade repetition, being subject to disciplinary action, working in a paid-job while studying, place of residence, monthly income, number of siblings, having dropout siblings, having close dropout friends) were measured using the Student Demographic Information Form developed by the researcher.

School Demographic Information Form: The variables at the school level (school type, the number of students, the average number of students per class, the number of students per teacher, school opportunities (physical conditions), the number of school counsellors, college-going rates of schools (percentage of graduates placed in a university after the Undergraduate Placement Exam/LYS), the number of students who received disciplinary action, the average monthly income of the school, the average success rate of the school, the number of social and cultural activities organized annually in the school, the number of active student clubs, the number of projects carried out by the school at home and abroad in the last five years) were measured using the School Demographic Information Form developed by the researcher. The School Demographic Information Form was filled in by the school principals.

Statistical Analyses

In the study, the effects of the variables in the student and school systems on school dropout risk were examined using a two-level hierarchical linear model (HLM) test. Cronbach's Alpha coefficients were calculated to determine the reliability levels of the measurements. The margin of error in the study was set at .05. The HLM 6 software package developed by Raudenbush, Bryk, and Congdon (2004) was used in the analysis of the data.

Results

The two-level hierarchical linear model developed in the study consisted of two levels, i.e. the student level (Level 1) and the school level (Level 2). Table 1 shows the descriptive statistics of the variables of the levels.

Table 1. Descriptive Statistics of Variables Used in the Hierarchical Linear Model

Student Level	**n**	$\overline{x}$	**sd**	**min**	**max.**
Gender	1851	0.40	0.49	0	1
Grade 10	1851	0.34	0.48	0	1
Grade 11	1851	0.31	0.46	0	1
Academic performance	1851	72.59	11.80	30	98
Absence (days)	1851	4.08	2.75	0	19
Grade repetition	1851	0.06	0.25	0	1
Being subject to disciplinary action	1851	0.06	0.23	0	1
Working in a job	1851	0.04	0.21	0	1
Place of residence	1851	0.89	0.32	0	1
Number of siblings	1851	2.56	1.05	1	10
Monthly income	1851	2850.75	1544.19	400	11300
Having a dropout sibling	1851	0.11	0.32	0	1
Having a close dropout friend	1851	0.39	0.49	0	1
Neighborhood safety	1851	19.65	3.84	8	24
Anti-social behavior	1851	13.34	5.37	7	35
Neighborhood risk	1851	9.32	2.95	7	21
Academic press	1851	12.89	4.14	4	20
Academic motivation	1851	20.07	5.38	6	30
School Connectedness	1851	13.17	4.13	4	20
Alienation from school	1851	52.06	12.35	19	95
Parental involvement	1851	14.91	4.04	4	20
Teacher involvement	1851	13.19	3.99	4	20
Dropout risk	1851	35.13	6.33	26	71
School Level	**n**	$\overline{x}$	**sd**	**min**	**max.**
School type	30	0.53	0.51	0	1
Number of students	30	835.93	353.00	134	2200
Average number of students per class	30	31.63	7.01	22	57
Number of students per teacher	30	12.20	2.52	6	17
Number of school counsellors	30	2.20	0.92	1	6
School opportunities (physical conditions)	30	0.77	0.43	0	1
LYS (university) placement rate	30	47.30	24.03	2	85
Projects carried out by the school	30	2.47	2.74	0	10
Cultural and social activities	30	27.17	23.24	3	100
Active student clubs	30	11.50	4.26	0	18
Number of students who received disciplinary action	30	37.70	73.70	1	361
Average school success	30	71.90	7.53	55.91	84.20
Monthly average income of the school	30	2820.99	618.24	1701.85	4698.11

As shown in Table 1, 40% of the participants were male, 34% were 10th graders and 31% were 11th graders. Academic performance of the participants was 72.59 (sd = 11.80), and the number of absences was ($\bar{x}$) 4.08. 89% of the students live with their parents. The characteristics of the schools show that the number of students in the schools is 836 (sd = 353.00) and the number of students per class is 32 (sd = 7.01). The differences observed between the variables were explained by the one-way random effects ANOVA model (Model 1), random coefficients model (Model 2) and the model where intercept and slope parameters as the outcomes (Model 3).

Model 1

Are the intercepts of schools statistically different?

