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Examination of the Effectiveness of School Leadership: A Second-order Meta-analysis Study

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Abstract

This study aimed to examine the effectiveness of school leadership by exploring the relationships between various school leadership models and practices and different school outcomes, including organizational, teacher, and student outcomes. Data for this study were retrieved from multiple databases, including Web of Science, Scopus, ERIC, Academic Search Ultimate, and TR Dizin-Turkish national index. The analysis synthesized findings from 23 meta-analysis studies, utilizing second-order meta-analysis with the random-effects model. The study revealed a significantly positive relationship between school leadership and school outcomes, with a high level of correlation (mean effect size: 0.46). Additionally, this relationship varied significantly based on the type of school leadership, school outcome, and the quality of the studies conducted.

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Introduction

School leadership plays a crucial role in shaping both internal and external processes within schools by influencing various stakeholders. School leaders strive to align their actions with the school's vision, working in collaboration with stakeholders (Bush & Glover, 2014). Their intention is to enhance the quality of school outcomes, thereby defining school effectiveness (Huber & Muijs, 2010). Consequently, researchers have focused on examining the relationship between school leaders and school outcomes, as evidenced by studies conducted by Hendriks & Steen (2012) and Leithwood et al. (2020). The connection between school leadership and school outcomes is intricately linked to the effectiveness of school leadership (Mumford & Barrett, 2013).

In addition to primary studies exploring the relationship between school leadership and school outcomes, several meta-analysis studies have delved into this area (Alanoğlu & Karabatak, 2022; Liebowitz & Porter, 2019; Tan et al., 2021). Synthesizing the findings of these meta-analysis studies can provide a comprehensive evaluation of school leadership effectiveness. Such comprehensive meta-analysis studies are essential for a holistic assessment of school leadership effectiveness, fulfilling a crucial need within the existing literature.

School leadership constitutes a pivotal factor in accomplishing school objectives. The gauge for measuring the school's goal attainment is reflected in its outcomes, encompassing organizational, teacher, and student-level achievements. Understanding the influence of school leadership on these outcomes is essential. Hence, it is crucial to delineate the correlation between school leadership and organizational, teacher, and student-level outcomes. This exploration allows us to discern the specific levels at which school leadership

proves most effective and where its efficacy is comparatively low. Through this analysis, management policies can be formulated, taking into account the strengths and weaknesses of school leadership, thus ensuring a more targeted and strategic approach to school improvement.

Theoretical Background

School leadership

School leaders, comprising principals, assistant principals, and teachers, play a significant role in influencing school stakeholders in alignment with the school's objectives (Bush & Glover, 2014; Tan et al., 2020). School leadership involves the process of engaging internal and external school stakeholders in harmony with the vision, mission, values, and principles of the schools. Tan et al. (2020) and Krüger and Scheerens (2012) point out that school leadership comprises two essential aspects: school leadership models and school leadership practices.

Bush and Glover (2014) and Gümüş et al. (2018) state that school leadership models have a solid theoretical background, focusing on leadership situations rather than the characteristics of individual leaders. These models are derived from the examination of more successful and effective school examples. Furthermore, the literature encompasses various school leadership models, including instructional, transformational, authentic, distributed, systemic, moral, contingent, managerial, and teacher leadership models.

On the other hand, school leadership practices concern the actions of school leaders. In other words, these practices encompass the behaviors exhibited by school leaders (Liebowitz & Porter, 2019). School leadership practices include activities such as building shared

vision and values, school redesign, providing professional development, enhancing teaching and learning, empowering teachers, motivating teachers, managing resources, and engaging families and the community (Tan et al., 2020).

School leadership effectiveness

Mumford and Barrett (2013) define leadership effectiveness as the impact of organizational leaders on the organization's outcomes. They categorize these outcomes as organizational, social, psychological, performance, substantive, interpersonal, and team-related. Similarly, Derue et al. (2011) define leadership effectiveness as the extent to which leaders influence organizational performance, affective aspects, and relational characteristics of individuals and teams. In the context of schools, leadership effectiveness refers to the impact of school leaders on school outcomes (Hendriks & Steen, 2012).

