


# A Longitudinal Analysis of Academic Achievement and Its Correlates in Higher Education

SAGE Open  
January-March 2021: 1–13  
© The Author(s) 2021  
DOI: 10.1177/21582440211003085  
journals.sagepub.com/home/sgo  


Halis Sakız<sup>1</sup> , Faysal Özdaş<sup>1</sup>, İdris Göksu<sup>1</sup>, and Abdurrahman Ekinci<sup>1</sup>

## Abstract

Achievement in higher education is gaining importance and attracting attention among educational psychologists who seek for determining its correlates. This study examined longitudinal associations between academic achievement in higher education, university entrance exam performance, the psychosocial climate of the campus, and instructional behavior and socioeconomic status. Data concerning 2,361 students from three universities were collected via surveys and university records at Year 1, Year 2, and Year 4. Socioeconomic status (SES), university exam performance, perceived instructional behavior, and perceived psychosocial climate at Grade 1 were associated positively with academic achievement, perceived instructional behavior, and perceived psychosocial climate at Grade 2 and Grade 4. Indirect effects from SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at Grade 1 to Grade 4 outcomes were significant, through academic achievement, perceived instructional behavior, and perceived psychosocial climate at Grade 2. These results support that students' SES, earlier entrance exam performance, and perceptions of their academics' instructional behaviors and the campus' psychosocial atmosphere at the first year of university life are associated with their academic achievement at the final year through their relations with the developing levels of academic achievement, perceived instructional behavior, and psychosocial climate of the campus toward the middle of university life.

## Keywords

academic achievement, correlates, higher education, longitudinal research, path analysis

## Introduction

Higher education is a key source of development for individuals and countries. Individuals with a higher education degree are more likely to get employed, perform better in adult literacy tests, and possess better health than their peers (Schneider & Preckel, 2017). In an average Organisation for Economic Co-operation and Development (OECD) country, investment for individuals with a higher education degree provides better economic outcomes (US\$175067 for men and US\$110007 for women) than investment for an individual with an upper secondary degree (US\$77604 for men and US\$63035 for women) (OECD, 2012, 2019). Higher education brings economic benefits and contributes to the making of civic society (Bloom et al., 2007). All in all, higher education with good quality provides individuals with advantages including welfare, health, and competence.

Academic achievement is a reliable measure of individuals' level of knowledge and skills acquisition in higher education. Therefore, academic achievement and associated learning outcomes in higher education are of significant interest to various stakeholders including students,

researchers, teaching staff, tertiary education institutions, and funding authorities. Improvement in the level of academic achievement may require a better understanding of what happens in the learning process from the perspective of the learners and their surroundings. A conclusion that may be drawn from the large body of research that aimed to investigate achievement is that achievement is the outcome of complex human activity and one not easy to conceptualize through a simple model. The factors that can impact students' achievement in higher education are complex, but they are sometimes categorized as being either individual factors (e.g., age, prior experiences, learning styles) or contextual factors (e.g., teaching and learning activities, assessment procedures). Many studies have attempted to correlate learning outcomes in higher education with individual or

<sup>1</sup>Mardin Artuklu University, Turkey

### Corresponding Author:

Halis Sakız, Associate Professor, Department of Educational Sciences, Faculty of Letters, Mardin Artuklu University, Mardin 47200, Turkey.  
Email: halissakiz@artuklu.edu.tr



Creative Commons CC BY: This article is distributed under the terms of the Creative Commons Attribution 4.0 License (<https://creativecommons.org/licenses/by/4.0/>) which permits any use, reproduction and distribution of

the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

contextual factors, but few studies have attempted to elucidate the interrelationships between a number of these factors to determine a causal model of academic achievement. In this study, we test a model of academic achievement throughout higher education and its relationships with personal and contextual variables.

### *Academic Achievement and Factors Predictive of It*

Academic achievement, as measured by grade point average (GPA), is one of the performance outcomes of education and is associated with several personal and social outcomes, including higher self-concept (Guay et al., 2003; Sakız & Aftab, 2019), higher IQ scores (Brookover et al., 1964), higher self-efficacy (Zajacova et al., 2005), better self-discipline (Duckworth & Seligman, 2005), better decision-making skills (Fleming et al., 2005), and social skills (Caemmerer & Keith, 2015). As this evidence illustrates, academic achievement is a good indicator of several key aspects during the course of life.

For a few decades, university administrators and academics have sought ways to identify strong correlates of academic achievement that they can use in the education process. Around the world, university admission performance is the most common factor utilized for the prediction of academic success (Evans, 2000). However, while the traditional admission performance is still important, educators involved in higher education want to locate as many predictors of success as possible when planning and practicing at university (Sireci et al., 2003). Therefore, educators have discussed the factors that affect academic achievement. For example, researchers in higher education examined the relationships between academic achievement and psychosocial climate, teaching styles of academics, assessment practices, intelligence, prior knowledge, students' personality, social background, motivation, and learning strategies (Biggs & Tang, 2011; Chapman & Tunmer, 1997; Hair et al., 2015; Perry & Smart, 2007; Richardson et al., 2012; Schwartz & Gurung, 2012; Sirin, 2005). However, the relationship between achievement and these factors is complex and involves various correlations, causalities, and developmental changes (Bronfenbrenner & Morris, 1998; Darling-Hammond, 2000).

*Socioeconomic status (SES).* SES is probably one of the most widely used contextual variables in education research. There have been numerous research examining the associations between SES and student outcomes (Bornstein & Bradley, 2003; Crosnoe & Cooper, 2010; Duncan & Magnuson, 2005; Galindo & Sonnenschein, 2015; Hair et al., 2015). Children with low SES are more likely to start school with lower academic skills. What is more, the differences between low SES children and their peers with higher SES persist or expand as children proceed through school years (Bradley & Corwyn, 2002; Caro et al., 2009; Sirin, 2005). Therefore, SES is often perceived as a significant indicator of academic achievement at different levels of education.

*Campus psychosocial climate.* In his bioecological model, Bronfenbrenner (2005) argues that people are shaped by individual characteristics, contextual frameworks, and the environmental forces they interact with. Approaching educational settings as ecological systems necessitates studying the meso (e.g., personal relationships) and the macro (e.g., culture) systems within which they operate to better understand the dynamics of learning and education (Cemalcilar, 2010). Hence, an investigation of academic achievement as an educational construct and outcome needs to take into consideration both the social interactions within the educational setting and the climate where these social interactions are actualized (Feldman, 1986). Research has confirmed a positive association between students' perceptions of their educational settings and various academic outcomes such as academic achievement (Osterman, 2000; Uline & Tschanen-Moran, 2008).

Deriving from the organizational literature, the overall tangible and intangible aspects of an educational setting are regarded as climate (Anderson, 1982). The climate of an educational context influences the experiences of students, teachers, and administrators in several ways by creating a positive or negative learning environment (Thapa et al., 2013). In higher education, campus environments are "complex social systems defined by the relationships between the people, bureaucratic procedures, structural arrangements, institutional goals and values, traditions, and larger socio-historical environments" (Hurtado et al., 1998, p. 296). A supportive and positive climate is related to a sense of well-being, persistence, and success (Adams et al., 2006; Hoy et al., 1998).

*Instructional behavior.* Academics are important adult figures at university. They play multiple roles, provide academic input, and influence the general social climate of the educational setting through their relations with students (Allen et al., 2011). Effective instructional academic behavior is associated with academic achievement (Adams et al., 2000; Thomas, 2000). In general, high-quality relationships with faculty, characterized by mutual respect, support, and care, are strongly associated with higher academic motivation and achievement, positive attitudes toward university, positive self-concept, and prosocial behaviors (Buckley et al., 2004; Gustafsson & Nilsen, 2016; Hughes & Kwok, 2007). Behaviors of the academics have a significant impact on students inside the classroom because students attribute meaning to the behaviors of their academics. Perceived academic behaviors are one of the main elements in the learning process because the way students perceive the instructional behaviors is as important as the actual performance of the academics. Also, the instructional behaviors perceived by students are indicators of the achievement level of the curriculum and student training (Kara et al., 2015).