In Table 2, the school average is 35.15 and se = .31, .95% CI = 35.15 ± 1.96 * .31 = .34.54 to 35.76. The difference between the average school dropout rates is zero and the difference between students' dropout rates (intra-school) is (σ^2) 37.98. The variance between the schools is 2.25. The average dropout rates among the schools is 35.15 ± 1.96 (2.25) = 30.74 to 39.56 with a probability of 95%. The difference between the average dropout rates of schools is statistically significant ($\tau_{00} = 2.25, \chi^2_{29} = 133.35, p =$ .00). The intraclass correlation coefficient ($\hat{\rho} = \frac{\tau_{00}}{\tau_{00}+\sigma^2} = \frac{2.25}{40.23} =$ .06) shows that 6% of the variance in the dropout rates is due to the difference between the schools and the remaining 94% of the variance is due to the difference between the students (intra-school). The reliability coefficient ($\hat{\lambda}$) is .78, which means that 78% of the estimates of the average dropout rates of schools are associated with the real school average, and 22% are associated with random errors. The total variance is 40.23. The intra-school variance is reduced by about 6% only when the random intercept is added to the equation. The deviance of the model whose intercept is defined as fixed is 12,087.63, and with the random intercept (model 1) is 12,030.35 (df = 2). $\Delta\chi^2_1$= 57.28, p = 00 was considered as the result of using random regression coefficients in the model.

Table 2. Hierarchical Linear Model

Models	**One-Way Random Effects Anova**					**Random Coefficients**					**Models Where Intercept and Slope are the Outcomes**				
Fixed Effect	γ	**se**	t	df	p	γ	**se**	t	df	p	γ	**se**	t	df	p
INTRCPT, γ_{00}	35.15	0.31	115.13	29	<.001	36.57	1.30	28.04	29	<0.001	36.07	1.21	29.86	28	<.001
School success $\boldsymbol{\gamma_{01}}$											-0.16	0.03	-5.28	28	<.001
Grade 11, $\boldsymbol{\gamma_{10}}$						-0.51	0.35	-1.48	29	.15	1.29	1.02	1.26	28	.22
Student club, $\boldsymbol{\gamma_{11}}$											-0.16	0.08	-2.01	28	.05
Academic performance, γ_{20}						-0.02	0.02	-1.44	29	.16	-0.03	0.02	-1.76	27	.09
LYS placement rate. %, γ_{21}											0.00	0.00	2.43	27	.02
Discipline rate, γ_{22}											-0.12	0.05	-2.44	27	.02
Working in a job, γ_{30}						1.21	.52	2.33	1839	.02	1.10	0.48	2.28	1832	.02
Dropout friend, γ_{40}						0.67	0.26	2.55	1839	.01	0.62	0.26	2.42	1832	.02
Neighborhood safety, $\boldsymbol{\gamma_{50}}$						-0.28	0.04	6.73	29	<.001	-0.44	0.11	-4.01	28	.00
Number of sch. couns., $\boldsymbol{\gamma_{51}}$											0.08	0.04	1.84	28	.05
Antisocial behav., γ_{60}						0.13	0.03	3.96	29	<.001	0.11	0.04	2.84	28	.01
Discipline rate, γ_{61}											0.69	0.29	2.36	28	.03
Neighborhood risk, $\boldsymbol{\gamma_{70}}$						0.21	0.05	4.43	29	<.001	0.32	0.07	4.93	28	<.001
Cultural activity, $\boldsymbol{\gamma_{71}}$											-0.00	0.00	-2.93	28	<.001
Academic press, γ_{80}						-0.20	0.04	4.63	1839	<.001	-0.20	0.04	-4.79	1832	<.001
School Connectedness, γ_{90}						-0.28	0.04	7.63	1839	<.001	-0.28	0.04	-7.63	1832	<.001
Alienation, γ_{100}						0.08	0.01	6.86	1839	<.001	0.08	0.01	6.73	1832	<.001
Parental involvement, γ_{110}						-0.21	0.03	7.32	1839	<.001	-0.21	0.03	-7.19	1832	<.001
Random effect	**sd**	**Var**	$\boldsymbol{\chi^2}$	df	p	**sd**	**Var**	$\boldsymbol{\chi^2}$	df	p	**sd**	**Var**	$\boldsymbol{\chi^2}$	df	p
INTRCPT, u_0	1.50	2.25	133.35	29	<.001	5.57	31.05	58.62	26	<.001	4.75	25.64	54.12	25	.00
Grade 11, u_1						1.30	1.69	57.27	26	<.001	1.19	1.41	52.00	25	.00
Academic performance, u_2						0.07	0.00	47.57	26	<.001	0.07	0.00	48.74	24	.00
Neighborhood safety, u_5						0.14	0.02	50.28	26	<.001	0.11	0.01	43.41	25	.01
Anti-social behavior, u_6						0.14	0.02	60.21	26	<.001	0.13	0.02	59.07	25	.00
Neighborhood risk, u_7						0.17	0.03	48.43	26	.01	0.15	0.02	47.37	25	.00
level-1, r	6.16	37.98				4.62	21.33				4.60	21.16			
Deviation			12030.35					11036.65					11013.87		
df			2					34					41		
Δx^2								$993.70_{(32)}^{**}$					$22.78_{(7)}^{**}$		

