Education and Science

Vol 44 (2019) No 200 93-116

Examination of the Relationships between Academic Achievement and the Variables at the Levels of School and Students in Secondary Schools: Two-Level Path Analysis

Nedim Özdemir [1], Mehmet Tufan Yalçın [2]

Abstract

This study examines the relationship between the academic achievement of students with the instructional leadership behaviors of principals on the base of the mediating role of variables that are instructional climate, school safety, and student engagement. In this research, two-stage sampling method was used. In the first stage, stratified sampling was used to determine the schools in scope of the study. In the second stage, the students and teachers that would participate in the study in those schools were determined randomly. 2601 students and 994 teachers from 35 secondary schools are included in the research in 2016 – 2017 educational year. In this framework, the teachers' perception was referred to determine the instructional leadership and instructional climate level. On the other hand, students' perceptions were used for determining the levels related to school safety and students' engagement. The transition to higher education examination (YGS) of 2017 results was used to determine the academic achievement of students which was the dependent variable of the research. The relationship between independent variables and dependent variables are examined on the base of two-level structural equation model. The results of the research have shown that principals' instructional leadership behaviors have an indirect effect on students' achievement through instructional climate. It has also determined that the principal can make increase the students' engagement and achievement by influencing school safety.

Keywords

Academic achievement
Instructional leadership
Instructional climate
School safety
Student engagement

Article Info

Received: 07.22.2018
Accepted: 08.28.2019
Online Published: 10.30.2019

DOI: 10.15390/EB.2019.8056

[1] Karamanoğlu Mehmetbey University, Faculty of Education, Dept. Educational Sciences, Turkey, ozdemirnedim@gmail.com
[2] Şehit Polis Hakan Yılmaz İmam-Hatip Lower Secondary School, Karaman, Turkey, tufan.yalcin@hotmail.com

Introduction

The efforts on determining the variables having an influence on students' achievement have been getting involved by the researchers and politicians for a long time. Especially there is an emphasize on basic underlying proficiencies those are literacy and numeric skills which were needed to have for the necessities of modern society and for sustainable economic development on the fields of literacy and numeracy. Findings of the national examinations and the international researches (PISA, TIMSS) reflects that the students' performance in these fields is lower (Anıl, Özer Özkan, & Demir, 2015; Ulutan, 2018). One of the greatest struggles on this issue is to find out how to put in practice the policies for not to leave behind any students by school administration and teachers. In this context, it becomes important to determine what kind of strategies the schools follow and what factors affect the success of the upbringing of students. It could be seen that there are numerous hypothetic and empirical evidence on how and to what extent of the impact of principal on academic achievement when the related literature examined (Hallinger & Heck, 1996; Hanushek & Woessmann, 2017; Özdemir & Kavak, 2017; Supovitz, Sirinides, & May, 2010; Ten Bruggencate, Luyten, Scheerens, & Sleegers, 2012). However this situation is an object to discuss and there are few researches conducted in this area in Turkey (Kondakci & Sivri, 2014; Oldac & Kondakci, 2019). The previous studies have produced limited information on the role of the principals for creating of climate focused on instruction, providing school safety and role on the engagement of students to the school. In this study, it is aimed to offer intervention spaces to the policy makers and implementers by focusing on the effective variables on students' achievement.

Accountability arguments directed to the students' achievement generate pressure on the administration of schools and teachers (Özdemir & Kavak, 2017). As a result of this tendency, the necessity for undertaking more responsibility of principals for the studies on instruction and education has become more emphasizing aspects. Because of this situation, the public oppression for being more accountable of school administration on the students' outcomes increased and the implementations performed by principals who can influence the learning has come to the forefront (Urun & Gökçe, 2015). On the other hand, the results of researches and meta-analysis suggest that the principles do not have any effect on students' achievement (Grift, 1990; Kyriakides, Creemers, Antoniou, & Demetriou, 2010; Witziers, Bosker, & Krüger, 2003) besides of different dimensions to discussions. Some of the researchers expressed that this inconsistency has come to exist for the different choices on theoretical and methodical aspects (Hallinger & Heck, 1996, 1998; Marks & Printy, 2003; Witziers et al., 2003). On the other hand, despite many studies conducted in the related literature, it can be seen that a small part of the behaviors considered in terms of the school principal can explain the variance in student achievement (Hallinger, 2011). Therefore, it is important to know which behaviors of principals influence the academic achievement and which variables have a mediating role in this scope. It is expected to contribute to this study in this sense.

Theoretical Framework

This study is based on instructional management role of principals revealed by Bossert, Dwyer, Rowan, and Lee (1982) in the aspect of the theoretical framework. According to the model, behaviors of the principal have been forming appropriate to own experiences, values, beliefs, and knowledge. These behaviors of principal are also open to the influence of the conceptual factors of the school. According to this model influence of the principal on the outcomes of learning reveals indirectly and instructional climate and organization of the instruction are in the mediating variable position. International findings based on this framework suggest that the indirect effect of principals on students' achievement occurs through instructional climate (Hallinger, Bickman, & Davis, 1996; Ross & Gray, 2006). In accordance with the above explanations, the indirect effect of principals on students' achievement is examined in this study. The model formed to explain the difference in achievement between the schools is placed in Figure 1.

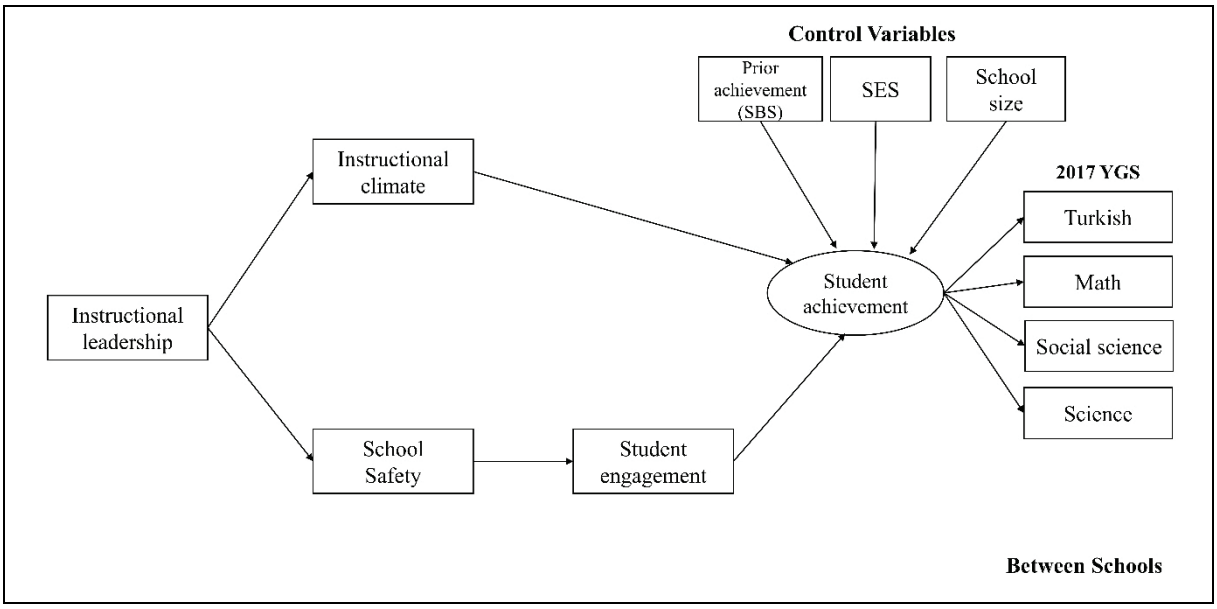

Figure 1. The Model Examined in this Study

According to Figure 1, it is supposed that the principal can increase the students' achievement through a direct effect on the instructional climate and the school safety, and indirectly effect on the students' engagement. The capacious of the schools with the scores of students for the transition to the high schools and socio-economic status (SES) are included in the model as contextual variables. 2017 YGS Turkish, basic mathematics, social sciences, and natural sciences scores are taken as a latent variable for determining the academic achievement of students in the Model. Multilevel modelling was less in number in the field of management education in Turkey. Therefore, this study may contribute in the field of management. Definitions of the variables in the scope of the research based on the literature are explained as follow.

Instructional Leadership

The question for which role and responsibilities of the principal have more efficiency on progressing the learning and instruction in the school is still actual. The researchers conducted in the last 50 years evaluated the attitudes of principals in the scope of instructional and transformational leadership approach (Cemaloğlu & Çoban, 2019; Hallinger, 2018; Leithwood, Patten, & Jantzi, 2010). These attitudes are classified as providing of concentrating of the participants of the school to the objects of the school, creating an environment based on trust and collaboration, and to support the developing of the instructional performances (Hallinger, 2018). On the other hand, some of the researchers emphasized that the experimental evidence those provided by both approaches are limited (Marks & Printy, 2003; Robinson, Lloyd, & Rowe, 2008). However, the recent researches started to focus on different approaches as distributed leadership (Heck & Hallinger, 2009) and shared leadership (Marks & Printy, 2003) it has seen that there is not any commitment on the role and responsibilities of principals which have to be expressed directed to the students' achievement.