*University entrance examination.* In most countries, there is a high demand for public university education because the

tuition fee is very low compared to private universities. Students are placed at universities and departments based on an overall score involving performance scores at the university entrance examinations. Therefore, students' performance at earlier stages such as high schools is significant for higher education (Parker et al., 2005). However, the consistency between previous education and university selection examinations is questionable in Turkey. For example, Sakız (2016) argued that the significant variation between schools concerning the quality of education, distribution of resources, and content of the instruction decreases the validity of the university entrance examinations.

Although students with high exam scores enter favorable universities and departments, the number of research works that investigates the longitudinal impact of these examinations on academic achievement at university is very limited. For example, Gifford et al. (2006) found that entrance scores were effective predictors of student academic success at university. Also, in their research concerning the transition between high school and university, Wintre et al. (2011) examined important qualities that distinguish first-year Canadian university students who maintain their high school GPA from those whose GPA declines at least one letter grade. The strength of a student's institutional attachment is one of the key factors differentiating grade maintainers from decliners with maintainers having a stronger attachment to the institution.

In summary, the academic achievement of university students is an outcome of various factors including SES, the psychosocial climate of the campus, instructional behavior, and university entrance exam performance. First, the SES may affect the level of mental, social and capital investment in education and therefore influence the return obtained from this investment usually in the form of achievement and learning (Sirin, 2005). Second, the psychosocial climate of the campus may be associated with students' experiences, values, attitudes and beliefs attached to the university, and therefore, influence their performance and achievement (Payandeh Najafabadi et al., 2013). Third, the quality of instructional behavior performed by the academics might affect students' motivation to engage with the course content, participate in classroom activities, and ultimately, perform better to achieve academically (Cadez et al., 2017). Finally, the performance of students at the university entrance examinations is associated with the level of academic achievement in higher education because at least some consistency in the level of achievement can be predicted throughout developmental stages (Gifford et al., 2006). Looking at the variables associated with academic achievement in higher education, some of them (e.g., SES) are highly investigated, whereas some others (e.g., entrance examination performance) are rarely scrutinized. However, a study that investigates the associations of these factors with academic achievement in a holistic model does not exist. This study attempts to fill this research gap.

## *The Current Study*

There is a need for higher education institutions to be conscious of the transition students are making throughout grades and the changes that occur in the levels of their academic achievement. Without nurturing the factors that are associated with academic achievement, which are to some degree controllable within the learning environment, higher education institutions are jeopardizing the aim of reaching the ultimate goal of academic achievement. The current study aims to develop a causal model of student academic achievement in higher education at three different year-levels. In particular, it examines the interrelationships between academic achievement and several student-related, family-related, and campus-related factors, some of which have been examined in previous studies. The variables evaluated included psychosocial climate of the campus, perceived instructional behaviors of the academics, and SES and university entrance examination performance. These factors were found to be sufficiently interrelated to be subject to path modeling, in an attempt to identify the decisive factors that impact academic achievement.

The study conducted measurement at three levels of higher education: Year 1, Year 2, and Year 4. The aim in selecting these years was to represent the beginning, middle, and end of university life, respectively. To represent the middle point, we could select Year 2, Year 3, or both. We selected only one time point because we thought this could be more manageable and sufficient to represent the middle years in higher education. Also, we preferred Year 2 to Year 3 because the early years could be more critical and dynamic. Besides, the study collected data at the end of Year 4, which is the final year. University exam performance was measured before Year 1. However, as researchers could not access this information at the time of measurement (3 months before university entrance) and this measurement does not change significantly within a short period, this variable was included at Year 1.

Three hypotheses were tested in this study. The first goal of the study was to focus on the early years (Year 1), which have critical value in terms of their influence on later years of higher education. We hypothesized that SES, university exam performance, and students' perceptions of their academics' instructional behavior and university's psychosocial climate at Year 1 would be associated positively with students' academic achievement, perceptions of their academics' instructional behavior, and university's psychosocial climate at Year 2.

The second goal was to focus on later stages of higher education (Year 2 and Year 4) and examine how variables were associated at these two stages. We hypothesized that higher academic achievement and more positive perceptions toward instructional behavior and psychosocial climate at Year 2 would be associated with higher levels of these variables at Year 4.

The final goal was to investigate whether there was continuity in academic achievement and related variables throughout different stages of higher education. We hypothesized that higher levels of input variables and early perceptions at Year 1 would be positively associated with students' academic achievement, perceptions of their academics' behavior, and university's psychosocial climate at Year 2 variables, which in turn would be associated with higher levels of these variables at Year 4. We also anticipated that the indirect effects statistically testing the mediating role of Year 2 variables would be significant.

## Materials and Method

### Participants

This study utilized data from 2,361 university students at the bachelor level who were part of an ongoing longitudinal study. Of the participants, 1,251 were male (52.9%) and 1,110 (47.1%) were female. The study was approved by the Institutional Review Board (IRB protocol number 2015/01-1). The main goal for recruitment was to obtain a sample of students who had longitudinal records at university. Students' records were anonymized and collected from the university system. Student data were collected from three public universities located in three different regions of Turkey.

The strategy for employing the sample included a random sampling strategy. For the first stage, the criterion being a Year 1 student at university, all students were invited through email and, therefore, had an equal chance to join the study. Of 3,531 invited Year 1 students, a sample of 2,622 students initially agreed to join. The students were informed that recruitment would be made at the end of the academic years 2014–2015 (Year 1), 2015–2016 (Year 2), and 2017–2018 (Year 4), respectively. Of the 2,622 students who were initially employed, 164 (95 males and 69 females) students were dropped at Year 2 and 97 (41 males and 56 females) students were dropped at Year 4 because they did not participate in any data collection. The resulting 2,361 participants who joined all assessment levels did not differ significantly from students who were excluded from the study on gender and program. The high rate of recruitment (74.3%) enabled to obtain participants that could represent their characteristics including faculty, program, and gender. Within the entire sample, there were students from the Faculty of Tourism and Hotel Management (55 males and 44 females), Faculty of Letters (542 males and 411 females), Faculty of Architecture (142 males and 103 females), Faculty of Fine Arts (48 males and 55 females), Faculty of Economic and Administrative Sciences (71 males and 57 females), and Faculty of Health Sciences (383 males and 440 females). All participants were informed about the study and their verbal consent was received before the study.

### Measures

**SES.** Family SES was assessed using the Socioeconomic Status Measure developed by Tüzün (2000). This measure is a four-factor index that considers SES as a multidimensional concept. The four factors used in the index are occupational status, educational status, ownership of a flat/house and its social value, and the possessions in this property. Scores between 1 and 5 are obtained from each of the four factors, resulting in a maximum score of 20 and a minimum score of 4. The model developed by Tüzün (2000) includes five levels of social strata. Scores that belong to the five levels range from 17 to 20 (high socioeconomic status), 14 to 16 (middle-high socioeconomic status), 11 to 13 (middle socioeconomic status), 8 to 10 (middle-low socioeconomic status), and 4 to 7 (low socioeconomic status).