Model 2

What is the average intercept and slope of schools?

The average school dropout rate is 36.57. In addition, the fixed effects of the variables "grade 11" and "success" among the predictors in the equation above were found not to be statistically significant, while the averages of the other first level variables were found to be statistically significant. As the random effects of these variables were found to be statistically significant, they were not excluded from the equation. Accordingly, the regression equation generated by the student-level predictors is given below:

Dropout Risk= 36.57 - .51(Grade 11) - .02(Performance) + 1.21(Working in a Job) + .67 (Dropout Friend) - .28 (Neighborhood Safety) + .13 (Anti-Social Behavior) + .21 (Neighborhood Risk) - .20 (Academic Press) - .28(School Connectedness) + .08 (Alienation) - .21 (Parental Involvement)

How much do schools' intercepts and slopes vary from one school to another?

The estimated variance between the average dropout rates of schools was found to be significant just like in the ANOVA model (τ_{00}= 31.05;χ^2_{26} = 58.62, p = .00). The correlation between the dropout risk scores and the intra-school variables of grade 11 (τ_{10}= 1.69; χ^2_{26} = 57.27, *p*= .00), academic performance (τ_{20}= 0.00; χ^2_{26} = 47.57, *p*= .00), neighborhood safety (τ_{30}= 0.02; χ^2_{26}= 50.28, *p*=.00), anti-social behavior (τ_{40}=0.02; χ^2_{26}= 60.21, *p*= .00), neighborhood risk (τ_{50}= 0.03; χ^2_{26}= 48.43, *p*=.00) is significantly different between the schools (slope). Thus, we assumed that the correlations changed randomly.

Equation for the intercept:

36.57 ± 1.96*(31.05)½= 25.65 to 47.49

Equation for the slope:

Grade 11 -0.51 ± 1.96*(1.69)½= -3.06 to 2.04

Aca. success -0.02 ± 1.96*(0.00)½= -0.16 to 0.12

Neigh. safety -0.28 ± 1.96*(0.02)½= -0.56 to 0.00

Anti-social 0.13 ± 1.96*(0.02)½= -0.14 to 0.40

Neigh. risk 0.21 ± 1.96*(0.03)½= -0.13 to 0.55.

The highest average dropout rate is approximately 1.85 times greater than the lowest average dropout rate (47.49/.25.65). The difference between the maximum and minimum values of the correlation between grade 11 and school dropout risk is 0.67. The difference between the maximum and minimum values of the correlation between academic performance and dropout risk is 0.75, between neighborhood safety and dropout risk is 0.004, between anti-social behavior and dropout risk is 2.90 and between neighborhood risk and drop out risk is 4.32.

Is there a correlation between in-school slope means and the means intercept among the schools?

Table 3 shows the correlation coefficients between the intercepts and slopes in the random coefficients model and the reliability coefficients of the variables.

Table 3. Tau Correlations and Reliability Estimates

Variables		**Tau (τ) Correlations**						$\widehat{\boldsymbol{\beta}}$
Intercept	B_0	1.00						.54
Grade 11	B_1	- .11	1.00					.45
Aca. performance	B_2	- .97	.05	1.00				.48
Neigh. safety	B_5	- .47	- .27	.53	1.00			.40
Anti-social	B_6	- .26	- .62	.34	- .10	1.00		.53
Neigh. Risk	B_7	.57	.03	- .61	.25	- .78	1.00	.35