It is seen that the studies examining the indirect relations between school principal and student achievement are mostly presented in USA, UK, Austria and China; and it should be conduct this kind of studies in developing countries in this direction (Hallinger, 2018; Neumerski, 2012). Most of the researches those examined the relationship between principal and students' achievement conducted in USA, UK, Austria and China.In recent years, to explain the relationship, variables such as teachers' motivation (Leithwood & Jantzi, 2006; Louis, Leithwood, Wahlstrom, & Anderson, 2010), professional engagement (Ross & Gray, 2006; Sebastian & Allensworth, 2012) teacher peer effect (Supovitz et al., 2010), teaching practices in the classroom (Sebastian, Huang, & Allensworth, 2017), collective teachers' effectiveness (Fancera & Bliss, 2011), teachers' professional community (Özdemir & Kavak, 2017;

Sebastian & Allensworth, 2012) and collaborative culture (Day, Gu, & Sammons, 2016) have placed in mediating variables position. The number of the studies that have been conducted to investigate the indirect relationships between school principal and academic achievement is very limited in Turkey (Oldac & Kondakci, 2019; Özdemir & Kavak, 2017; Yılmaz & Turan, 2015). In the aspect of balancing the time one of the greatest struggles is the diversity and intensity of the works at the school (Balyer, 2012). Besides managing of instructional aspects, it is expected to administrate the issues related to law, construction, occupational health and safety from the principals. In this case, it is difficult for school principals to focus on instructional leadership roles and they have to concentrate mostly on bureaucratic works (Can, 2007; Gümüşeli, 1996; Koşar, Sezgin, & Aslan, 2012). Also changing on policies for employment of qualified school administrators at different times has shown that searching for choosing criterions, examinations and period offices still continue. Moreover, there are studies that reveals school principals in Turkey have the potential to raise academic achievement (Oldac & Kondakci, 2019; Özdemir, 2019; Özdemir & Kavak, 2017).

Studies that examined the effect of the principal on students' achievement have tried to define the different attitudes that make the successful principals different. For example, Hallinger and Heck (1998) emphasized the school vision and noticed the identifying of specific objects and strategies. Monitoring of instructions, providing feedbacks, analyzing of the students' data and supporting of professional development of the teachers are the other issues that were examined in the other studies (Hallinger, 2018; Lochmiller, 2016). Additionally, there are many studies which reveal that principal can influence the students' achievement by defining the mission of the school, managing the curriculum and instructions, inspecting the instruction, monitoring the progression of students, protecting the period of instruction and creating instructional climate (Marks & Printy, 2003; Robinson et al., 2008). These studies shown that the researches for finding out what would be the possible intervention points on students' achievement are still conducting. On the basis of the instructional leadership studies mentioned above, twelve behaviors for the current research are discussed.

Some of the studies which investigate the effect of school principal on organizational outcomes have examined the mediator effect of instructional climate (Hallinger et al., 1996; Krüger, Witziers, & Sleegers, 2007). For instance Hallinger et al. (1996) examined the relationship between the leadership of principal with students' achievement with two level modeling. The instructional climate was defined as a mediating variable and it was stated that this has a significant and positive effect on reading scores of the students in their research. The school climate has examined with two variables in this study. The first variable is instructional climate that focused on collaboration directed to the instructional studies between the teachers. The second one is the school safety variable which examines how the students feel safe in school according to the students' perception. In this context, instructional climate and school safety tool were included as mediating variables in the relationship between school principal and student achievement.

Instructional Climate

Climate is a complex concept which is aimed at social climate, learning climate or classroom climate. Hallinger et al. (1996) define the instructional climate as attitudes and behaviors of the students and staffs in the school environment that are directed to instruction and learning to contain the mission of the school, opportunities to learning for students and expectation of the teachers. The instructional climate of a school can be defined as beliefs, values and daily interactions between school employees, parents, and students (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010). Safety and regime in the school, the motivation of the students and teachers and basic needs can influence the learning are also included in these interactions (Cornell & Mayer, 2010; Ripski & Gregory, 2009). Interactions of the teachers with their each other, styles for working together and their common endeavor for the academic development of students is the theme dwelled upon for instructional climate of this research.

The researches relate with the instructional climate of schools started with the effective school studies (Bossert et al., 1982). In this framework, many studies have conducted which manifested that instructional climate has a direct and strong effect on students' achievement (Hallinger et al., 1996; Karadağ, İşçi, Öztekin, & Anar, 2016; Krug, 1992; Sebastian et al., 2017). The research pointed out the importance of having sense of common responsibility directed to instruction, together with the planning of instruction studies and sharing the experiences for raising the achievement (Sebastian et al., 2017; Wahlstrom & Louis, 2008). The findings also reflect that schools with positive instructional climate create higher expectations on teachers, students, and parents; and motivate the students attending to academic studies (Johnson, Livingston, Schwartz, & Slate, 2000).

It can be seen that principals' instructional leadership behaviours have an important role in creating a learning centered climate, contributing to collaboration between teachers (Ayık & Şayir, 2014; Hallinger & Heck, 1998; Spillane, 2006; Şentürk & Sağnak, 2012). According to this principle could make a positive contribution to the students' achievement by instructional climate. In a study conducted on secondary education level has shown that instructional climate is an important mediating variable between principle and students' achievement (Sebastian et al., 2017). Because of this reason, the direct and indirect relationships between instructional leadership, instructional climate and YGS achievement have been investigated.

School Safety

There are different considerations on literature related to the extension and size of safe schools. In one of this studies, Orpinas and Horne (2006) consider that safe schools are the schools which are ready for any kind of crisis those are violence, disasters (storm or earthquakes) or the other problems require emergency intervention (medical emergencies, fire or etc.). Dönmez and Güven (2002) define this concept as environments where teachers and students feel comfortable and safe in those places for psychological, emotional and physical aspects. It is also emphasized that students can attend to social activities and improves themselves in academic fields. In this study, it is examined in which measure the students feel in safe at the corridor of school, in restrooms, out of the school, while arriving to and departing from the school of into the classroom.

Students' feeling safe in school environment effects their school belonging (Booren, Handy, & Power, 2011; Gottfredson, 2001; Greene, 2005; Ripski & Gregory, 2009) and academic achievement (Mikk, 2006; Mullis, Martin, & Foy, 2008). Therefore, it can be said that students can focus on academic works in safe schools where violence is experienced less (Çalık & Kurt, 2010). Particularly in these schools there are less discipline problems (Cohen & Geier, 2010; Gregory et al., 2010)**.** The studies in the samplings of Turkey, it is seen that these studies conducted to determine the reason for the problems or the school safety and the level of the problems. Dönmez and Güven (2002) find out in their study that almost half of the students have safety problems relate to fighting in their schools. In another study, it was seen that school principals controlled the risky areas in order to prevent violence in schools and contacted the parents to inform them (Hoşgörür & Orhan, 2017). In addition, it was stated that measures such as the establishment of a camera system, supervision of guard teachers and search of student belongings were taken to ensure the safety of the school (Karakütük, Özdoğan Özbal, & Sağlam, 2017). Despite this, it can be said that the number of the researches which examines the relationship between school safety, students' engagement and academic achievement is very limited in sampling of Turkey. In one of these studies, it has been determined that there is a moderate correlation between students' perceptions of school safety and academic achievement (Yıldırım, 2017). In another study, Özdemir and Kalaycı (2013) stated that students' perception of school as a positive place is an important predictor of their commitment. Sağlam and İkiz (2017) found that as students' commitment to school decreased, their tendency to violence increased.

School principals have responsibilities in providing safe environments for learning (Bryk et al., 2010; Taymaz, 2003). Recent studies have reported that the school principal contributes to the students'

focus on success by ensuring that the school is safe and orderly. For example, Sebastian and Allensworth (2012) found that school security had a mediating effect between school principal's leadership behaviors and academic achievement. Robinson et al. (2008) indicate in their meta-analysis study that creating a safe school effects academic achievement in .42 level. Therefore, discussing the findings related to the effects of the principals on students' engagement and achievements by making them feel safe have importance.

Student Engagement

The most effective school researches are concentrated on student engagement which is an important variable in the aspect of students' achievement (Newmann & Wehlage, 1997; Zyngier, 2008). In this context, effective school research focuses on student commitment, which is an important variable in terms of student achievement. The results of the studies which conducted in recent years reveal that lower students' engagement causes unwilling students' attitudes as leaving from school, discontinuity, lecture disruption, failing to complete missions, boring in the lessons and lower achievement of students (Yazzie Mintz, 2007). According to the PISA 2009 results which are conducted by OECD (2010) it is mentioned that one of the greatest reason for the achievement of the female students on literacy skills is their engagement to the school.