Effective school leaders create a conducive learning environment by considering the specific context they are in. In doing so, they implement interventions to enhance motivation, commitment, and working conditions for staff, particularly teachers. Moreover, effective school leadership is closely linked to the equitable distribution of leadership responsibilities among various school stakeholders (Leithwood et al., 2020). Consequently, school leaders concentrate on improving learning outcomes.

Tan et al. (2020) and Scheerens (2012a) argue that school leaders significantly contribute to the outcomes of organizations, teachers, and students. Organizational outcomes, as identified by Karadağ et al. (2015) and Sarıer and Uysal (2020), include aspects such as organizational culture, climate, health, performance, learning, citizenship, commitment, trust, and justice. They also pinpoint

negative organizational outcomes like stress, burnout, and cynicism. Similarly, teacher outcomes encompass self-efficacy, job satisfaction, well-being, and teaching practices (Alanoglu, 2021; Goktas, 2021; Liebowitz & Porter, 2019). Additionally, student outcomes, as defined by Tan et al. (2021), encompass academic achievement, learning attitudes, and attainment.

Moderator variables

Several variables can mediate the relationship between school leadership and school outcomes. Various meta-analysis studies have indicated that this relationship varies based on the countries in which the studies were conducted (location) (Alanoğlu & Karabatak, 2022; Balwant, 2016; Uysal & Sarier, 2019). However, Alanoglu (2021) observed that this relationship remained consistent regardless of countries.

Another moderator is the hierarchical statuses of leaders. Tan et al. (2020) found that leadership status influenced school outcomes, while Tan et al. (2021) did not find a significant difference. The third moderator variable is the school level at which school leaders operate. Köybaşı Şemin (2022) suggested that the relationship between school leadership and school outcomes varied based on school levels, although some other studies (Ertem, 2021; Karadağ, 2020) did not find such a distinction.

Other potential moderator variables include the quality of studies, types of primary studies, and publication bias statuses. The reliability of calculated effect size should consider the quality of meta-analysis studies, the types of reports they encompass, and the presence of publication bias (Kung et al., 2010).

The present study

Wu and Shen (2021), Scheerens (2012a), and Hendriks and Steen (2012) conducted second-order meta-analysis studies investigating the relationships between school leadership and student cognitive outputs. However, these studies did not account for the issue of overlap in meta-analysis studies. In contrast, Tan et al. (2020) published a second-order meta-analysis study on school leadership and school outcomes, yet it did not include published book chapters. Additionally, Tan et al. (2020) recommended that future second-order meta-analysis studies should incorporate cross-cultural comparisons.

In this study, we addressed the problem of overlap while examining meta-analysis studies on school leadership and school outcomes. Furthermore, this research included published book chapters in the meta-analysis. Moreover, the analysis encompassed meta-analysis studies published in Turkish, in addition to those in English, considering the cultural context in the examination of these studies.

Purpose

This study aims to examine the relationships between school leadership and school outcomes. The research sought to answer the following questions in line with this purpose:

1. What is the level of the relationship between school leadership and school outcomes?
2. Does the relationship between school leadership and school outcomes differ significantly in terms of moderator variables?

Method

The current study utilized the second-order meta-analysis method to examine the relationships between school leadership and school outcomes. This method is akin to the first-order meta-analysis approach (Schmidt & Oh, 2013). In the second-order meta-analysis method, meta-analysis studies are employed to calculate the effect sizes instead of primary research studies (Oh, 2020). Consequently, this method allows for a more comprehensive examination of the constructs.

Data collection

The data for this study comprised meta-analysis studies. Electronic databases, such as Web of Science, Scopus, ERIC, Academic Search Ultimate, and TR Dizin national index, were utilized to access meta-analysis studies focusing on school leadership and school outcomes. The search utilized keywords including leadership, leader, principal, administrator, and meta-analysis, meta analysis, or meta-analytic. The data were selected based on the previously identified inclusion criteria.