Table 3 shows that there is a correlation between the intercepts and the slopes (τ= -.97 to .57). According to this, the correlation between neighborhood risk and dropout risk (B_7) is higher in the schools with high average dropout rates compared to those with low average dropout rates (the slope is becoming steeper). The correlation of academic performance (B_2), neighborhood safety (B_5) and antisocial behavior (B_6) with dropout risk are negative and higher in the schools with high average dropout rates, and negative but lower in the schools with low average dropout rates. In addition, the correlation between the average school dropout and the grade - dropout correlation (B_{10}) has similar trends with other variables with negative tau correlations; however, the size of this correlation is higher. The reliability indices ($\hat{\beta}$) are between .35 and .54. The reliability index of .54 based on a average of 60 students per school shows that the estimates of the intercept are reliable. The reliability of slopes is low. This is because the slope variance between the schools is smaller than the mean-variance and the schools are homogeneous in terms of slopes.

With the variables at the student level added to the model, the error at the first level decreased from 37.98 to 21.33. The variance explained by the variables at the first level (intra-school) is $\frac{37.98-21.33}{37.98}$= .44. On the other hand, although there are significant correlations between dropout risk and the variables of gender (male), grade 10, having a dropout sibling, teacher involvement, being subject to disciplinary action, absenteeism, and academic motivation, these variables' correlation with other variables prevented them from being added in the model. As stated by Tabachnick and Fidell (2013), the effect of a predictor variable in a standard multiple regression analysis is evaluated based on the variance that is left after the variance in the outcome variable explained by other predictors is subtracted. Therefore, the individual effects of the variables which were found to be important decreased among similar participants in terms of the other predictors. This also indicates the mediation effects in the model. The variables "living with parents" and "the number of siblings" were excluded from the model because they did not have a significant effect on the dropout risk.

The Model Where Intercept and Slope Parameters are the Outcomes (Model 3)

At this stage, we sought answers to the questions "Which characteristics of schools lead them to have higher average dropout rates than others?" and "Why is the correlation between the student-level variables and dropout risk higher in some schools?"

Two separate research questions were tested to find answers.

Do the second level variables predict the intercept?

School-level predictors were added to the second level equations one by one first for intercepts and then for slopes. The effectiveness of the predictors was examined using significance and deviance tests. The predictors found to be statistically insignificant were excluded from the equation and new second-level variables were added to the model. The results for the final model are presented in the rightmost column of Table 5: School success is (γ_{01}=) 0 (average level) and the 'weighted' average dropout rate of schools is 36.07. School success is negatively correlated with the average dropout rate. The difference of 0.16 points is statistically significant, showing that schools with higher school success have lower intercept values.

Do the second-level variables predict in-school slopes?

- The average correlation between grade and dropout risk is 1.29, p= .22. The dropout rate for 11th graders is an average of 1.29 points higher than that for 9th graders. Although this difference is not statistically significant, the correlation between grade and dropout rate varies significantly between schools (τ_{10}= 1.69; χ^2_{26}= 57.27, p=.00). The parameter "γ_{11}*Student-club*(Grade 11)" is statistically significant, which means that the slope of the variable "grade" at the student level changes depending on the variable "student-club" at the school level. According to this, we can say that the correlation between being in the 11th grade (compared to being in the 9th grade) and the dropout rate is weaker in the schools with a higher number of student clubs (γ_{11}= -0.16; t_{28}= -2.01, p=.05).

- In the random coefficients model, it was found that the negative fixed correlation between academic performance and dropout rate was statistically insignificant (γ_{20}= -0.02; t_{29}= 1.44, p= .16), but varied between schools (τ_{20}= 0.00; χ^2_{26} = 47.57, p= .00). In order to determine the reason for the difference between schools, second level variables were added in the regression equation and only the placement percentage (LYS) was found to be significant. In the random coefficients model, the correlation between dropout and academic performance is equal to "$-\gamma_{20}$". When LYS placement rate is added in the last model where slopes are the outcomes, the universal equation of the correlation between dropout and academic performance is as follows: $-\gamma_{20}$*academic performance + γ_{21} * LYS * academic performance This is called "interaction between levels" parameter. The interaction parameter is statistically significant (γ_{21}= 0.00; t_{27}= 2.43, p= .02). Accordingly, the correlation between academic performance and dropout varies depending on the school's percentage of students placed in a university as a result of LYS. If LYS = 0 (failure) and LYS = 1 (success), the correlation between success and dropout (slope) is $-\gamma_{20}$ for unsuccessful schools and $-\gamma_{20}+\gamma_{21}$ for successful schools. As it is seen, the negative slope is flatter in schools with higher LYS placement percentages since the γ_{21} parameter is positive. In schools with lower LYS placement percentages, the negative slope is steeper.