Newmann, Wehlage, and Lamborn (1992) define the students' engagement as active participation in the learning process, taking responsibility and focusing. Kuh, Kinzie, Buckley, Bridges, and Hayek (2007) define the students' engagement as participation in the instructional activities in measurable outcomes both in and out of the classroom. While active participation concentrated attention and interest can be seen where engagement is relatively higher, superficial involvement, indifference and lack of interest seen where engagement is relatively lower. It is seen that there are emotional and behavioral dimensions of students' engagement when the definitions are viewed (Jimerson, Campos, & Greif, 2003). On the other hand, students' engagement is evaluated in two dimensions in this study similar to the study conducted by Leithwood and Jantzi (2000).

It is seen that students' level of commitment to school is associated with academic achievement scores. For example, Erdoğdu and Yüzbaş (2018), in their research on high school students, reported that the loyalty levels of students with high grade point average were more positive than the others. Low student engagement resulting in dropout and absenteeism is also important to determine the factors that affect this variable. Related researches show that school conditions affect student engagement both directly and indirectly through the mediation of classroom conditions (Leithwood & Jantzi, 2000; Yang, Sharkey, Reed, Chen, & Dowdy, 2018). For instance, there are researches conducted in primary schools revealing that students participate in school works more effectively and develop positive attitude towards learning (Marks, 2000). Sustaining students' positive attitudes towards school and learning through upper level of their education is an issue on the agenda. In this context, student engagement is an important concept in that it enables students to have quality education and get desired educational outputs.

In this framework, the object of the study is to detect the relationship between leadership behaviors of principal with academic achievement of students in the base of roles of mediating variables as instructional climate, school safety, and students' engagement. These two following hypotheses were tested:

Hypothesis 1: Instructional climate have a mediating effect on the relationship between instructional leadership behaviors of principal with students' achievement.

Hypothesis 2: School safety and students' engagement have a mediating effect on the relationship between the instructional leadership behaviors of principal with student achievement.

Method

This research was conducted as a descriptive study in the relational screening model as it aimed to examine the direct and indirect relationships among the school and student level variables and the academic achievement of 12th-grade students in secondary education.

Sample

The universe of the study consists from the 12th class students and teachers registered to the public secondary educational institutions in Altındağ, Çankaya, Keçiören, Mamak and Yenimahalle districts of Ankara Province in 2016-2017 educational year. Data were obtained by two stages of sampling because of the study have a hierarchical form as schools (Level 2) and students (Level 1). In this context, it was decided to contain at least 30 schools and at least 30 students for each school for estimating variable components that are related to both stages (Maas & Hox, 2005). In the first stage, stratified sampling method based on the possibility to be chosen proportionally size of the schools was used for determining the schools would be placed in the sampling. District and type of the program (vocationally or general) were considered as a measurement. Within this scope, the list containing the school information was obtained from Ankara Province National Education Directorate, Department of the Strategy Development. Then, the number of schools was determined by lot according to the number of schools and program types in each district. Following the determination of the schools in the sample, 12th grade students and teachers working in this school were determined in the second stage. In this context, the students and teachers who will participate in the application were determined by random sampling method which is proportional to the size of the school. For this purpose, the classes to be applied in the relevant school were determined by lot method. In this study, a weighted sample which was formed at the level of student and school was used in the statistical analysis in order to avoid the prejudice of the standard errors in estimating parameters and do not reach an incorrect result of the hypothesis test. It is aimed to present every student and every school in the right manner for every school and every student. The method for calculation of weighting of sampling is placed in Appendix 1.

Data collecting tools for students and teachers were applied April – June of 2016 – 2017 educational year by the researchers. Dispersion of the sampling formed by the method explained before is presented in Table 1.

Table 1. Numbers of Universe and Sample of Research

Properties	Universe	Sample
Number of schools	213	35
Number of general secondary schools (ratio)	104 (%49)	18 (%51)
Number of vocational secondary schools (ratio)	109 (%51)	17 (%49)
Number of students	139 087	2 601
Number of female students (ratio)	68153 (%49)	1434 (%55)
Number of teachers	12 332	994

According to the table, 2601 students and 994 teachers from 35 schools participate in the study. The average number of students is 74 students and of teachers are 28 per schools. In this context, there are adequate participants for estimating variance components related to both stages.

Data Collection

Obtaining of the data performed with two different data collecting tools that one for students and on for teachers. In this framework, for determining the level of instructional leadership and instructional climate, the teachers' perception was requested. On the other hand, students' perception was asked for determining the level of the variables related to school safety and students' engagement.

The transition to higher education examination (YGS) of 2017 results was used to determine the academic achievement of students which was the dependent variable of the research.

Instructional Leadership Scale

This scale was used to determine the instructional management practices of the principal according to the perceptions of the teachers. The scale was developed as 12 items by Yalçın (2018). The response option of the scale is 5 Likert (*1 = never, 5 = always*). Sample statements from the scale include; "*Principal sets educational goals with us to increase student achievement*", "*Principal carries out professional development studies of teachers according to the needs of the school*", and "*Principal is responsible for the knowledge, skills and competence levels of teachers*". In the analysis of the reliability of the scale, Cronbach's Alpha coefficient has been found to be .94. In addition, item-total correlation coefficients for the scale ranged from .69 to .78. It can be said that the scale is reliable in terms of the data of this research.

Instructional Climate Scale

This scale was used to determine the educational climate level according to teachers' perceptions. The scale was developed as six items by Yalçın (2018). The response option of the scale is 5 Likert (*1 = never, 5 = always*). Example statements of the scale are; *''Relations in this school are based on mutual respect and trust*", "*All staff in this school take joint responsibility in student learning*", and "*Teachers are eager to develop teaching together in this school*". In the analysis of the reliability of the scale, Cronbach's Alpha coefficient was found to be .83. In addition, item-total correlation coefficients for the scale ranged from .43 to .58. In this framework, it can be said that your scale is reliable in terms of the data of this research.

Student Engagement Scale

Student engagement scale was used to determine the level of belonging according to students' perceptions. The 15-item-part of the scale developed by Finn (1989) was used for this study. The scale is detected to be used in recent exercises (Leithwood & Patrician, 2017). The scale is 5 Likert type (*1 = never, 5 = always*). The scale is composed of two-sub-scales; behavioral engagement and identification with school. In this context, the sample statements for the behavioral engagement subscale consisting of eight statements are: "*I complete my school work on time*", "*I do all the homework I have to do about school*" and "*I answer whenever I am asked a question*". On the other hand, the sample statements for the identification with school subscale consisting of seven statements are; "*Most of my teachers treat me as an individual*", "*Most of my teachers treat me like other students*", and "*Most of my teachers make me feel comfortable in class*". In the analysis of the reliability of the scale, Cronbach's Alpha coefficient was calculated as .86. From the perspective of subscales, calculated values are .80 and .82 respectively. In addition, item-total correlation coefficients for the first subscale ranged from .48 to .59. The second subscale's value is between .39 and .66. In this framework, it can be said that the scale is reliable in terms of the data collected in this research.

School Safety Scale

The school safety scale was used to determine how much confidence they feel at and around the school according to students' perceptions. Academic pressure scale, on the other hand, was used to determine the level of academic pressure students have from the school staff. Both of the scales have been developed by the University of Chicago (2017). The scale options are 5 Likert (*1 = never, 5 = always*). School safety scale is made up of five items. The sample statements are "*I feel safe in the school corridors*", "*I feel safe in the school restrooms*", "*I feel safe at and around the school*". In the analysis of the reliability of the scale, Cronbach's Alpha coefficient has been estimated to be .81. Also, item-total correlation coefficients range between .54 and .68. In this regard, the scale can be said to be reliable for the data of the study.

Academic Achievement

According to the related literature students' achievement are assessed in the extent of the studies on mathematics, reading skills, science, language and social activities which were determined with central examinations (Sun & Leithwood, 2012). For the latent variables formed to determine the academic achievement of students, the scores for 2017 YGS Turkish, basic mathematics, social sciences, and natural sciences were used. When the measurement model was tested, it was seen that the path coefficient of four observed variables are statistically significant and the model is verified. SBS (Upper Secondary School Entrance Exam) scores of the students which is the score obtained from a central examination for beginning to secondary education, belonged to the year 2013 were added as a control variance to the model. In this framework, the rate of differentiation depending on the past academic achievement of students is added to the calculation. These data were obtained through a questionnaire directed to students after the announcement of YGS results.

Control Variables

Control variables have been used in the models developed for Level 2 in order to determine the impacts of independent variables on dependent variables. In the related literature, it is observed that SES is an important control variable in the shaping of the academic achievement variance between students and schools. This variance has been calculated through an index which has been developed by using the variants such as the education level of the parents, the monthly income of the parents in the student scales. Besides, the average SES of Level 2 has been calculated by taking the average results of the students. However, the other control variables discussed in the study are the students' scores on the central examination at the entrance to secondary education and the school size in terms of the number of students.

Data Analysis

Prior to the analysis of the research problem, the factor structure of the scales was tested with the Confirmatory Factor Analysis (CFA) based on the collected data. When the factor loadings were examined, it was found out that the rate was between .43 and .74 for the parental involvement scale; between .52 and .68 for the behavioral engagement subscale of the student engagement scale, between .42 and .75 for the identification of school subscale, between .61 and .77 for school safety subscale, between .69 and .82 for the scale of instructional management practices of the principals and between .45 and .77 for the instructional climate scale (Appendix 2). The fit indices of the scales according to the results of the CFA are shown in Table 2.