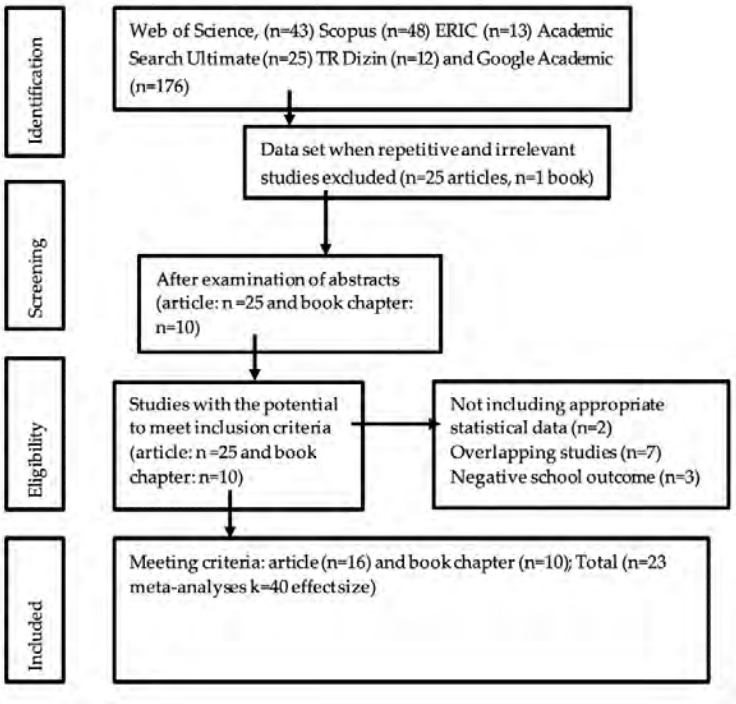

Figure 1. *PRISMA flow diagram*

Inclusion criteria

1. Meta-analysis studies published between 2015-2022 in Turkish or English were considered.
2. Meta-analysis studies focusing on school leadership and school outcomes were included.
3. Meta-analysis studies should contain appropriate data to calculate generic effect size, such as effect size, lower limit, upper limit, standard error, and variance.

A data pool consisting of 35 studies meeting the inclusion criteria of the current study was compiled. The contents, methods, and findings

of these studies were examined. The PRISMA flow diagram detailing the formation of the dataset is presented in Figure 1. Nine studies were excluded for reasons explained in Figure 1. Consequently, the dataset for this study comprised 23 studies. The characteristics of these studies are provided in Appendix-1.

Overlapping problem

One challenge encountered in second-order meta-analysis studies is the issue of overlap among the meta-analysis studies. Cooper and Koenka (2012) assert that meta-analysis studies with over 25% overlap with other meta-analysis studies should not be included in second-order meta-analysis studies. Consequently, one of the overlapping meta-analysis studies was excluded from our analysis. Details regarding the overlapping meta-analysis studies and the chosen ones among them are provided in Appendix-2.

Karadağ (2020) simultaneously assessed the relationship between academic achievement and leadership models and practices. In contrast, Tan et al. (2021) examined only the relationship between leadership practices and student outcomes, such as academic achievement. There was partial overlap between the meta-analysis studies by Karadağ (2020) and Tan et al. (2021) concerning the constructs of leadership practices and academic achievement. Consequently, effect sizes related to leadership practices and academic achievement in Karadağ (2020) were excluded from this study. However, effect sizes representing the relationship between leadership models and academic achievement in Karadağ (2020) were included.

Additionally, Uysal and Sarıer (2019) analyzed the relationships between teacher leadership and student outcomes in different countries (Turkey and the USA). The general effect sizes in the USA

overlapped with those in Shen et al. (2020). Consequently, the study by Uysal and Sarıer (2019) was only represented with effect sizes from Turkey, and coding was conducted accordingly.

Quality evaluation

The Revised Assessment of Multiple Systematic Reviews (R-AMSTAR) scale, introduced by Kung et al. (2010), was employed to assess the quality of the meta-analysis studies. R-AMSTAR comprises 11 parts. However, the A and B items in the eighth part, designed for clinical practices, were excluded from the analysis in this study. The scores in the R-AMSTAR were categorized as follows: 0-11= inadequate, 12-22= low, 23-33= medium, 34-42= high (Young, 2017).