**University entrance examination performance.** The performance of the students at the university entrance examinations was obtained from their scores in these examinations. These scores were obtained via university records. In Turkey, placement in a university in the 2014–2015 academic year was based on scores obtained at two national/central examinations: The Transition to Higher Education Examination (Turkish: Yükseköğretime Geçiş Sınavı [YGS]) and The Bachelor Placement Examination (Lisans Yerleştirme Sınavı [LYS]). The Transition to Higher Education Examination was compulsory for everyone who wanted to enter a bachelor's program. An overall score between 100 and 500 was obtained from subtests measuring knowledge in four general areas: Turkish, Social Sciences, Basic Mathematics, and Science. There are 40 questions in each subtest, resulting in a total of 160 questions. The Bachelor Placement Examination, however, was subject-based and provided scores from each subtest measuring knowledge in Mathematics (50 questions), Geometry (30 questions), Physics (30 questions), Chemistry (30 questions), Biology (30 questions), Turkish Language and Literature (56 questions), Foreign Language (80 questions), Geography (38 questions), History (44 questions), and Philosophy (32 questions). A score between 100 and 500 was obtained from each subtest. Higher scores at YGS and LYS indicate better exam performance.

**Academic achievement.** GPA was utilized as an indicator of students' academic achievement. Information regarding the GPA levels of the students was collected via university records. GPA is measured on a scale between 0 and 100. GPA is a calculation indicating a student's overall academic achievement before the time of measurement. Higher scores of GPA indicate higher levels of academic achievement.

**Perceived instructional behavior.** The way university students perceived academics' instructional behaviors was measured by the Perceived Instructional Behavior Scale developed by Kara et al. (2015). The scale contains four factors identifying



the academics' behavior: insufficient, nervous, understanding, and authoritative. The scale consists of 24 questions focusing on various instructional behavior such as support, motivation, academic-student communication, decision-making, instructional quality, and class management (e.g., "My academics encourage me" or "I cannot ask questions to my academics"). The scale is a five-point Likert-type type measure (*disagree* = 1, *partially disagree* = 2, *no opinion* = 3, *partly agree* = 4, and *agree* = 5). Higher scores indicate more positive perceptions of instructional behavior. The reliability coefficient for this scale was originally found as .90. The median split-half correlation across the three administrations of the instrument was .84, and the median test-retest correlation between adjacent administrations was .80.

**Perceived psychosocial climate.** Perceptions of students toward the psychosocial climate of the university were measured with the School Climate Scale. The scale was developed by Cemalcilar (2010) as a 5-point Likert-type survey (e.g., *strongly disagree* = 1, *strongly agree* = 5). The scale is made up of seven dimensions: (a) perceived quality of the academic-student relationships (e.g., "We can express opinions in the class freely"), (b) perceived quality of the administrator-student relationships (e.g., "Administrators attempt to meet our needs"), (c) perceived quality of the peer relationships, (d) perceived violence in the campus (e.g., "I feel safe here"), (e) perceived quality of the physical environment, (f) perceived quality of the supporting resources, and (g) sense of belonging (e.g., "I feel I belong to here"). Higher scores in the scale indicate more positive perceptions toward the climate. Unit scores range between 1 and 5; scores of each dimension and the total scale are calculated by finding the average scores of related items (maximum score = 5). The reliability coefficient for this scale was originally found as .76. The median test-retest correlation between adjacent administrations was .80. The median overall test-retest correlation of all the individual items was .84.

## Data Analysis

Before conducting data analyses, we addressed the issue of missing data. First, there were no cases in which respondents failed to answer any questions within the surveys. Within the entire cases, missing data ranged from a low of 1.97% (in the Perceived Psychosocial Climate Scale) to a high of 3.11% (in the Perceived Instructional Behavior Scale). Although there is not a universal agreement on what is an acceptable amount of missing data, cutoffs range from 5% (e.g., Schaefer, 1999) to 20% (e.g., Sterner, 2011), putting the percentages in this study well within conservative estimates for acceptability. Thus, in this case, missing data were not imputed.

To check appropriateness for path analysis, all data including SES, GPA, university entrance examination scores, perceived instructional behavior, and perceived psychosocial climate were analyzed to identify meaningful correlations.

Significant variables were included in the path model. Next, a path analysis was conducted to determine overall goodness of fit for the model that examines associations between SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at the end of Year 1 and GPA, perceived instructional behavior, and perceived psychosocial climate at the end of Year 2 and Year 4. We used Mplus Version 7 to conduct the analyses. We assessed model fit by examining the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). Values close to or greater than .95 indicate good model fit for the CFI and TLI, values less than .06 indicate good model fit for RMSEA, and values less than or equal to .08 indicate good model fit for SRMR. We utilized a bias-corrected bootstrapping procedure (10,000 draws) to test the indirect effect of SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at the end of Year 1 on GPA, perceived instructional behavior, and perceived psychosocial climate at the end of Year 4, through GPA, perceived instructional behavior, and perceived psychosocial climate at the end of Year 2. The reason to use this approach is that it generates the most accurate confidence intervals for indirect effects, reducing Type I error rates and increasing power over other similar tests (MacKinnon et al., 2004).

## Results

### Model Results

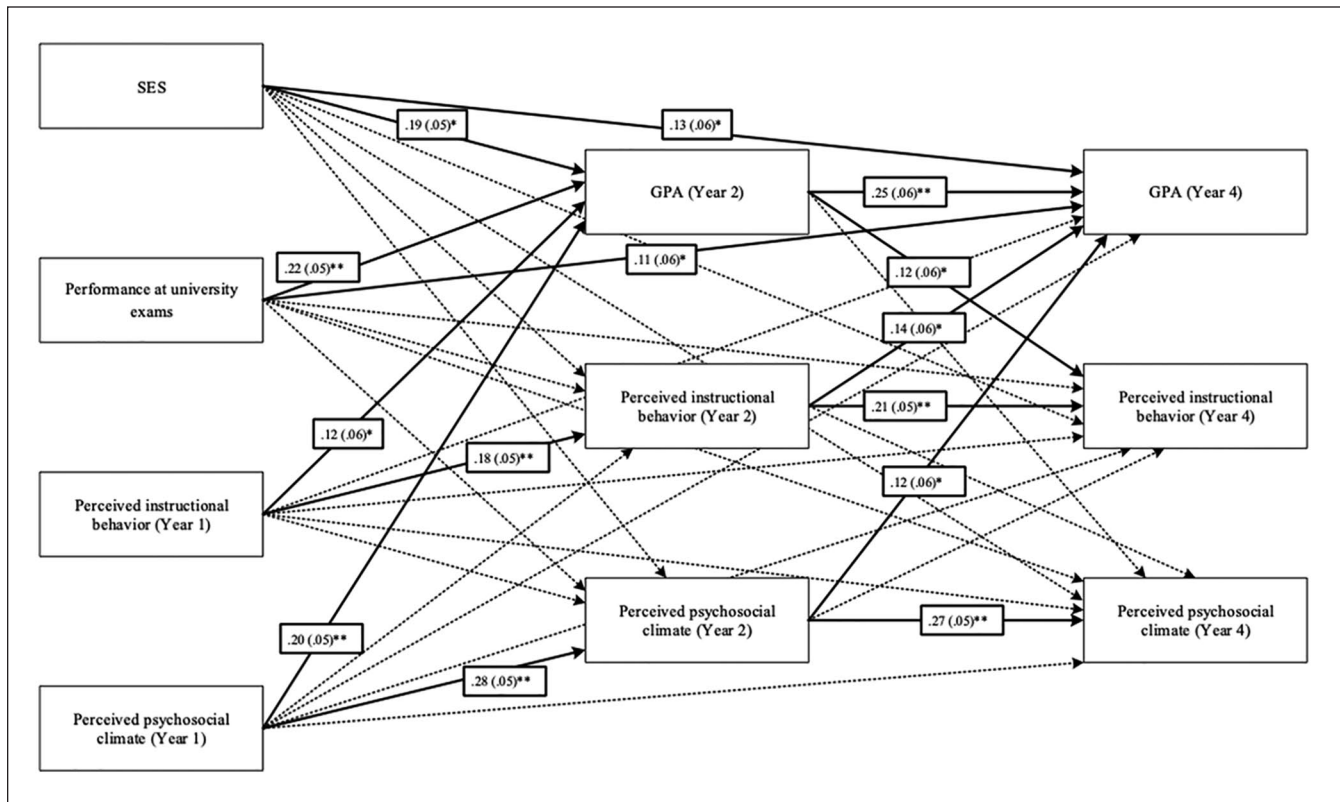
Descriptive statistics and correlations for study variables are presented in Table 1. As expected, there were significant positive correlations between SES, university exam performance, perceived instructional behavior and perceived psychosocial climate, and GPA at all levels. The hypothesized model was a good fit to the data,  $\chi^2(45, N = 2,361) = 76.38, p = .01$  CFI = .92, TLI = .91, SRMR = .03, RMSEA = .03 [CI = .02, .06] (standardized coefficients are presented in Figure 1).