When the LYS placement percentage is checked out, it can be seen that the rate of disciplinary action is negatively correlated with the academic performance-dropout risk slope (γ_{22}= -0.12, t_{27}= -1.76, p= .02). Students with high academic performance are at a lower risk of dropping out in schools where disciplinary actions are taken more frequently.

- The average slope between neighborhood safety and dropout is γ_{50}= -0.44, t_{27}= -4.01, p= .00. Accordingly, perceiving the neighborhood as safe reduces the risk of school dropout. In the random coefficients model, this correlation was found to vary between schools (τ_5= 0.02; χ^2_{26} = 50.28, p= .00). In order to determine the reason for the difference between schools, second level variables were added in the model where slopes are the outcomes. As a result, the number of school counselors in schools was found to be positively correlated with the correlation between neighborhood safety and dropout (γ_{51}= 0.08, t_{28}= 1.84, p= .05). In schools with the high number of school counselors, those perceiving the neighborhood as very safe are less likely to drop out.

- The average slope between anti-social behavior and dropout is γ_{60}= 0.11, t_{28}= 2.84, p= .01. According to this, antisocial behavior increases dropout risk. In the random coefficients model, this correlation was also found to vary between schools (τ_6= 0.14; χ^2_{26} = 60.21, p= .00). In order to determine the reason of the difference between schools, second level variables were added in the model where slopes are the outcomes. As a result, the rate of disciplinary action was found to be positively correlated with the correlation between anti-social behavior and dropout (γ_{61}= 0.69, t_{28}= 2.36, p= .03). Students with anti-social behaviors are at a higher risk of dropping out in schools where disciplinary actions are taken more frequently.

- The average slope between neighborhood risk and dropout is γ_{70}= 0.32, t_{28}= 4.93, p= .00. Accordingly, perceiving the neighborhood as risky increases the risk of school dropout. In the random coefficients model, this correlation was also found to vary between schools (τ_7= 0.17; χ^2_{26} = 48.43, p= .01). In order to determine the reason of the difference between schools, second level variables were added in the model where slopes are the outcomes. As a result, cultural activities were found to be negatively correlated with the correlation between neighborhood risk and dropout (γ_{71}= -0.00, t_{28}= -2.93, p= .00). Students who perceive the neighborhood as risky are at a lower risk of dropping out in schools where various cultural activities are carried out compared to schools where such activities are limited.

To what extent do the second level variables explain the change in intercept and slopes?

Checking out the second level variables in Table 2 shows that there is still significant unexplained variance in intercepts and slopes.

- The unconditional variance in the intercept was 31.05 in the random coefficients model, while the residual variance was reduced to 25.64 in the last model. Checking out the average school success rates shows that there is a decline of $\tau_{00}= \frac{31.05-25.64}{31.05}$ => .17 points in the variance of the average dropout rates.
- Checking out the number of student clubs shows that there is a decline of $\tau_{10}= \frac{1.69-1.41}{1.69}$ => .17 points in the residual variance in the slope of being in the 11th grade.
- Checking out the LYS placement percentage and disciplinary action rate shows that there is a decline of $\tau_{20}= \frac{.00462-.00451}{.00462}$ => .02 points in the residual variance in the slope of academic performance.
- Checking out the number of school counsellors shows that there is a decline of $\tau_{50}= \frac{.01847-.01217}{.01847}$ => .34 points in the residual variance in the slope of neighborhood safety.
- Checking out the disciplinary action rate shows that there is a decline of $\tau_{60}= \frac{.01743-.01699}{.01743}$ => .03 points in the residual variance in the slope of anti-social behavior.
- Checking out the rate of cultural activities shows that there is a decline of $\tau_{70}= \frac{.02758-.02362}{.02362}$ => .14 points in the residual variance in the slope of neighborhood risk.

Discussion

The findings of this study show that the difference between the average dropout rates of schools is statistically significant. These findings are consistent with the findings of other studies (Magen-Nagar & Shachar, 2017; Rumberger, 1995; Wood, Kiperman, Esch, Leroux, & Truscott, 2017). The difference between schools suggests that dropout is not solely due to the characteristics of the students, but that there are other factors such as the school environment that lead to dropout. This finding supports the validity of both the adopted model and the selected statistical method.