Table 2. The Fit Indices of the Scales According to the Results of the CFA

Scale	x^2(df)	CFI	GFI	RMSEA	RMR	SRMR
Student engagement	274.57 (87)	.96	.94	.069	.075	.049
School Safety	7.21 (3)	.99	.99	.073	.036	.018
Instructional Leadership	175.85 (51)	.99	.94	.077	.033	.029
Instructional climate	14.55 (4)	.98	.99	.070	.056	.029

Table 2 suggests that the x^2/df value is lower than 3, RMSEA, RMR, and SRMR values are lower than .80 and CFI and GFI values are higher than .90. In this regard, the results of the CFA show that the compliance indices are in acceptable levels (Hu & Bentler, 1999). The index score is calculated with the formula placed in the equality 1 related to a variable and passed to testing of the hypothesis stage (OECD, 2014).

$$index\ score = \frac{\beta_1.x_1 + \beta_2.x_2 + \cdots + \beta_n.x_n}{\varepsilon_i} \qquad [1]$$

Symbol β is the load value generated after the factor analysis, symbol x is the answer of the participant and symbol ε is the eigenvalue of the first basic component.

First, Pearson moment correlation analysis has been conducted in order to determine the relationship between the scores of dependent and independent variables. In that scope, index scores related to the scales was calculated. On the other hand, the literature suggests that multilevel analysis methods which emphasize indirect relationships have frequently been used in order to provide stronger evidence of the impact of the principal on student achievement (Day et al., 2016; Hallinger et al., 1996; Supovitz et al., 2010). In this framework, the relationship between the independent and dependent variables of the research has been examined based on the two-level structural equation modeling. In the research model, the academic achievement of the students took place in Level 1, while the index scores of the scales did in Level 2. The basic hypothesis of this analysis is that student and school data show a more homogeneous characteristic in itself than in other schools. The academic achievement of the students and whether or not they show a significant difference compared to the other schools that are under the scope of the study have been analyzed through an effective one-way ANOVA model (Raudenbush & Bryk, 2002). The intraclass correlation coefficient (ICC) has been calculated in order to determine the aggregating level of the principal instructional leadership practices and instructional climate depending on the perceptions of the teachers. A similar calculation was made for the variable of school safety and student engagement. Then, data related to these variables were collected at school level and centralized based on general average. Thus, the observation data of each variable were included in the analysis by averaging multiple views. It would be more reliable if the behavior of the principal is observed by more teachers in that school than by a single teacher (Ostroff, 1993). Assumptions belonging to Level 1 and Level 2 were tested by making use of the remaining data folders based on the regression model where means were outcomes. As the distribution of within school errors did not deviate significantly from normal distribution as shown by the Q-Q graph, they met the normalcy assumption. At the same time, skewness and kurtosis values between -1.00 and +1.00 based on the descriptive statistics of Level 1 errors also suggested normal distribution. Finally, for the normalcy assumption of school level remainders, a CHIPCT scattergram was examined against Mahalanobis distance (MDIST). This showed MDIST and CHIPCT values scattered over a 45-degree axis, suggesting that the distribution met multivariable normalcy. Estimated values for the model have been calculated by using the M*plus* 6.12 program (Muthén & Muthén, 2010). The robust standard errors and the highest likelihood have been considered as the estimation method for this analysis. Besides, the statistics for the model have been obtained by using the EM algorithm and robust standard errors have been calculated through Huber-White. Comparison of the relative sizes of the coefficients and calculation of the indirect effects have been presented by standardizing the coefficients based on the direct effects between variables.

Results

Pearson correlation analysis was used to determine the relationships between variables at student level and variables at school level. In this context, the results related to the student level were given in Table 3.

Table 3. Correlation Coefficients Among the Student Level Variables (N = 2601 Students)

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Turkish score	-							
2. Math score	.54**	-						
3. Social science score	.50**	.26**	-					
4. Science score	.46**	.76**	.13**	-				
5. Prior achievement (SBS)	.42**	.35**	.18**	.28**	-			
6. SES	.23**	.22**	.16**	.18**	.21**	-		
7. School safety	.15**	.13**	.02	.13**	.09**	.08**	-	
8. Student engagement	.22**	.17**	.16**	.15**	.06**	.02	.38**	-

*p < .05; **p < .01

According to Table 3, there was a positive relationship between score for secondary school and university entrance scores of students in the four subjects -Turkish, math, social sciences and science. Furthermore, as the SES of the students increased, their scores obtained from these four courses increased. Moreover, it is obviously seen that there was a positive relationship between students' level of school engagement and their Turkish, math, social sciences and science scores. As is seen in the table, there is a positive relationship between students' perceptions about school safety and Turkish, math and science scores.

The ICC for each variable at the school level was calculated before testing the research hypotheses. In this context calculated variables are as following: For Turkish .48; for math .49; for social science .19; for science .42; for students' engagement .05; for school safety .10; for instructional climate .16 and for instructional leadership .26. Being higher than .05 of these values reveal that these data can be collected at the school level (Bliese, 2000). Accordingly, the scale scores obtained from students and teachers were examined at school level. Firstly, the results of Pearson correlation analysis to determine the relationships between the school level variables were presented in Table 4.

Table 4. Correlation Coefficients Among the School Level Variables (N = 35 Schools)

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Turkish score	-											
2. Math score	.80**	-										
3. Social science score	.73**	.53**	-									
4. Science score	.71**	.94**	.35*	-								
5. Prior achievement (SBS)	.83**	.73**	.54**	.63**	-							
6. SES	.76**	.76**	.59**	.62**	.69**	-						
7. School size	-.18	-.11	-.08	-.13	-.22	-.04	-					
8. Instructional climate	.48**	.34*	.43*	.29	.38*	.20	-.25	-				
9. School safety	.61**	.64**	.22	.62**	.61**	.60**	-.19	.23	-			
10. Student engagement	.59**	.51**	.51**	.55**	.32	.39*	-.18	.35*	.52**	-		
11. Instructional leadership	.46**	.45**	.36*	.42*	.38*	.14	-.23	.76**	.41*	.35*	-	
12. Student achievement	.92**	.96**	.68**	.90**	.78**	.77**	-.14	.42**	.63**	.61**	.48**	-

*p < .05; **p < .01

According to Table 4, there is a positive and high relationship between instructional leadership and instructional climate (r = .76, p < .05). In this context, while the instructional leadership behaviors of the school principal increase, the instructional climate level of the school can increase. Similarly, there is a positive and moderate relationship between the school's instructional climate and student achievement (r = .42, p < .05). Accordingly, as the instructional climate level of the school increases, student achievement increases. To the same table, there is a positive relationship between school safety and student engagement based on students' response (r = .52, p < .05).

Model belonged to Level 2, that is composed based on the literature related to the analysis of difference of achievement between the schools based on four lessons are tested through M*plus* 6.12 software. At the end of the analysis, the compliance indexes of the model are examined. Pursuant thereto, x^2 = 248.17, df = 68, RMSEA = .03, CFI = .91, TLI = .89, SRMR = .05 were calculated as is seen. In this context, it can be said that the model has consistency with the data (Hu & Bentler, 1999). The values of the path co-efficiency of the model as a result of the analysis are presented in Figure 2.

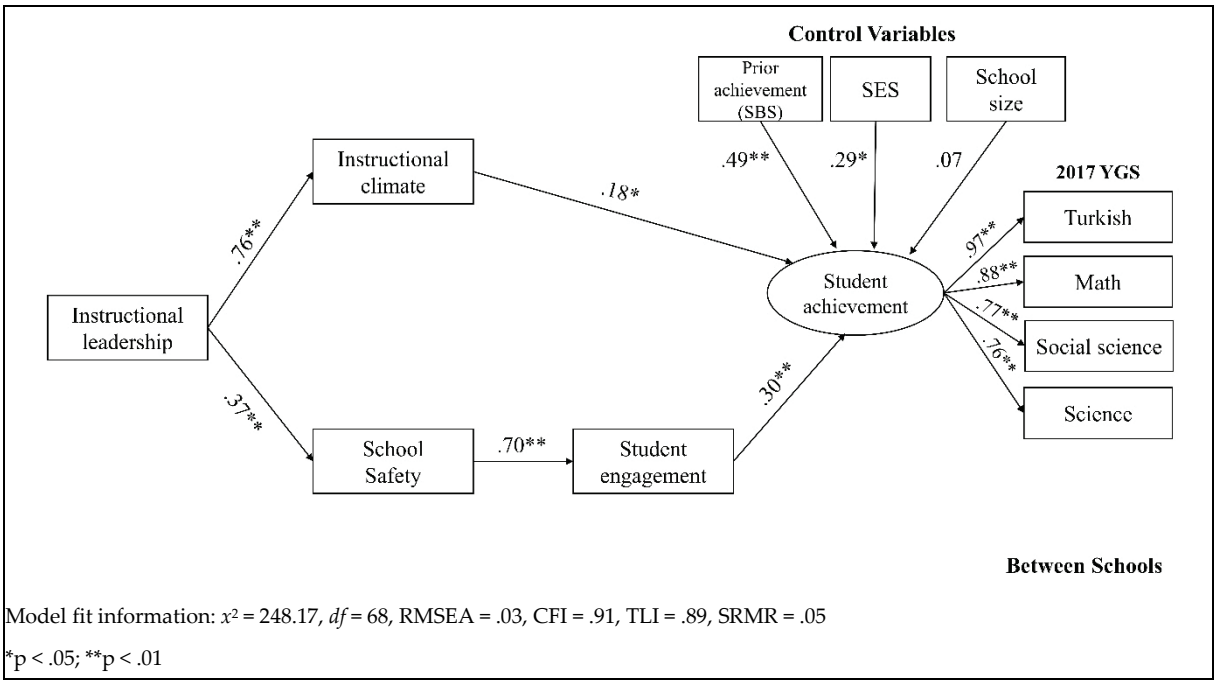

Figure 2. Results belonged to the Model Examined in this Study (Standardized)