Analysis to achieve the first aim of the study showed that SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at Year 1 were associated with GPA, standardized regression coefficient ( $\beta$ ) = 0.19,  $p < .05$  for SES;  $\beta = 0.22, p < .01$  for university exam performance;  $\beta = 0.12, p < .05$  for perceived instructional behavior; and  $\beta = .20, p < .01$  for perceived psychosocial climate, perceived instructional behavior ( $\beta = 0.18, p < .01$  for perceived instructional behavior), and perceived psychosocial climate ( $\beta = 0.28, p < .01$  for perceived psychosocial climate) at Year 2. Analysis to achieve the second goal showed that GPA, perceived instructional behavior, and perceived psychosocial climate at the end of Year 2 predicted GPA ( $\beta = 0.25, p < .01$  for GPA;  $\beta = 0.14, p < .05$  for perceived instructional behavior; and  $\beta = 0.12, p < .05$  for

**Table 1.** Descriptive Statistics and Correlations.

Variable name	1	2	3	4	5	6	7	8	9	10
1. Socioeconomic status	—									
2. University exam performance	.20**	—								
3. Perceived instructional behavior (Grade 1)	.15*	.13*	—							
4. Perceived psychosocial climate (Grade 1)	.02	.08	.17**	—						
5. GPA (Grade 2)	.22**	.37**	.18**	.26**	—					
6. Perceived instructional behavior (Grade 2)	.11	.06	.21**	.18**	.28**	—				
7. Perceived psychosocial climate (Grade 2)	.03	.09	.15*	.31**	.25**	.14*	—			
8. GPA (Grade 4)	.19**	.21**	.16**	.15*	.36**	.17**	.20**	—		
9. Perceived instructional behavior (Grade 4)	.11	.08	.19**	.10	.19**	.16*	.14*	.24**	—	
10. Perceived psychosocial climate (Grade 4)	.01	.11	.15*	.13*	.14*	.08	.15*	.16*	.09	—
M	12.94	291.71	3.11	3.01	71.47	2.98	3.05	75.03	3.21	3.12
SD	4.11	37.46	.45	.54	8.31	.32	.47	9.64	.51	.39
Range (max–min)	16.00	236.35	4.00	4.00	53.55	4.00	4.00	56.24	4.00	4.00
N	2,361	2,361	2,361	2,361	2,361	2,361	2,361	2,361	2,361	2,361

Note. GPA = grade point average.  
Significance levels \* $p < .05$ . \*\* $p < .01$ .



**Figure 1.** Standardized model estimates.

Note. Only significant coefficients are depicted. All paths are depicted but only significant paths are bolded. Model Fit:  $\chi^2(45, N = 2,361) = 76.38, p = .01$ , comparative fit index (CFI) = .92, Tucker–Lewis Index (TLI) = .91, SRMR = .03, root mean square error of approximation (RMSEA) = .03 [confidence interval (CI) = 0.02, 0.06].

\* $p < .05$ . \*\* $p < .01$ .

perceived psychosocial climate), perceived instructional behavior ( $\beta = 0.12, p < .05$  for GPA and  $\beta = 0.21, p < .01$  for perceived instructional behavior) and perceived psychosocial climate ( $\beta = 0.27$  and  $p < .01$  for perceived

psychosocial climate) at the end of Year 4. Results suggested that GPA, perceived instructional behavior, and perceived psychosocial climate at Year 2 were associated positively with the same variables at Year 4.

**Table 2.** Unstandardized Estimates of Indirect Effects, SEs, and 95% Bias-Corrected Bootstrap Confidence Intervals.

Indirect paths	Estimate	SE	Confidence intervals	
			Lower	Upper
SES → GPA (Year 2) → GPA (Year 4)	<b>1.85</b>	<b>0.87</b>	<b>0.24</b>	<b>3.24</b>
SES → GPA (Year 2) → PIB (Year 4)	<b>0.78</b>	<b>0.52</b>	<b>0.11</b>	<b>1.89</b>
SES → GPA (Year 2) → PPC (Year 4)	<b>0.56</b>	<b>0.45</b>	<b>0.08</b>	<b>0.56</b>
SES → PIB (Year 2) → GPA (Year 4)	<b>0.12</b>	<b>0.02</b>	<b>0.06</b>	<b>0.19</b>
SES → PIB (Year 2) → PIB (Year 4)	0.03	0.01	0.04	0.12
SES → PIB (Year 2) → PPC (Year 4)	<b>0.08</b>	<b>0.22</b>	<b>0.08</b>	<b>0.48</b>
SES → PPC (Year 2) → GPA (Year 4)	<b>0.04</b>	<b>0.35</b>	<b>0.13</b>	<b>0.67</b>
SES → PPC (Year 2) → PIB (Year 4)	0.14	0.09	0.13	0.16
SES → PPC (Year 2) → PPC (Year 4)	<b>0.56</b>	<b>0.44</b>	<b>0.34</b>	<b>1.13</b>
UEP → GPA (Year 2) → GPA (Year 4)	<b>1.33</b>	<b>0.71</b>	<b>0.19</b>	<b>2.14</b>
UEP → GPA (Year 2) → PIB (Year 4)	<b>0.83</b>	<b>0.32</b>	<b>0.17</b>	<b>0.88</b>
UEP → GPA (Year 2) → PPC (Year 4)	0.02	0.06	0.11	0.13
UEP → PIB (Year 2) → GPA (Year 4)	<b>1.01</b>	<b>0.62</b>	<b>0.38</b>	<b>3.16</b>
UEP → PIB (Year 2) → PIB (Year 4)	<b>0.57</b>	<b>0.22</b>	<b>0.19</b>	<b>0.65</b>
UEP → PIB (Year 2) → PPC (Year 4)	0.03	0.01	0.03	0.09
UEP → PPC (Year 2) → GPA (Year 4)	<b>1.67</b>	<b>0.91</b>	<b>0.23</b>	<b>2.88</b>
UEP → PPC (Year 2) → PIB (Year 4)	<b>0.77</b>	<b>0.45</b>	<b>0.10</b>	<b>1.91</b>
UEP → PPC (Year 2) → PPC (Year 4)	<b>0.08</b>	<b>0.16</b>	<b>0.11</b>	<b>0.19</b>
PIB (Year 1) → GPA (Year 2) → GPA (Year 4)	<b>1.49</b>	<b>0.77</b>	<b>0.32</b>	<b>3.66</b>
PIB (Year 1) → GPA (Year 2) → PIB (Year 4)	<b>1.43</b>	<b>0.39</b>	<b>0.17</b>	<b>1.23</b>
PIB (Year 1) → GPA (Year 2) → PPC (Year 4)	0.04	0.01	0.03	0.09
PIB (Year 1) → PIB (Year 2) → GPA (Year 4)	<b>0.39</b>	<b>0.18</b>	<b>0.23</b>	<b>1.10</b>
PIB (Year 1) → PIB (Year 2) → PIB (Year 4)	<b>0.08</b>	<b>0.03</b>	<b>0.02</b>	<b>0.08</b>
PIB (Year 1) → PIB (Year 2) → PPC (Year 4)	0.01	0.01	0.02	0.04
PIB (Year 1) → PPC (Year 2) → GPA (Year 4)	<b>1.39</b>	<b>0.77</b>	<b>0.17</b>	<b>2.14</b>
PIB (Year 1) → PPC (Year 2) → PIB (Year 4)	<b>0.32</b>	<b>0.16</b>	<b>0.11</b>	<b>0.68</b>
PIB (Year 1) → PPC (Year 2) → PPC (Year 4)	<b>0.06</b>	<b>0.02</b>	<b>0.12</b>	<b>0.24</b>
PPC (Year 1) → GPA (Year 2) → GPA (Year 4)	<b>1.64</b>	<b>0.53</b>	<b>0.26</b>	<b>3.11</b>
PPC (Year 1) → GPA (Year 2) → PIB (Year 4)	<b>0.38</b>	<b>0.11</b>	<b>0.24</b>	<b>0.45</b>
PPC (Year 1) → GPA (Year 2) → PPC (Year 4)	<b>0.22</b>	<b>0.14</b>	<b>0.18</b>	<b>0.96</b>
PPC (Year 1) → PIB (Year 2) → GPA (Year 4)	<b>0.82</b>	<b>0.38</b>	<b>0.31</b>	<b>1.54</b>
PPC (Year 1) → PIB (Year 2) → PIB (Year 4)	<b>0.15</b>	<b>0.05</b>	<b>0.03</b>	<b>0.22</b>
PPC (Year 1) → PIB (Year 2) → PPC (Year 4)	0.02	0.01	0.02	0.05
PPC (Year 1) → PPC (Year 2) → GPA (Year 4)	<b>0.32</b>	<b>0.11</b>	<b>0.09</b>	<b>0.21</b>
PPC (Year 1) → PPC (Year 2) → PIB (Year 4)	0.05	0.01	0.02	0.09
PPC (Year 1) → PPC (Year 2) → PPC (Year 4)	<b>0.19</b>	<b>0.03</b>	<b>0.03</b>	<b>0.08</b>