According to the findings, working in a job outside school hours significantly increases the risk of dropout. These findings are supported by the previous studies (Bridgeland, 2010; Şirin et al., 2009). The boys are engaged in income-generating works to contribute to their family budgets in families living in economic difficulties. Özer (1991) associates the risk of school drop-out of male students with their work at a job. As a result of working at a job out of school hours, the student may not be able to focus sufficiently on their academic tasks, and both earning money and declining interest in school activities may lead to dropout. In other words, the student may come to the conclusion that the learning experience makes no sense because the job provides financial income, and the desire to attend school may decrease.

Having a friend who has dropped out of school increases the dropout risk. Adolescents gain experience in human relations by recognizing themselves in peer relationships. Namely, adolescents need to socialize with their peers to develop a positive identity (Hartup & Stevens, 1997) and this often results in adolescents being more affected by their peers than by their parents (Moretti & Peled, 2004). Therefore, the presence of a friend or a group who has dropped out of school may lead to a change in the adolescent's school-related experiences. For example; that he may skip the school to be accepted by his/her friends or group, may increase his absenteeism and may result in early leaving. Apart from this, adolescents may leave school due to peer pressure.

In addition to negative peer relationships, antisocial behaviors also increase the risk of dropout (Falch, Borge, Lujala, Nyhus, & Strom, 2010; Özer et al., 2011; Robison et al., 2017). Antisocial behaviors, which are defined as behaviors that do not comply with norms, values and social rules (Jessor, 1987), are seen as a social problem that negatively affects adolescent development. Although this concept includes various types of behavior such as aggression, theft, damage to property, and being dragged into crime, it is seen as swearing, hitting, mocking, lying, and misusing / damaging school materials in

schools (Türnüklü & Yıldız, 2002). In adolescence, increase in risk factors (tobacco and alcohol use, impulsive behavior, involvement of friends in crime, high crime rate in the poor environment and the environment) and decrease in protective factors (achievement, future expectation, positive self-perception, support of family, friends and teachers) might cause negative attitudes towards school (Çetinkaya-Yıldız & Hatipoğlu-Sümer, 2010; Siyez & Aysan, 2007). In this context, academic achievement of adolescents who exhibit antisocial behavior may decrease, their relations with teachers may be deteriorated and they may be punished for failing to comply with school rules. As a result, they can be suspended from school because they cannot develop a sense of belonging to their schools.

According to another finding of the study, perceiving social environment as risky increases the risk of dropout. This finding is consistent with previous studies (Mendoza Cazarez, 2019; French & Conrad, 2001). According to the ecological approach, individuals interact with each other in the social environment systems (especially the microsystem) and develop by this interaction (Bronfenbrenner & Ceci, 1994). According to Jessor (1987), adolescents are exposed to and learn from risky behaviors in the social environment. Similarly, Wilson (1996) emphasized that living in a social environment perceived as risky and unsafe affects the socialization of adolescents negatively, and causes them to be exposed to antisocial behaviors. The fact that the school is located in a disadvantaged area, and that its social environment includes risks such as aggression, violence, and bullying, and students' feeling insecure at school may negatively affect their learning process. Depending on this situation, parents may take their children out of school due to safety concerns.

Teachers' academic monitoring reduces the dropout risk. Students who drop out are considered to be low achievers (Janosz, Le Blanc, Boulerice, & Tremblay, 2000; Kronick & Hargis, 1990). However, Bowers and Sprott (2012) argued that the students in the middle-decreasing risk group were initially successful, but couldn't realize that the students in this group set off dropping out, even though their success decreased. Therefore, academic monitoring should be considered as part of the early warning system and should be added to other intervention components. In addition, in the study conducted by Şimşek (2011) in 1106 high school students, it was found that the perceived satisfaction from the teacher and the school decreased, the risk of dropout significantly increased. The positive attitudes and behaviors of teachers and school administrators towards students increase school satisfaction, which decreases the risk of dropout (Taş, Selvitopu, Bora, & Demirkaya, 2013). In this context, students who are followed by their teachers may feel valuable and develop more meaningful relationships with the teacher. Therefore, this bond with the teacher can be a protective factor in school dropout.