It is seen that teachers' perception for instructional climate of school causes β = .18 (z = 2.23, p = .03) one unit increasing on students' achievement when the Figure 2 examined. In this scope it can be said that schools have a higher instructional climate, could have higher achievement. On the other hand, instructional leadership implementation of principal have contribute on instructional climate of the school that is β = .76 (z = 10.86, p = .00). Engagement of students to the school have positive on lower level direct effect on students' achievement. According to this, one unit increasing on student engagement causes β = .30 (z = 3.20, p = .00) unit increasing on students' achievement. This finding reveals that students have higher engagement have a tendency to have higher achievement. Also one unit increasing on perception of students on school safety cause β = .70 (z = 5.58, p = .00) unit increasing on school engagement of them.

When the control variables related to the model are examined, it is seen that the scores of the students obtained from the school entrance examination four years ago predicted the student achievement at β=.49 (z = 4.09, p = .00). Besides, it is observed that a one-unit increase in the SES of students caused increasing of β = .29 (z = 2.12, p = .03) unit. On the other hand, the size of the school according to the number of students was not effective in the students' success (β = .07, z = 1.17, p = .24).

For testing the two hypotheses of the research, the indirect relationships between the instructional leadership behaviors of principal with students' achievement are examined. The relationships obtained from the direct relationships on the school level are presented in Table 5.

Table 5. Indirect relationships between the instructional leadership behaviors of principal with student achievement (Standardized)

Predictive Variable	Via 1	Via 2	β	S.E.	z value
Instructional leadership →	Instructional climate	-	.14*	.06	2.14
Instructional leadership →	School safety →	Student engagement	.08*	.04	1.99

*p < .05; **p < .01

The first hypothesis of the research is whether if the instructional climates have a mediating effect on the relationship between instructional leadership of principal with students' achievement. The indirect effect of instructional leadership behaviors of principal on student achievement is found as β = .14 (z = 2.14, p = .032) when the data on Table 5 examined. Accordingly, it can be said that principals have an indirect effect on student achievement through instructional climate. In other words, this one unit increase on behaviors of principals causes .14 units increasing on average students' achievement.

The second hypothesis of the research is whether if the school safety and students' engagement have a mediating effect on the relationship between instructional leadership of principal with the students' achievement. According to the Table 5, there is a statistically significant indirect effect of leadership behaviors of principal on students' achievement through variables of school safety and students' engagement (β = .08, z = 1.99, p = .046). In this framework, it can be said that the principal has an indirect effect on students' achievement through variables of school safety and students' engagement. In other words, one unit increase of the behaviors of the principal causes .08 units increasing on average students' achievement of school. The total indirect effect of instructional leadership behaviors on student achievement was calculated as β = .21 (z = 3.18, p = .001).

Conclusion and Discussion

In this study, the relationships between leadership behaviors of principals in secondary education schools and students' academic achievement examined based on mediating roles of the variables instructional climate, school safety, and students' engagement. With the structural equation model that is designed to examine the achievement differentiation between schools, first direct relationships between the variables examined, then the indirect relationships are evaluated. The findings reveal that instructional climate of the school increases by the increasing of instructional leadership behaviors of the principal. This finding is consistent with other research findings showing that the school principal plays an important role in creating a learning-oriented climate by encouraging cooperation between teachers (Ayık & Şayir, 2014; Hallinger & Heck, 1998; Spillane, 2006). There can be several reasons to create a positive school climate. One of these is school principals' leadership behaviors. Şentürk and Sağnak (2012) indicate that principals' sincerity, spirits, close control, work-oriented and understanding behaviors are positively in relation with school climate. Within the present study, school principals' instructional leadership behaviors and instructional climate of school have been investigated according to teachers' perceptions. It can be said that interactions of teachers with each other, willingness for working together and common endeavor for academic progressing of students are formed with the behaviors of the principal when evaluated from this point of view. It is possible to have a more participative climate in schools where exhibited stronger leadership behaviors than the others.

According to another results of the study, the instructional climate variable has a direct effect on student achievement. This finding has compliance with the results of the other studies which manifested the relationship between the instructional climate and students' achievement (Atar, 2014; Hallinger et al., 1996; Sebastian et al., 2017). For example, in the meta-analysis study of Karadağ et al. (2016) it is found that school climate is an important variable that effects student achievement. Sebastian and Allensworth (2012) have reported that school climate has an indirect effect on student achievement by its effect on instructional activities in classroom positively. Teachers' sense of common responsibility directed to instruction, planning the instruction studies together and sharing the experiences provide a contribution to the students' achievement.

The first hypothesis is tested through those two relationships above mentioned. According to this, principals have an indirect effect on students' achievement through instructional climate. This shows the fact that school principal has an important role in explaining the achievement difference between schools. This result has consistency with the studies revealed that principals increase the

academic achievement of students indirectly (Hallinger et al., 1996; Hallinger & Heck, 1998; Louis, Dretzke, & Wahistrom, 2010; Marks & Printy, 2003; Özdemir & Kavak, 2017; Robinson et al., 2008; Sebastian & Allensworth, 2012). When the issue evaluates on this aspect, it can be said that principals who focused on providing an instructional works and leading the teachers to help each other contribute to students' academic achievement. School principals work with teachers from several different branches at secondary education level. Researches reveal that because of these differences, school principals have little knowledge about each branch and cannot lead instructional practices in classrooms directly (Lochmiller, 2016; Stein & Nelson, 2003). There are also research results showing that the direct interaction of school principals with classroom activities may be perceived as useless by teachers (Aslanargun & Göksoy, 2013; Grissom, Loeb, & Master, 2013). Results of the present study shows that principals can enhance the instruction in class and students' achievement by contributing to school climate. This aspect is important for the principals who are assigned for four years in Turkey. It is often expressed that the duty of the being principal to a school is not a fundamental duty. In this scope, it is needed to examine what the expectation from the school administrators is in the extent of school achievement with the findings of previous findings of research (Özdemir & Kavak, 2017; Yılmaz & Turan, 2015). It can be suggested that school principals make the school climate their priority in their school improvement works as school instructional environment is an important factor in decreasing the achievement between schools.

Another finding of the study is that students' perception on school safety directly affects their levels of engagement. This finding is similar to previous studies. For example, Özdemir and Kalaycı (2013) stated that students perceived schools as nice places and this perception displays that school safety is an important predictor of the engagement to school. What is more Sağlam and İkiz (2017) found that as students' engagement to school decreased their tendency to violence increased. In addition to this, it is difficult for teachers to focus on teaching works in an irregular and insecure school environment (DeAngelis & Presley, 2011; Way, 2011). When the findings of the studies and this recent study are evaluated together, it can be said that students' feeling safe at school is an important factor in improving their engagement to school. Another result of the present study points out that the increase in students' engagement to school led to an increase in student achievement. This finding is consistent with the research results indicating that students' engagement is a vital predictor of increasing in their academic achievement results (Kong, Wong, & Lam, 2003; Newmann et al., 1992). Similarly, Erdoğdu and Yüzbaş (2018) in their research with high school students, reported that the engagement levels of students who have high points were more positive than the others. In this context, it can be concluded that students' allocating more time for studying, having positive communication with their teachers and their beliefs on teachers' giving value to them may affect their school achievements.

The mediating effect of school safety and students' engagement on the relationship between the instructional leadership behaviors of principal and student achievement are examined in the scope of the second hypothesis of the research. The result of analysis shown that, leadership behaviors of principal have an indirect effect on student achievement through school safety and students' achievements. This finding has consistency with the experimental evidence which manifests that principals provide a contribution for concentrating of students on achievement by ensuring regular and safe school environment (Sebastian & Allensworth, 2012). In some schools, school safety can become a more priority area than education and training. In this context, it can be said that arrangements that make students feel safe in and out of school, during their arrival and departure or in the classroom are important. Positive changing on school safety can increase the proper behaviors of students and help to form classrooms having a higher academic expectation.