Note. Bolded values represent significant indirect effects. SES = socioeconomic status; GPA = grade point average; UEP = university exam performance; PIB = perceived instructional behavior; PPC = perceived psychosocial climate.

Finally, the indirect effects from SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at Year 1 to GPA, perceived instructional behavior, and perceived psychosocial climate at Year 4 were significant via GPA, perceived instructional behavior, and perceived psychosocial climate at Year 2 (see Table 2 for unstandardized estimates of indirect effects). Considering the final GPA at Year 4, first, the indirect effect from SES at Year 1 to GPA at Year 4 was significant via GPA ( $\beta = 1.85$ ), perceived instructional behavior ( $\beta = 0.12$ ), and perceived psychosocial climate ( $\beta = 0.04$ ) at Year 2. Second,

the indirect effect from university exam performance at Year 1 to GPA at Year 4 was significant via GPA ( $\beta = 1.33$ ), perceived instructional behavior ( $\beta = 1.01$ ), and perceived psychosocial climate ( $\beta = 1.67$ ) at Year 2. Third, the indirect effect from perceived instructional behavior at Year 1 to GPA at Year 4 was significant via GPA ( $\beta = 1.49$ ), perceived instructional behavior ( $\beta = 0.39$ ), and perceived psychosocial climate ( $\beta = 1.39$ ) at Year 2. Fourth, the indirect effect from perceived psychosocial climate at Year 1 to GPA at Year 4 was significant via GPA ( $\beta = 1.64$ ), perceived instructional behavior ( $\beta = 0.82$ ), and perceived psychosocial climate ( $\beta = 0.32$ )

at Year 2. These outcomes indicate that GPA, perceived instructional behavior, and perceived psychosocial climate at Year 2 are significantly mediating mechanisms between input variables including SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at Year 1 and GPA at Year 4. Overall, these findings indicate that SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate at Year 1 were associated with changes in GPA, perceived instructional behavior, and perceived psychosocial climate at Year 4 through their association with GPA, perceived instructional behavior and perceived psychosocial climate at Year 2.

## Discussion

Identification of the predictors of achievement in higher education is important because they can be used to compare the academic achievement of individual students to others. Literature classifies these predictors into pre-university and at-university predictors. Pre-university predictors include SES, university preparedness, test scores, academic ability, adaptability, and parents' level of education. At-university predictors of achievement include classroom experience, climate, academic advising, extracurricular activities, financial aid, and faculty involvement (Gifford et al., 2006). In this study, we used longitudinal data spanning multiple developmental periods to assess associations between academic achievement and its predictors, including SES, performance at university exams, perceptions of academics' behavior, and the psychosocial climate of the university.

Measurement was conducted at Year 1, Year 2, and Year 4 because these years represented the beginning, middle, and end of university life, respectively. At Year 1, students are supposed to adapt to university and establish new academic and social relationships, while their personal and social backgrounds still have considerable influence on their lives. At Year 2, students' views and practices regarding university life are supposed to get more stabilized while the critical transitory period is still going on. Finally, at Year 4, students are supposed to possess crystallized views regarding university and a more uniform and stable academic and social identity. We hypothesized that as students progress throughout these periods, changes in their academic achievement and its correlates are likely to occur.

In this study, the longitudinal work assessed the associations between GPA, students' perceptions of their academics' instructional behavior, and the psychosocial climate of the university during and toward the end of university education. A finding of this study was that higher levels of GPA, perceived instructional behavior, and perceived psychosocial climate at Year 2 persisted at Year 4 and were related to greater levels of GPA, perceived instructional behavior, and psychosocial climate. Students who are provided with a positive psychosocial climate and quality instruction appear to possess favorable views toward their

university and academics, develop appropriate academic skills, perform well in their tasks, and graduate with a higher level of academic achievement. These findings suggest that in a supportive campus where students' needs are assessed and met and students feel a sense of belonging, they can be self-assured, emotionally strong, and able to deal with challenges and difficulties. This creates an important foundation for their learning, development, and achievement (Allen et al., 2018). These findings support previous research which found that there is a direct relationship between school climate and academic achievement (Davis & Warner, 2018; Hoy et al., 1998; Thapa et al., 2013), and between instructional behavior and academic achievement (Adams et al., 2000; Allen et al., 2011).

An important advantage of this study is that we included earlier measures of outcome variables and therefore accounted for some stability in these constructs over time. By focusing on students' perceptions toward the campus climate, instructional behavior and GPA at Year 2, we were able to provide stronger support for the associations between potential changes in these constructs from Year 1 through Year 4. Therefore, students' achievement and perceptions toward the university by the end of Year 2 predict the likelihood students will increase or decrease their achievement and perceptions toward the university. This stability in achievement was illustrated by earlier research (Carrillo-de-la-Pena et al., 2009; Gustafsson & Nilsen, 2016; Maxwell, 2016). This finding underlines the significance of having achieved academically and developed positive perceptions toward the university by the end of Year 2, which is the middle point of university life.

Findings of this study indicate that students from families of higher SES, students performing better at entrance exams and students who perceived behaviors of the academics and the psychosocial climate of the university more positively were more likely to have higher academic achievement. Especially the finding that early student perceptions toward instructional behavior and psychosocial climate predict students' similar perceptions at the following years is significant. Perceived instructional behavior and perceived psychosocial climate at Year 1 were associated with perceptions at Year 2, indicating that the way academics behave and the university climate is shaped has a longitudinal influence on students' perceptions. Indeed, studies have indicated the relationships between students' attitudes toward school and their overall adaptation within the academic environment and beyond (Marchant et al., 2001; Wang & Holcombe, 2010).