Low school engagement increases the dropout risk. There are similarities between this finding and the results of previous studies (Suh & Suh, 2006; Magen-Nagar & Shachar, 2017). Students who develop a sense of belonging to school have higher academic achievement (Kızıldağ, Demirtaş-Zorbaz, & Zorbaz, 2017) and a high level of commitment reduces the risk of absenteeism and dropout (McNeely & Falci, 2004). Decrease in school commitment leads to failure (Finn & Rock, 1997), negative relationships with teachers (McNeely & Falci, 2004), and increased risk behaviors (Jessor, 1987). In this context, low school engagement is expected to increase the risk of school dropout.

According to the findings of the present study, alienation of students from school increases the risk of early school leaving. Alienation is defined as the closure of the person to their inner world as a result of negative experiences (Ayık & Ataş-Akdemir, 2015). Alienation to school takes place in the form of ignoring the school, meaningless learning, the identification with the school and emotional distancing (Hascher & Hagenauer, 2010). According to Carley (1994), the lack of interest in academic activities and failure to comply with school rules increase alienation, which results in abandonment.

Low parental involvement increases the dropout risk. In addition to low parental involvement, the lack of educational expectations of parents also increases students' dropout (Rumberger, 1983). On the other hand, the fact that parents follow the students' education process more, cooperate with the teachers and follow their work almost every day reduces the risk of students early school leaving (Taylı,

2008). In addition, low share of the family members and insufficient emotional ties may increase the risk of abandonment, as this will reduce parental involvement.

Previous studies have found that the risk of dropout occurs at the ninth-grade level at most (Franklin & Trouard, 2016; Stearns & Glennie, 2006; Yorğun, 2014). There are further research findings that academic inefficacy is an important predictor of school dropout (Fortin et al., 2013; Franklin & Trouard, 2016; Rumberger, 1995; Wood et al., 2017). In the present study, the average of the relationship between grade level and academic achievement and school dropout risk was statistically insignificant but its variance was significant. This means that the direction and magnitude of the relationship between these variables vary from one school to another. As can be seen in Table 2, the number of clubs in the school in the relationship between the grade and dropout, the undergraduate placement exams in the relationship between academic achievement and dropout are effective. According to this finding, the affecting factor is not at the 11th grade itself, but students' taking part in student clubs as they gain experience and become accustomed to the school. As a matter of fact, Mahoney (2014) found that participation in extracurricular activities in the school reduces the risk of dropping out. Similarly, the main factor reduces the risk of drop out is not only students' academic failure itself; but the school's lack of the achievement at the transition to higher education examinations. At successful schools, students with high academic achievement are less likely to dropout than students at unsuccessful schools. This is an inevitable result for the conditions in Turkey where the transition to higher education examinations are very substantial. Although there is a regional school enrollment system in Turkey, parents almost compete to enroll their children in successful schools. Another reason for the differences between the previous studies and the results in this study may possibly be attributed to the high number of variables and levels of analysis in this study. Although there are significant correlations between the variables (10th grade, absenteeism, academic motivation and so on) and dropout risk, their relationship with other variables in the model may be presumably prevented them from entering the equation. As Tabachnick and Fidell (2013) indicated, the effect of one predictor variable on outcome in the standard multiple regression analysis is evaluated on the remaining variance after the variance removed by the other predictors in the outcome variable. Therefore, the individual effects of the variables found to be significant were decreased among similar participants in terms of other predictors. This also points out to the mediating effects in the model.

According to the findings of the study is that, although there are significant correlations between dropout risk and the variables of gender (male), grade repetition, having a dropout sibling, teacher involvement, being subject to disciplinary action, absenteeism and academic motivation, these predictors did not make an important contribution to the regression equation. As mentioned above, this consequence may drive from the fact that the predictors have supplementary correlations with each other, in addition to their relationship with school dropout. In the regression analysis, when the effect of each predictor on the outcome was examined, the other predictors were taken as covariate variables. Taking a large number of covariate variables predicting the dropout in the study leads to equalization of the participants in terms of covariates, and assessment of the relationship between the predictor and the outcome over the remaining variance (which in this case decreases). Therefore, instead of saying that the effect of these variables on school dropout is insignificant, it would be more appropriate to assert that they are ineffective in a large number of variables predicting the dropout and solely on this studied sample. Moreover, the total number of disciplinary penalties in this sample reported as 106 in 30 schools, which means 3.53 students per school. This rate is well below the rate that will change the direction of in-school regression slopes. Furthermore, the students given disciplinary penalties hereby responded to the scales, which means they are currently at school, may be explained as the given penalties were not long-term suspension ones and/or their effects may have lingered. Successful students are less likely to drop out at schools which apply heavier disciplinary penalties than unsuccessful students. Research shows that there is an increased risk of dropout at schools where teacher-student' relationships is poor, where rules are strictly applied, and penalties are not fair and effective (McNeal Jr, 1997; Reschly & Christenson, 2006). Besides, students who behave antisocially in these schools are at higher risk of dropping out compared to schools where disciplinary punishment is