In this study, SES of the students is included in the model as a control variable. The results of the analysis provided evidence that SES has an effect on achievement similarly to the previous researches (Hallinger & Heck, 2010; Heck, 2000). Similarly, there is significant evidence that the family

variable is an important part of the variable of student achievement in Turkey (Gelbal, 2008). In addition, the TIMSS 2015 report expresses that while the economic situation of 8th grade students decreases, math scores of them in Turkey decrease (Mullis, Martin, & Foy, 2016). Family history is a multi-dimensioned concept including unchangeable variables both in short and long term as income of family and formation of parents. However, there are changeable aspects related to family history. These changeable aspects are defined as "educational culture" for parents (Leithwood & Jantzi, 1999). Leithwood and Patrician (2017) found out that family has a positive effect on increasing the academic achievement in their research. When all of the results evaluated together it can be thought that families can provide a positive contribution on students' academic achievement who are in secondary schools. Therefore, it becomes important that leading the parents to create an educational culture in their home by school employees for decreasing the gap between advantageous groups with disadvantageous groups. In this context, principals should encourage the students that they can increase academic achievement despite their SES. Again, the SBS grade used by the student in the transition to secondary education four years ago was added to the model and it was found to have a significant effect on the current achievement. In this case, secondary schools that accepted students with higher achievement scores in Turkey shows that these schools have a more advantageous position.

Limitations

This research is limited with the secondary instruction institutions in Ankara Province central districts and the results of 2016-2017 academicals year YGS Exam of 12th class students registered to these institutions. In this study, teachers' perceptions were used to determine instructional leadership and instructional climate. Also for determining the school safety and students' engagement, students' perceptions are used. According to this, the study has limitations in the directions of perceptions of teachers and students. The official institution ware included the research, but the private schools were not included. Another limitation of this study is the use of cross-sectional data on student achievement.

Suggestions

This study presents evidence that principals have an indirect effect on average school achievement by mediating variables related to teachers and students. It is seen that the effect of principal on the instructional environment, school's safety and students' engagement is important. It should be taken into account that these variables should be strengthened by school principals. According to this, the principal should plan activities to increase collaboration between teachers directed to instructional studies. Additionally, the school principal must also take measures to ensure the safety of the school. In this direction, arrangements should be made in the school corridors, restrooms, outside the school, at the time of arrival and departure, or in the classroom. On the other hand, on the process of training and employment of effective principals, these effects of principals should be considered. The instructional leadership behaviors of principals are examined in this study and it is found that these behaviors have less impact on students' achievement. According to this, principals should have a more integrative approach to cover the other leadership behaviors beyond the instructional leadership in the aspect of behaviors of principals. In the process of creating an effective school, transformational leadership and distributive leadership roles aiming at the strategic distribution of tasks as well as the role of instructional leadership are important. On the other hand, studies on student achievement in the process of monitoring and evaluating school principals should be considered as a criterion. In addition, studies on inter-school cooperation should be conducted in order to promote good practices.

One of the limitations of this study is the use of cross-sectional data on student achievement. In recent years, it has been observed that the relations between the school principal and student achievement have been analyzed based on longitudinal data (Hallinger & Heck, 2010, 2011; May, Huff, & Goldring, 2012; Sebastian et al., 2017). Accordingly, it can be suggested that a similar study should be conducted for several years. In this study, the indirect effect of the school principal on student

achievement is examined through the variables of instructional climate, school security, and students' engagement. In particular, researchers frequently describe the need for analysis of models in which different mediating variables of teachers and students are addressed (Krüger et al., 2007). In future research, the indirect relationship between the school principal and student achievement can be examined using different mediator variables. In this study, only indirect relations were examined. Some researchers have presented evidence that principals directly influence the students' achievement by working with them (Gentilucci & Muto, 2007; Silva, White, & Yoshida, 2011). In this extent, studies examine the direct relationship between principal and students' achievement can be designed.

References

Anıl, D., Özer Özkan, Y., & Demir, E. (2015). *Pisa 2012 araştırması ulusal nihai rapor*. Ankara: İŞKUR Matbaacılık Ltd. Şti.

Aslanargun, E., & Göksoy, S. (2013). Öğretmen denetimini kim yapmalıdır?. *Uşak Üniversitesi Sosyal Bilimler Dergisi, 14*, 98-121.

Atar, H. Y. (2014). Öğretmen niteliklerinin TIMSS 2011 fen başarısına çok düzeyli etkileri. *Eğitim ve Bilim*, *39*(172), 121-137.

Ayık, A., & Şayir, G. (2014). Okul müdürlerinin öğretimsel liderlik davranışları ile örgüt iklimi arasındaki ilişki. *Elektronik Sosyal Bilimler Dergisi, 13*(49), 253-279.

Balyer, A. (2012). Çağdaş okul müdürlerinin değişen rolleri. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 13*(2), 75-93.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349-381). San Francisco: Jossey-Bass.

Booren, L. M., Handy, D. J., & Power, T. G. (2011). Examining perceptions of school safety strategies, school climate, and violence. *Youth Violence And Juvenile Justice, 9*(2), 171-187.

Bossert, S. T., Dwyer, D. C., Rowan, B., & Lee, G. V. (1982). The instructional management role of the principal. *Educational Administration Quarterly, 18*(3), 34-64.

Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from chicago*. Chicago: University of Chicago Press.

Can, N. (2007). İlköğretim okulu yöneticisinin bir öğretim lideri olarak yeni öğretim programlarının geliştirilmesi ve uygulanmasındaki yeterliliği. *Eğitimde Kuram ve Uygulama, 3*(2), 228-244.

Cemaloğlu, N., & Çoban, Ö. (2019). Okul yöneticilerinin liderlik stilleri ile psikolojik iyi olma durumları arasındaki ilişki. *Milli Eğitim Dergisi, 48*(221), 73-90.

Cohen, J., & Geier, V. K. (2010). School climate research summary. *School Climate Brief, 1*(1), 1-6.

Cornell, D. G., & Mayer, M. J. (2010). Why do school order and safety matter?. *Educational Researcher, 39*(1), 7-15.

Çalık, T., & Kurt, T. (2010). Okul iklimi ölçeği'nin (OİÖ) geliştirilmesi. *Eğitim ve Bilim*, *35*(157), 167-180.

Day, C., Gu, Q., & Sammons, P. (2016). The impact of leadership on student outcomes: How successful school leaders use transformational and instructional strategies to make a difference. *Educational Administration Quarterly, 52*(2), 221-258.

DeAngelis, K. J., & Presley, J. B. (2011). Teacher qualifications and school climate: Examining their interrelationship for school improvement. *Leadership and Policy in Schools, 10*(1), 84-120.

Dönmez, B., & Güven, M. (2002). Ortaöğretimde görev yapan öğretmen ve okul yöneticilerinin okul güvenliğine ilişkin algı ve beklentileri. *Yaşadıkça Eğitim, 75*(4), 60-64.

Erdoğdu, M. Y., & Yüzbaş, D. (2018). Lise öğrencilerinin okula bağlılık ile genel öz-yeterlilik düzeyleri arasındaki ilişki. *Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 32*(3), 205-227.

Fancera, S. F., & Bliss, J. R. (2011). Instructional leadership influence on collective teacher efficacy to improve school achievement. *Leadership and Policy in Schools, 10*(3), 349-370.

Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research, 59*(2), 117-143.

Gelbal, S. (2008). Sekizinci sınıf öğrencilerinin sosyoekonomik özelliklerinin Türkçe başarısı üzerinde etkisi. *Eğitim ve Bilim, 33*(150), 1-13.

Gentilucci, J. L., & Muto, C. C. (2007). Principals' influence on academic achievement: The student perspective. *NASSP Bulletin, 91*(3), 219-236.

Gottfredson, D. G. (2001). *Schools and delinquency*. New York, NY: Cambridge University Press.

Greene, M. B. (2005). Reducing violence and aggression in schools. *Trauma, Violence, & Abuse, 6*(3), 236-253.

Gregory, A., Cornell, D., Fan, X., Sheras, P., Shih, T. H., & Huang, F. (2010). Authoritative school discipline: High school practices associated with lower bullying and victimization. *Journal of Educational Psychology, 102*(2), 483.

Grift, W. V. D. (1990). Educational leadership and academic achievement in elementary education. *School Effectiveness and School Improvement, 1*(1), 26-40.

Grissom, J. A., Loeb, S., & Master, B. (2013). Effective instructional time use for school leaders: Longitudinal evidence from observations of principals. *Educational Researcher, 42*(8), 433-444. doi:10.3102/0013189x13510020

Gümüşeli, A. İ. (1996). Okul müdürlerinin öğretim liderliğini sınırlayan etkenler. *Kuram ve Uygulamada Eğitim Yönetimi, 6*(6), 1-9.

Hallinger, P. (2011). Leadership for learning: Lessons from 40 years of empirical research. *Journal of Educational Administration, 49*(2), 125-142.

Hallinger, P. (2018). Principal instructional leadership: From prescription to theory to practice. *The Wiley Handbook of Teaching and Learning*, 505-528.