Students with higher academic achievement and more positive perceptions toward instructional behavior and psychosocial climate at Year 2 were more likely to increase their academic achievement and perceptions, as they transition toward the end of their bachelor's life. This finding suggests that the way students perceive the psychosocial climate of the campus and academics' behaviors at the first



2 years influences their future perceptions because it is during this time that students start to form attitudes about the university and specifically instructional quality. These initial experiences, and the level of academic achievement which is associated with them, may then set the stage for achievement or underachievement in the final year. Thus, early attempts for adaptation of university students may play an important role in the development of positive experiences and attitudes, thereby playing a role in academic achievement. This finding is innovative when it can be related to the fact that experiences at early levels have marked effects on the future development of university students (Adey & Shayer, 2006).

Another significance of this study is the focus on SES, as it relates to students' GPA at the end of Year 2 and Year 4. This finding is in line with previous research which found that there is a direct relationship between SES and academic achievement (Crosnoe & Cooper, 2010; Duncan & Magnuson, 2005; Galindo & Sonnenschein, 2015). This suggests that higher SES provides students with more chances to achieve. These results are not surprising, considering the relationship between funding and achievement at university. As this finding shows, achievement is influenced by students' SES. This finding indicates that our society may be failing in one of the greatest commitments of every modern society, that is, the responsibility to provide educational opportunities for each student regardless of social and economic background. Unfortunately, many poor students come to university without the social and economic benefits held by many middle-to-high-SES students. In Turkey, like elsewhere in the world, family SES is one of the most important determinants of school achievement (Sirin, 2005). Thus, the current university system creates a situation where students who come from lower-family-SES are likely to achieve lower.

It is well-known that the way students view themselves and their university has significant implications for their relationships with people and the amount of time they invest in their academic studies. This may be because the development of a sense of self-efficacy and belongingness toward the university allows students to spend more time to develop academic skills (e.g., study, writing) and engage in constructive academic relationships, thereby increasing academic investment (Høigaard et al., 2015). In turn, this may be associated with greater academic productivity, an optimistic view of the school, and increased self-confidence.

Finally, we investigated whether GPA, perceived instructional behavior, and perceived psychosocial climate at the end of Year 2 were mechanisms that linked SES, university examination performance, perceived instructional behavior, and perceived psychosocial climate at Year 1 with GPA, perceived instructional behavior, and perceived psychosocial climate at Year 4. Most importantly, all indirect effects that linked Year 1 variables to GPA at Year 4 through Year 2 variables were significant. The indirect links of SES, university

exam performance, perceived instructional behavior, and psychosocial climate at Year 1 to achievement at Year 4 were substantially related to GPA, students' perceptions of their academics' behavior, and the psychosocial climate of the campus at Year 2. This finding underscores the influence of academics' behavior and campus climate in academic achievement. This finding is in line with Hoy et al. (1998) who found that achievement in middle years and the climate of the educational setting were effective in changes in the relationship between SES and achievement.

The indirect effect of university examination performance on achievement at Year 4 through changes in GPA and students' perceptions toward instructional behaviors and university climate achievement at Year 2 indicates the role that achievement at early years plays between pre-university factors and achievement level at graduation. This also illustrates the effect of the scores obtained on the university entrance examination on the achievement level at Year 4 through Year 2 variables. This finding is consistent with Gifford et al. (2006) who found that university entrance examination scores served as an effective predictor of student academic success as demonstrated by significantly higher cumulative GPA.

We located indirect effects of perceived academic behaviors and psychosocial climate at Year 1 on achievement at Year 4 through Year 2 variables. This finding is in line with Allen et al. (2011) who found that instruction-related behaviors influenced academic achievement directly and indirectly. Similarly, Uline and Tschannen-Moran (2008) found that school climate had direct and indirect effects on achievement. The overall results suggest that SES, university examination performance, perceived instructional behavior and psychosocial climate at Year 1 can be tools to promote academic achievement indirectly by supporting students to achieve better, creating a positive atmosphere at the campus and motivating academics to enhance the quality of their instruction. With the significant direct and indirect associations between SES, university exam performance and students' perceptions of their academics' behavior and psychosocial climate at Year 1 and achievement at Year 4, we argue that appropriate educational planning needs to prioritize a quality pedagogical environment, support students in their study skills and provide them with psychosocial and financial support.

The statistical outcomes illustrated above underscore the impact of university examination performance as an outcome of high school educational quality, financial and psychosocial support, and the instructional quality at university on academic achievement. Indeed, existing research has provided some evidence for the mediation role of school climate (Maxwell, 2016; Uline & Tschannen-Moran, 2008), instructional behavior (Allen et al., 2011; Gustafsson & Nilsen, 2016), and outcomes of formative assessment of academic achievement (Carrillo-de-la-Pena et al., 2009). Building on this work, we identified that students' early perceptions of

the campus climate and the instructional behavior, SES, and university examination performance were associated with later GPA, perceived instructional behavior, and perceived psychosocial climate. We subsequently provided evidence that GPA, perceived instructional behavior, and perceived psychosocial climate at Year 2 are associated with final measures of GPA, perceived instructional behavior, and perceived psychosocial climate at Year 4. Moreover, we extended the span in which this specific mediational model has been tested by going from Year 1 through Year 4, a period that covers the entire bachelor's life. This period is important to human life because achievement at university can help university graduates attain developmental objectives and establish a settlement within adult life.

All in all, outcomes of the current study suggest that (a) high levels of student SES and performance at the university entrance examinations as well as positive perceptions toward the university's psychosocial climate and instructional quality may positively affect students' achievement across the middle years and, subsequently, by the end of higher education; (b) students' perceptions toward the university and achievement that appear to crystallize toward the middle year of high education are likely to continue throughout the final year; (c) and the factors linked to academic achievement involve achievement at university entrance examinations, instructional quality, and the psychosocial climate of the university.

## Limitations

Despite the strengths of this study, there are some limitations. First, we provided support for the unique longitudinal relationships between academic achievement and university examination performance. However, cross-sectional measurement of performance may not allow trends in an outcome to be monitored over time because this measurement does not allow observation at multiple time points (Sedgwick, 2014). Nevertheless, the strength and assumptions of the structural equation model allowed us to investigate the prediction of academic achievement at later years by students' examination performance. Second, the use of only one statistical measure of academic achievement may be a shortcoming. Ideally, future studies should incorporate multiple measures of academic achievement that can be linked with qualitative data. Third, this study examined associations of academic achievement with four variables—SES, university examination performance, perceived psychosocial climate, and perceived instructional behavior—whereas current research acknowledges additional important factors such as personality or educational policy (Rattan et al., 2015; Rimfeld et al., 2016). Therefore, future studies are warranted to investigate the relationships among other factors associated with academic achievement in higher education. Fourth, the sample which encompassed students from different departments, programs, and genders was included in the

analysis as a whole. Acknowledging that exclusion of these variables may have led to potential biases in the results, future studies may analyze the impact of these variables on achievement. Fifth, there was no inclusion of outcome variables such as employment or preparation for jobs because we preferred to stay within university years and believed that career goals are not typically met during university. However, the relationships between academic achievement and such outcomes need to be investigated by future studies. Finally, this study was conducted with students from public universities. Therefore, the feasibility of investigating the theoretical and methodological approach in private universities should be tested by future research.