applied less. According to Türnüklü, Zoraloğlu, and Gemici (2014), factors such as crowded classes in schools, the ineffectiveness of course materials and curriculum, the inadequacy of social activities and guidance services are effective in increasing disciplinary events at schools. Also, schools where disciplinary punishment is applied more severely might be the schools where risky behaviors are intensely displayed and students exhibit illegal behaviors (McNeal Jr, 1997; Reschly & Christenson, 2006). In other words, the existence of a school and teacher system (may) traumatize students and may lead to the continuation or triggering of antisocial behaviors where positive relationships cannot be maintained and positive psychological interventions cannot be applied (Yavuzer, 2011). In this respect, students who exhibit antisocial behaviors might get trouble in following the school rules and regulations and might even get suspended from school.

The variables "living with parents" and "the number of siblings" were excluded from the model because they did not have a significant effect on the dropout risk. These findings are consistent with the findings of other studies in the literature (Bridgeland, 2010; Gamier et al., 1997; Yadav et al., 2010; Şimşek, 2011) which examined school dropout risk and parental variables. The variables "living with family" and "the number of siblings" might be associated with such parental variables as family's income level and parental involvement examined in this study. Variables such as "living with family" and "the number of siblings" have already been analyzed in this study; therefore, family's income level and parental involvement variables haven't predicted school dropout risk significantly.

According to the findings of the study, there is a negative correlation between dropout risk and perception of neighborhood as safe. Çetinkaya-Yıldız and Hatipoğlu-Sümer (2010) stated that students perceiving the school as a positive and supportive environment exhibited aggressive behaviors less frequently. In brain-based approaches, aggressive behaviors are considered as the fight or flight response of the sympathetic system along with increasing of pulse rate and respiration frequencies (Cacioppo, Uchino, & Berntson, 1994). In this context, negative childhood experiences, traumas and insecurity of neighborhood might lead individual constantly be alerted and might cause the perception of the environment as an unsafe. However, the negative relationship between the perception of safe environment and school dropout is higher in schools with fewer counselors. The recruitment of counselors in schools is determined by the number of students in schools. Though the school counselors are recruited according to the norm staffing in Turkey, redundant counselors are employed in some schools or even the teacher doesn't work in the school he/she nominated to, but in another school due to the assignment process. In Turkey, there is only 1 school counselor per 600 students and the number of counselors in schools varies between 0 and 2. Considering that the number of counselors allocated to students at school is limited, it can be argued that research findings should be treated with caution. Moreover, the factors such as: the location of the school (near city center), high level of SES, LYS success and so on might have compensated for the lack of school counselors.

Students who perceive the neighborhood as risky are at a lower risk of dropping out in schools where various cultural activities are carried out compared to schools where such activities are limited. The results of the study conducted by Şimşek (2011) in eight provincial centers and 54 high schools in the Southeastern Anatolia Region are similar. Accordingly, the participation of students in social and cultural activities in the school reduces the risk of dropout. Similarly, a study by Mahoney (2014) found that participation in cultural activities in the school reduces the risk of abandonment. In this context, focusing on cultural and social activities in schools can reinforce the idea that the school is a safe place for students, increase school loyalty and increase the risk of dropout.

Limitations and Future Directions

This study examined the school dropout risk for high school students within the framework of the Ecological Theory (Bronfenbrenner, 1994) using student-level and school-level variables. A review of the literature shows that the variables in the family system also have an effect on the dropout risk. We suggest further studies to collect data from families and to examine parental variables. In addition, students who are at risk of dropping out of school may be identified and monitored throughout the school year. Carrying out such a longitudinal study may provide both new findings and evidence for the predictive validity of this study.

In this study, the variables of academic performance and grade were not found to be important predictors of school dropout. The other variables in the model might have reduced the effects of these variables on the dropout risk. Further studies may examine whether these variables have an important role in explaining school dropout.

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