Hallinger, P., & Heck, R. H. (1996). Reassessing the principal's role in school effectiveness: A review of empirical research, 1980-1995. *Educational Administration Quarterly, 32*(1), 5-44.

Hallinger, P., & Heck, R. H. (1998). Exploring the principal's contribution to school effectiveness: 1980-1995. *School Effectiveness and School Improvement, 9*(2), 157-191.

Hallinger, P., & Heck, R. H. (2010). Leadership for learning: Does collaborative leadership make a difference in school improvement?. *Educational Management Administration & Leadership, 38*(6), 654-678.

Hallinger, P., & Heck, R. H. (2011). Conceptual and methodological issues in studying school leadership effects as a reciprocal process. *School Effectiveness and School Improvement, 22*(2), 149-173.

Hallinger, P., Bickman, L., & Davis, K. (1996). School context, principal leadership, and student reading achievement. *The Elementary School Journal, 96*(5), 527-549.

Hanushek, E. A., & Woessmann, L. (2017). School resources and student achievement: A review of cross-country economic research. In M. Rosén, K. Y. Hansen, & U. Wolff (Eds.), *Cognitive abilities and educational outcomes: A festschrift in honour of jan-eric gustafsson* (pp. 149-171). Springer.

Heck, R. H. (2000). Examining the impact of school quality on school outcomes and improvement: A value-added approach. *Educational Administration Quarterly, 36*(4), 513-552.

Heck, R. H., & Hallinger, P. (2009). Assessing the contribution of distributed leadership to school improvement and growth in math achievement. *American Educational Research Journal, 46*(3), 659-689.

Hoşgörür, V., & Orhan, A. (2017). Okulda zorbalık ve şiddetin nedenleri ve önlenmesinin yönetimi (Muğla merkez ilçe örneği). *Bayburt Eğitim Fakültesi Dergisi, 12*(24), 859-880.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *The California School Psychologist, 8*(1), 7-27.

Johnson, J. P., Livingston, M., Schwartz, R. A., & Slate, J. R. (2000). What makes a good elementary school? A critical examination. *The Journal of Educational Research, 93*(6), 339-348.

Karadağ, E., İşçi, S., Öztekin, Ö., & Anar, S. (2016). Okul iklimi ve akademik başarı ilişkisi: Bir meta-analiz çalışması. *İnönü Üniversitesi Eğitim Fakültesi Dergisi, 17*(2), 107-122.

Karakütük, K., Özdoğan Özbal, E., & Sağlam, A. (2017). Okul yönetiminde okul güvenliğini sağlamak İçin yapılan uygulamalar konusunda öğretmen ve okul müdürlerinin görüşleri. *Mersin University Journal of the Faculty of Education, 13*(3), 1214-1232.

Kondakci, Y., & Sivri, H. (2014). Salient characteristics of high-performing turkish elementary schools. *Journal of Educational Administration, 52*(2), 254-272.

Kong, Q., Wong, N., & Lam, C. (2003). Student engagement in mathematics: Development of instrument and validation of construct. *Mathematics Education Research Journal, 15*(1), 4-21.

Koşar, S., Sezgin, F., & Aslan, H. (2012). Okul müdürlerinin resmi görev tanımlarının dışında olduğunu düşündükleri işlere ilişkin görüşleri. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi, 33*(1), 147-164.

Krug, S. E. (1992). Instructional leadership: A constructivist perspective. *Educational Administration Quarterly, 28*(3), 430-443.

Krüger, M. L., Witziers, B., & Sleegers, P. (2007). The impact of school leadership on school level factors: Validation of a causal model. *School Effectiveness and School Improvement, 18*(1), 1-20.

Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2007). Piecing together the student success puzzle: Research, propositions, and recommendations. *ASHE Higher Education Report, 35*(5), 1-182.

Kyriakides, L., Creemers, B., Antoniou, P., & Demetriou, D. (2010). A synthesis of studies searching for school factors: Implications for theory and research. *British Educational Research Journal, 35*(6), 807-830.

Leithwood, K. A., & Jantzi, D. (1999). The relative effects of principal and teacher sources of leadership on student engagement with school. *Educational Administration Quarterly, 35*(5), 679-706. doi:10.1177/0013161x99355002

Leithwood, K. A., & Jantzi, D. (2000). The effects of transformational leadership on organizational conditions and student engagement with school. *Journal of Educational Administration, 38*(2), 112-129.

Leithwood, K. A., & Jantzi, D. (2006). Transformational school leadership for large-scale reform: Effects on students, teachers, and their classroom practices. *School Effectiveness and School Improvement, 17*(2), 201-227.

Leithwood, K. A., & Patrician, P. (2017). Changing the educational culture of the home to increase student success at school. In K. Leithwood, J. Sun, & K. Pollock (Eds.), *How school leaders contribute to student success: Studies in educational leadership* (Vol. 23). Cham: Springer.

Leithwood, K. A., Patten, S., & Jantzi, D. (2010). Testing a conception of how school leadership influences student learning. *Educational Administration Quarterly, 46*(5), 671-706.

Lochmiller, C. R. (2016). Examining administrators' instructional feedback to high school math and science teachers. *Educational Administration Quarterly, 52*(1), 75-109. doi:10.1177/0013161x15616660

Louis, K. S., Dretzke, B., & Wahistrom, K. (2010). How does leadership affect student achievement? Results from a national us survey. *School Effectiveness and School Improvement, 21*(3), 315-336.

Louis, K. S., Leithwood, K. A., Wahlstrom, K., & Anderson, S. (2010). *Investigating the links to improved student learning: Final report of research findings*. Twin Cities: University of Minnesota, Center for Applied Research and Educational Improvement.

Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology, 1*(3), 86-92.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal, 37*(1), 153-184.

Marks, H. M., & Printy, S. M. (2003). Principal leadership and school performance: An integration of transformational and instructional leadership. *Educational Administration Quarterly, 39*(3), 370-397.

May, H., Huff, J., & Goldring, E. (2012). A longitudinal study of principals' activities and student performance. *School Effectiveness and School Improvement, 23*(4), 417-439.

Mikk, J. (2006). Economic and educational correlates of timss results. *Social Research, 1*(7), 83-89.

Mullis, I. V. S., Martin, M. O., & Foy, P. (2008). *TIMSS 2007 international mathematics report: Findings from iea's trends in international mathematics and science study at the fourth and eighth grades*. Chestnut Hill, MA:: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I. V. S., Martin, M. O. ve Foy, P. (2016). *TIMSS 2015 International results in mathematics*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Muthén, L. K., & Muthén, B. O. (2010). *Mplus user's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.

Neumerski, C. M. (2012). Rethinking instructional leadership, a review. *Educational Administration Quarterly, 49*(2), 310-347.

Newmann, F. M., & Wehlage, G. G. (1997). *Successful school restructuring: A report to the public and educators by the center on organization and restructuring of schools*. Madison, WI: Document Service, Wisconsin Center for Education Research.

Newmann, F. M., Wehlage, G. G., & Lamborn, S. D. (1992). The significance and sources of student engagement. In F. Newmann (Ed.), *Student engagement and achievement in american secondary schools* (pp. 119-152). New York: Teachers College Press.

OECD. (2010). *Pisa 2009 results: Learning to learn – student engagement, strategies and practices* (Vol. III). Paris: OECD.

OECD. (2014). *PISA 2012 technical report*. Paris: OECD Publishing.

Oldac, Y. I., & Kondakci, Y. (2019). Multilevel analysis of the relationship between school-level variables and student achievement. *Educational Management Administration & Leadership*, 1-19. doi:10.1177/1741143219827303

Orpinas, P., & Horne, M. A. (2006). *Bullying prevention: Creting positive school climate and developing social competence*. Washington DC: American Psychological Association.

Ostroff, C. (1993). Comparing correlations based on individual-level and aggregated data. *Journal of Applied Psychology, 78*(4), 569-582. doi:10.1037/0021-9010.78.4.569

Özdemir, M., & Kalaycı, H. (2013). Okul bağlılığı ve metaforik okul algısı üzerine bir inceleme: Çankırı ili örneği. *Educational Sciences: Theory & Practice, 13*(4), 1-13.

Özdemir, N. (2019). Principal leadership and students' achievement: Mediated pathways of professional community and teachers' instructional practices. *KEDI Journal of Educational Policy, 16*(1), 81-104.

Özdemir, N., & Kavak, Y. (2017). *Akademik başarı kıskacındaki okul yöneticileri*. Ankara: Pegem Akademi.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Ripski, M. B., & Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement?. *Journal of School Violence, 8*(4), 355-375.

Robinson, V. M. J., Lloyd, C., & Rowe, K. (2008). The impact of leadership on student outcomes: An analysis of the differential effects of leadership types. *Educational Administration Quarterly, 44*(5), 635-674.

Ross, J. A., & Gray, P. (2006). School leadership and student achievement: The mediating effects of teacher beliefs. *Canadian Journal of Education, 29*(3), 798-822.

Sağlam, A., & İkiz, F. E. (2017). Ortaokul öğrencilerinin şiddet eğilimleri ile okula bağlılık düzeyleri arasındaki ilişkinin incelenmesi. *İlköğretim Online, 16*(3), 1235-1246.