## Implications

The levels of SES, university examination performance as an outcome of high school education, perceived instructional behavior, and perceived psychosocial climate at the beginning of university life were associated with changes in academic achievement as well as the changes among these variables. These findings have some implications. First, the finding implies that students with low SES are at risk of underachievement and, therefore, various measures should be taken for improving the learning effectiveness of these students. Universities should consider SES in the education they offer and the practices they implement. Also, policies at the university and national level should include efforts that explore and work to eliminate socioeconomic disparities between students. This might happen by offering additional study and course options, part-time in-campus work opportunities, and grants based on socioeconomic needs analysis. Second, stakeholders need to set goals to achieve a secure, supportive, and intimate psychosocial atmosphere within the campus. Explicit policies for action as well as a whole campus program for establishing a sound psychosocial environment need to be designed and implemented in collaboration. Third, a high profile and coherent approach needs to be implemented to enhance the standards of teaching behaviors expected from the academics. Finally, academics should be assessed on the quality of their teaching behavior before employment while they should be provided with in-service opportunities (e.g., funding, training) to improve their pedagogical skills.

The significant indirect effects found in this study suggest that students' achievement and perceptions as they progress toward the middle of higher education may be mechanisms that link SES, university exam performance, perceived instructional behavior, and perceived psychosocial climate and GPA at graduation. To have students graduating with high academic achievement levels, at the macro level, policy needs to focus on student performance during high school education and the university entrance exams, and acknowledge early university life as a time to facilitate the development of students' academic achievement and

positive perceptions toward the university. Also, universities that aim to offer quality education to their students and have successful graduates equipped with various skills should present an environment whereby students are less influenced by low SES, design a welcoming university climate, and enhance the quality of instruction within their institutionalized bodies.

## Conclusion

In conclusion, this study has multiple strengths and adds to our current understanding regarding the developmental phase of academic achievement. GPA, perceived instructional behavior, and perceived psychosocial climate during university years may be associated with changes in academic achievement from the beginning of higher education toward its end. Thus, targeting the first year of higher education as a time to improve the conditions of the university students (e.g., SES) and the university (e.g., instructional behavior, campus environment) may facilitate the development of academic skills. The significant indirect effects found in the current study suggest that the students' GPA, perceived instructional behavior, and psychosocial climate toward the middle years of higher education, such as Year 2, maybe one mechanism that links SES, university exam performance and perceived instructional behavior and the psychosocial climate and the final level of academic achievement at Year 4. Although the influence of student-related, institution-related, and examination-related factors are not taken into consideration sufficiently, students' academic achievement levels may be receptive to improvements in the conditions of students and universities to allow students to develop appropriate skills and better overall achievement levels.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## ORCID iD

Halis Sakız  <https://orcid.org/0000-0003-2406-1011>

## References

- Adams, G. R., Berzonsky, M. D., & Keating, L. (2006). Psychosocial resources in first-year university students: The role of identity processes and social relationships. *Journal of Youth and Adolescence, 35*, 78–88. <https://doi.org/10.1007/s10964-005-9019-0>
- Adams, G. R., Ryan, B. A., & Keating, L. (2000). Family relationships, academic environments, and psychosocial development during the university experience: A longitudinal investigation. *Journal of Adolescent Research, 15*, 99–122. <https://doi.org/10.1177/0743558400151006>
- Adey, P., & Shayer, M. (2006). *Really raising standards: Cognitive intervention and academic achievement*. Routledge.
- Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science, 333*, 1034–1037. <https://doi.org/10.1126/science.1207998>
- Allen, K., Kern, P., Vella-Brodick, D., Hattie, J., & Waters, L. (2018). What schools need to know about belonging: A meta-analysis. *Educational Psychology Review, 30*, 1–34. <https://doi.org/10.1007/s10648-016-9389-8>
- Anderson, C. S. (1982). The search for school climate: A review of the research. *Review of Educational Research, 52*, 368–420. <https://doi.org/10.3102/00346543052003368>
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university*. SRHE and Open University Press.
- Bloom, D., Hartley, M., & Rosovsky, H. (2007). Beyond private gain: Public benefits of higher education. In J. F. Forest & P. G. Altbach (Eds.), *International handbook of higher education* (pp. 293–308). Springer.
- Bornstein, M. C., & Bradley, R. H. (2003). *Socioeconomic status, parenting, and child development*. Lawrence Erlbaum.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371–399. <https://doi.org/10.1146/annurev.psych.53.100901.135233>
- Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. SAGE.
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon (Series Ed.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology: Theoretical models of human development* (5th ed., pp. 993–1028). John Wiley.
- Brookover, W. B., Thomas, S., & Paterson, A. (1964). Self-concept of ability and school achievement. *Sociology of Education, 37*, 271–278. <https://doi.org/10.2307/2111958>
- Buckley, J., Schneider, M., & Shang, Y. (2004). *LAUSD school facilities and academic performance, national clearing house for educational facilities*. [www.edfacilities.org/pubs/LAUSD%20Report.pdf](http://www.edfacilities.org/pubs/LAUSD%20Report.pdf)
- Cadez, S., Dimovski, V., & Zaman Groff, M. (2017). Research, teaching and performance evaluation in academia: The salience of quality. *Studies in Higher Education, 42*(8), 1455–1473. <https://doi.org/10.1080/03075079.2015.1104659>
- Caemmerer, J. M., & Keith, T. Z. (2015). Longitudinal, reciprocal effects of social skills and achievement from kindergarten to eighth grade. *Journal of School Psychology, 53*, 265–281. <https://doi.org/10.1016/j.jsp.2015.05.001>
- Caro, D. H., McDonald, T., & Willms, J. D. (2009). A longitudinal analysis of math achievement gaps associated with socio-economic status: How do they change from childhood to adolescence. *Canadian Journal of Education, 32*, 558–590.
- Carrillo-de-la-Pena, M. T., Bailles, E., Caseras, X., Martínez, À., Ortet, G., & Pérez, J. (2009). Formative assessment and academic achievement in pre-graduate students of health sciences. *Advances in Health Sciences Education, 14*, 61–67. <https://doi.org/10.1007/s10459-007-9086-y>
- Cemalcilar, Z. (2010). Schools as socialisation contexts: Understanding the impact of school climate factors on students'



- sense of school belonging. *Applied Psychology*, *59*, 243–272. <https://doi.org/10.1111/j.1464-0597.2009.00389.x>
- Chapman, J. W., & Tunmer, W. E. (1997). A longitudinal study of beginning reading achievement and reading self-concept. *British Journal of Educational Psychology*, *67*, 279–291. <https://doi.org/10.1111/j.2044-8279.1997.tb01244.x>
- Crosnoe, R., & Cooper, C. E. (2010). Economically disadvantaged children's transitions into elementary school: Linking family processes, school contexts, and educational policy. *American Educational Research Journal*, *47*, 258–291. <https://doi.org/10.3102/0002831209351564>
- Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Educational Policy Analysis Archives*, *8*, 1–42. <https://doi.org/10.14507/epaa.v8n1.2000>
- Davis, J. R., & Warner, N. (2018). Schools matter: The positive relationship between New York City high schools' student academic progress and school climate. *Urban Education*, *53*, 959–980. <https://doi.org/10.1177/0042085915613544>
- Duckworth, A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, *16*, 939–944.
- Duncan, G. J., & Magnuson, K. A. (2005). Can family socioeconomic resources account for racial and ethnic test score gaps? *The Future of Children*, *15*, 35–54. <https://doi.org/10.1111/j.1467-9280.2005.01641.x>
- Evans, Z. L. (2000, November 10–13). *Survey examines trends in college admission*. NACAC Bulletin.
- Feldman, R. S. (1986). *The social psychology of education: Current research and theory*. Cambridge University Press.
- Fleming, C. B., Haggerty, K. P., Catalano, R. F., Harachi, T. W., Mazza, J. J., & Gruman, D. H. (2005). Do social and behavioral characteristics targeted by preventive interventions predict standardized test scores and grades? *The Journal of School Health*, *75*, 342–349. <https://doi.org/10.1111/j.1746-1561.2005.tb06694.x>
- Galindo, C., & Sonnenschein, S. (2015). Decreasing the SES math achievement gap: Initial math proficiency and home learning environments. *Contemporary Educational Psychology*, *43*, 25–38. <https://doi.org/10.1016/j.cedpsych.2015.08.003>
- Gifford, D. D., Briceno-Perriott, J., & Mianzo, F. (2006). Locus of control: Academic achievement and retention in a sample of university first-year students. *Journal of College Admission*, *191*, 18–25.
- Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology*, *95*, 124–136. <https://doi.org/10.1037/0022-0663.95.1.124>
- Gustafsson, J. E., & Nilsen, T. (2016). The impact of school climate and teacher quality on mathematics achievement: A difference-in-difference approach. In T. Nilsen & J. E. Gustafsson (Eds.), *Teacher quality, instructional quality and student outcomes* (pp. 81–95). Springer International.
- Hair, N. L., Hanson, J. L., Wolfe, B. L., & Pollak, S. D. (2015). Association of child poverty, brain development, and academic achievement. *JAMA Pediatrics*, *169*, 822–829. <https://doi.org/doi:10.1001/jamapediatrics.2015.1475>
- Høigaard, R., Kovač, V. B., Øverby, N. C., & Haugen, T. (2015). Academic self-efficacy mediates the effects of school psychological climate on academic achievement. *School Psychology Quarterly*, *30*, 64–74. <https://doi.org/10.1037/spq0000056>
- Hoy, W. K., Hannum, J., & Tschannen-Moran, M. (1998). Organizational climate and student achievement: A parsimonious and longitudinal view. *Journal of School Leadership*, *8*, 336–359. <https://doi.org/10.1177/105268469800800401>
- Hughes, J., & Kwok, O. M. (2007). Influence of student-teacher and parent-teacher relationships on lower achieving readers' engagement and achievement in the primary grades. *Journal of Educational Psychology*, *99*, 39–51. <https://doi.org/10.1037/0022-0663.99.1.39>
- Hurtado, S., Carter, D. F., & Kardia, D. (1998). The climate for diversity: Key issues for institutional self study. *New Directions for Institutional Research*, *98*, 53–63. <https://doi.org/10.1002/ir.9804>
- Kara, A., İzci, E., Köksalan, B., & Zelyurt, H. (2015). Algılanan öğretim elemanı davranışları ölçeğinin geliştirilmesi. *The Journal of International Lingual Social and Educational Sciences*, *1*, 21–32.
- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*, 99–128. [https://doi.org/10.1207/s15327906mbr3901\\_4](https://doi.org/10.1207/s15327906mbr3901_4)
- Marchant, G. J., Paulson, S. E., & Rothlisberg, B. A. (2001). Relations of middle school students' perceptions of family and school contexts with academic achievement. *Psychology in the Schools*, *38*, 505–519. <https://doi.org/10.1002/pits.1039>
- Maxwell, L. E. (2016). School building condition, social climate, student attendance and academic achievement: A mediation model. *Journal of Environmental Psychology*, *46*, 206–216. <https://doi.org/10.1016/j.jenvp.2016.04.009>
- OECD. (2012). *What are the returns on higher education for individuals and countries?*
- OECD. (2019). *Population with tertiary education (indicator)*.
- Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research*, *70*, 323–367. <https://doi.org/10.3102/00346543070003323>
- Parker, J., Duffy, J., Wood, L., Bond, B., & Hogan, M. (2005). Academic achievement and emotional intelligence: Predicting the successful transition from high school to university. *Journal of the First-Year Experience & Students in Transition*, *17*, 67–78.
- Payandeh Najafabadi, A. T., Najafabadi, M. O., & Farid-Rohani, M. R. (2013). Factors contributing to academic achievement: A Bayesian structure equation modelling study. *International Journal of Mathematical Education in Science and Technology*, *44*(4), 490–500. <https://doi.org/10.1080/0020739X.2012.742149>
- Perry, R. P., & Smart, J. C. (2007). *The scholarship of teaching and learning in higher education: An evidence-based perspective*. Springer.
- Rattan, A., Savani, K., Chugh, D., & Dweck, C. S. (2015). Leveraging mindsets to promote academic achievement: Policy recommendations. *Perspectives on Psychological Science*, *10*, 721–726. <https://doi.org/10.1177/1745691615599383>
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*, 353–387. <https://doi.org/10.1037/a0026838>



- Rimfeld, K., Kovas, Y., Dale, P. S., & Plomin, R. (2016). True grit and genetics: Predicting academic achievement from personality. *Journal of Personality and Social Psychology, 111*, 780–789. <http://dx.doi.org/10.1037/pspp0000089>
- Sakız, H. (2016). Ability, examination and inclusive education: Stretching the hard lines of the educational system. *Educational Process: International Journal (EDUPLJ), 5*(1), 65–75.
- Sakız, H., & Aftab, R. (2019). Academic achievement and its relationships with psychological resilience and socio-demographic characteristics. *International Journal of School & Educational Psychology, 7*(4), 263–273.
- Schaefer, J. L. (1999). Multiple imputation: A primer. *Statistical Methods in Medical Research, 8*, 3–15. <https://doi.org/10.1177/096228029900800102>
- Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological Bulletin, 143*(6), 565–600. <https://doi.org/10.1037/bul0000098>
- Schwartz, B. M., & Gurling, R. A. R. (2012). *Evidence-based teaching for higher education*. American Psychological Association.
- Sedgwick, P. (2014). Cross sectional studies: Advantages and disadvantages. *British Medical Journal, 348*, 1–2. <https://doi.org/10.1136/bmj.g2276>
- Sireci, S. G., Zanetti, M. L., & Berger, J. B. (2003). Recent and anticipated changes in post secondary admission: A survey of New England colleges and universities. *The Review of Higher Education, 26*, 323–342. <http://doi.org/10.1353/rhe.2003.0001>
- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*, 417–453. <https://doi.org/10.3102/00346543075003417>
- Stern, W. R. (2011). What is missing in counseling research? Reporting missing data. *Journal of Counseling & Development, 89*, 56–62. <https://doi.org/10.1002/j.1556-6678.2011.tb00060.x>
- Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*, 357–385. <https://doi.org/10.3102/0034654313483907>
- Thomas, S. L. (2000). Ties that bind: A social network approach to understanding student integration and persistence. *Journal of Higher Education, 71*, 591–615. <https://doi.org/10.1080/00221546.2000.11778854>
- Tüzün, S. (2000). Kentsel Türkiye hane ve bireyleri için bir tabakalaşma modeli olarak veri sosyo-ekonomik statü indeksi (Veri S.E.S.İ) [Data socio-economic status index as a stratification model for Urban Turkish houses and individuals]. In F. Atacan, F. Ercan, H. Kurtuluş, & M. Türkay (Eds.), *Mübeccel Kıray için yazılar [Essays for Mübeccel Kıray]* (pp. 371–385). Bağlam.
- Uline, C., & Tschannen-Moran, M. (2008). The walls speak: The interplay of quality facilities, school climate, and student achievement. *Journal of Educational Administration, 46*, 55–73. <https://doi.org/10.1108/09578230810849817>
- Wang, M., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal, 47*, 633–662. <https://doi.org/10.3102/0002831209361209>
- Wintre, M. G., Dilouya, B., Pancer, S. M., Pratt, M. W., Birnie-Lefcovitch, S., Polivy, J., & Adams, G. (2011). Academic achievement in first-year university: Who maintains their high school average? *Higher Education, 62*, 467–481. <https://doi.org/10.1007/s10734-010-9399-2>
- Zajacova, A., Lynch, S. M., & Espenshade, T. J. (2005). Self-efficacy, stress, and academic success in college. *Research in Higher Education, 46*, 677–706. <https://doi.org/10.1007/s11162-004-4139-z>