Sebastian, J., & Allensworth, E. (2012). The influence of principal leadership on classroom instruction and student learning a study of mediated pathways to learning. *Educational Administration Quarterly, 48*(4), 626-663.

Sebastian, J., Huang, H., & Allensworth, E. (2017). Examining integrated leadership systems in high schools: Connecting principal and teacher leadership to organizational processes and student outcomes. *School Effectiveness and School Improvement, 28*(3), 463-488.

Silva, J. P., White, G. P., & Yoshida, R. K. (2011). The direct effects of principal–student discussions on eighth grade students' gains in reading achievement an experimental study. *Educational Administration Quarterly, 47*(5), 772-793.

Spillane, J. (2006). *Distributed leadership*. San Francisco, CA: Jossey-Bass.

Stein, M. K., & Nelson, B. S. (2003). Leadership content knowledge. *Educational Evaluation and Policy Analysis, 25*(4), 423-448.

Sun, J., & Leithwood, K. A. (2012). Transformational school leadership effects on student achievement. *Leadership and Policy in Schools, 11*(4), 418-451.

Supovitz, J., Sirinides, P., & May, H. (2010). How principals and peers influence teaching and learning. *Educational Administration Quarterly, 46*(1), 31-56.

Şentürk, C., & Sağnak, M. (2012). İlköğretim okulu müdürlerinin liderlik davranışları ile okul iklimi arasındaki ilişki. *Türk Eğitim Bilimleri Dergisi, 10*(1), 29-47.

Taymaz, H. (2003). *Okul yönetimi*. Ankara: PegemA.

Ten Bruggencate, G., Luyten, H., Scheerens, J., & Sleegers, P. (2012). Modeling the influence of school leaders on student achievement: How can school leaders make a difference?. *Educational Administration Quarterly, 48*(4), 699-732.

Ulutan, E. (2018). *TEOG fen bilgisi başarısını etkileyen değişkenlerin çok düzeyli regresyon modeli ile incelenmesi* (Unpublished master's thesis). Hacettepe University, Ankara.

University of Chicago. (2017). *5essentials® survey*. Chicago, IL: University of Chicago Consortium on School Research.

Urun, Z., & Gökçe, A. T. (2015). Okul müdürlerinin baskı gruplarının istekleri ile başa çıkma taktikleri. *Journal of Teacher Education and Educators, 4*(1), 105-125.

Wahlstrom, K. L., & Louis, K. S. (2008). How teachers experience principal leadership: The roles of professional community, trust, efficacy, and shared responsibility. *Educational Administration Quarterly, 44*(4), 458-495.

Way, S. M. (2011). School discipline and disruptive classroom behavior: The moderating effects of student perceptions. *The Sociological Quarterly, 52*(3), 346-375.

Witziers, B., Bosker, R. J., & Krüger, M. L. (2003). Educational leadership and student achievement: The elusive search for an association. *Educational Administration Quarterly, 39*(3), 398-425.

Yalçın, M. T. (2018). *Ortaöğretim okullarının öğretimsel kapasitesi ile akademik başarı arasındaki ilişkinin incelenmesi* (Unpublished doctoral dissertation). Gazi University, Ankara.

Yang, C., Sharkey, J. D., Reed, L. A., Chen, C., & Dowdy, E. (2018). Bullying victimization and student engagement in elementary, middle, and high schools: Moderating role of school climate. *School Psychology Quarterly, 33*(1), 54-64.

Yazzie Mintz, E. (2007). *Voices of students on engagement: A report on the 2006 high school survey of student engagement*. Bloomington, IN: Center of Evaluation & Education Policy.

Yıldırım, S. (2017). *Liselerde öğrenci ve öğretmenlerin güvenli okul iklimi algıları ile öğrencilerin akademik başarıları arasındaki ilişki* (Unpublished doctoral dissertation). Hacettepe University, Ankara.

Yılmaz, D., & Turan, S. (2015). Dağıtılmış liderliğin okullardaki görünümü: Bir yapısal eşitlik modelleme çalışması. *Kuram ve Uygulamada Eğitim Yönetimi, 21*(1), 93-126.

Zyngier, D. (2008). (Re)conceptualising student engagement: Doing education not doing time. *Teaching and Teacher Education, 24*(7), 1765-1776.

Appendix 1. The Method for Calculating the Weight of Sampling

$$Stage\ 1\ (district\ level)\ possibility\ for\ being\ choosen\ = \frac{nm_i}{M} = \mathrm{P}_{1i}$$

In this formula, n is the total school number of the schools which the obtaining sampling in the district; m is the number of sampling students in i school; M is the total number of students of the schools where the samplings are obtained.

$$Stage\ 2\ (school\ level)\ possibility\ for\ being\ choosen\ = \frac{Number\ of\ the\ sampling\ students\ of\ the\ school}{Total\ number\ of\ the\ students\ of\ the\ school} = \mathrm{P}_{2i}$$

$$Stage\ 3\ (students\ level)\ possibility\ for\ being\ choosen = \frac{Number\ of\ students\ participated\ to\ teh\ research\ in\ the\ school}{Number\ of\ the\ sampling\ students\ of\ the\ school} = \mathrm{P}_{3i}$$

Possibility for final selection = P_{1i} x P_{2i} x P_{3i} = P

Sampling weight = 1/P = W

Appendix 2. Descriptive Statistics and Confirmatory Analysis of Scale Dimensions

Items	Descriptive Statistics		Confirmatory Analysis		Corrected Item-Total Correlation
	M	SD	Loading	S.E.	
Instructional leadership (α=.94)					
Principal sets out instructional goals in order to improve student achievement	3.63	1.07	.766	.014	.740
Principal carries out in-service teacher trainings according to the instructional needs of the school	3.57	1.04	.780	.014	.754
Principal gets informed about the academic achievement and competency levels of the teachers	3.58	1.06	.778	.014	.752
Principal observes the in-class instructional practices of the teachers	3.50	1.08	.722	.016	.703
Principal conducts practices in order to increase the parents' expectancy of academic achievement	3.46	1.12	.802	.012	.778
Principal develops higher expectancy of academic Achievement in students	3.45	1.04	.711	.017	.691
Principal utilizes the achievementful practices of other schools	3.36	1.13	.746	.015	.728
Principal ensures the instructional places at school to be ready for instruction	3.93	.99	.712	.017	.698
Principal provides places for students to study	3.78	1.06	.752	.015	.726
Principal provides feedback about the courses after discussions with the teachers	3.53	1.10	.819	.012	.795
Principal observes the academic development of the students	3.67	1.05	.777	.014	.760
Principal takes precautions in case of the situations (e.g. discipline problems, noise etc.) that ruin the instructional practices	3.83	1.05	.685	.018	.668
Student engagement (α=.86)					
I complete my tasks related to school on time.	3.75	1.20	.540	.017	.486
I do my homework.	3.71	1.19	.568	.016	.517
I always answer the questions in the class.	3.28	1.08	.647	.014	.565
I spend a great deal of energy to the tasks related to school.	3.29	1.21	.603	.015	.533
I ask questions related the topic in the lessons.	3.10	1.18	.678	.013	.591
I take part in conversations with the teachers about the topics that interest me.	3.22	1.29	.585	.015	.496
I conduct extra studies about the topics that interest me.	2.79	1.28	.544	.016	.483
I pursue extra readings about the topics that, I think, would contribute to my intellectual level.	3.44	1.26	.522	.017	.477
Most of the teachers consider me as an individual.	2.93	1.33	.688	.012	.588
Most of the teachers behave me the same way to other students.	3.40	1.32	.489	.017	.460
Most of the teachers ensure that I feel comfortable in the class.	3.18	1.32	.698	.012	.633
I get on well with most of the students that I have met at school.	3.59	1.21	.415	.018	.390
My teachers spare time to talk to me.	3.03	1.31	.746	.011	.641
In my opinion, most of the teachers understand and emphasize with me.	2.98	1.28	.749	.011	.656
I have a good relationship with most of the teachers.	3.79	1.20	.577	.015	.531
School Safety (α=.81)					
I feel safe in the corridors at school.	3.22	1.44	.774	.012	.675
I feel safe in the restrooms at school.	2.70	1.49	.696	.013	.593
I feel safe around the school.	2.93	1.41	.712	.013	.639
I feel safe when commuting from the house to the school.	3.22	1.34	.622	.015	.564
I feel safe in the class	3.57	1.36	.607	.015	.540

Instructional Climate (α=.83)					
The relationships at the school are based on mutual respect and trust.	3.22	1.37	.449	.019	.430
The staff has the equal responsibility in carrying out the instructional practices.	3.68	1.36	.509	.018	.469
The teachers have equal responsibility in improving the instruction.	3.06	1.40	.535	.017	.460
The teachers organize extra activities in order to improve the instruction.	3.71	1.28	.765	.014	.583
The teachers share their instructional experiences.	3.67	1.37	.701	.014	.527
The teachers collaborate well.	3.55	1.23	.580	.016	.490