Coding

A coding form reflecting the characteristics of meta-analysis studies was created. The codes in this study are presented in Table 1.

Table 1.
Coding of meta-analysis research

Group	Code
Study	Researcher/s (Publication Year)
School leadership	Leadership Model, Leadership Practice, And Mixed
Leadership status	Administrator, Teacher, and Mixed
School-level	K12, Higher, Mixed, and Unknown
Outcomes	Organizational Outcomes, Teacher Outcomes, Student Outcomes and Mixed
Primary research report type	Article And Mixed
Country location	Multi-county , Turkey and Indonesia
Meta-analysis quality	Inadequate, Low, Medium, and High
The state of bias	Yes, No, Negligible and Unknown

Statistical Independence

If the meta-analysis studies were coded concerning leadership models, leadership behaviors, and leadership practices, they were treated as independent meta-analyses. For example, effect sizes related to transformational leadership and instructional leadership were coded separately. Similarly, if the meta-analysis studies categorized their outcomes as organizational outputs, teacher outputs, and student outputs, these studies were also treated as independent. For instance, if ethical leadership was separately coded for job satisfaction and organizational commitment, each was considered independently. However, if the meta-analysis studies examined school leadership and school outcomes in a general context, they were coded as per the researchers' original coding.

Statistical model

Borenstein et al. (2011) recommend using the random-effects model when the samples and characteristics of studies, whose effect sizes will be combined, are highly diverse. In this study, the effect size, heterogeneity, moderator, and publication bias analyses were conducted using the random-effects model. The analyses below were performed for the dataset.

Effect size calculation

Out of the 23 studies in the dataset, 21 used Pearson correlation coefficient (r), and 5 used Fisher's z (Fz) index as effect size metrics. The Pearson correlation (r) index ranges from 1 to -1, leading to a limited variance. Therefore, all effect sizes were converted to the Fisher's z index as recommended by Borenstein et al. (2011). To interpret the magnitude of effect size, the value intervals provided by Funder and Ozer (2019) were utilized.

Publication bias analysis

The reliability of the calculated effect size is closely related to publication bias. Therefore, several publication bias analyses were conducted, including the examination of the Funnel Plot, Duval and Tweedie's trim and fill analysis techniques, Begg and Mazumdar rank correlation test (BMRC), and Egger's regression test (ERT) (Jin, Zhou & He, 2015).

Heterogeneity and moderator analysis

Q statistics were utilized to calculate the overall heterogeneity of the effect sizes. Additionally, I2 tests were performed to assess the levels of heterogeneity among the effect sizes (Higgins et al., 2003). Moderator variables, such as school leadership types, school outcome types, school levels, primary research report types, location types, meta-analysis quality, and bias status, were assigned. Mean effect sizes for the moderator groups were computed, and the statistical differences between these groups were examined using Q between tests. The statistical analyses were conducted using the CMA 2.0 package program.

Findings

This section presents statistical analyses concerning the school leadership and school outcomes dataset.

School leadership and school outcomes

This section presents descriptive analyses, mean effect size calculations, publication bias assessments, heterogeneity evaluations, and moderator analyses for the school leadership and school outcomes dataset. The school outcomes examined in this study include teacher

self-efficacy, teacher job satisfaction, teacher performance, teacher well-being, teaching practices, organizational health, organizational justice, organizational commitment, organizational trust, organizational performance, organizational trust, organizational climate, learning schools, organizational culture, student motivation, student outcomes, instructor credibility, and satisfaction with the leader. This dataset comprises 23 meta-analysis studies, generating a total of 40 effect sizes. If the overlap rate between meta-analyses exceeds 25%, the overlapping studies are excluded, and these exclusions are presented in the appendix. For cases where the overlap rate is below 25%, it is assumed that the meta-analyses are independent of each other.

The effect sizes in the dataset ranged between ES=.10 and ES=.1.07. The mean effect size was calculated as ES=.51 with a 95% confidence interval of [.45; .58]. In other words, the relationship between school leadership and school outcomes is at a high level. The total heterogeneity of the effect sizes was calculated as Q=912.61 ($p<.05$), indicating significant heterogeneity (I2=95.72).

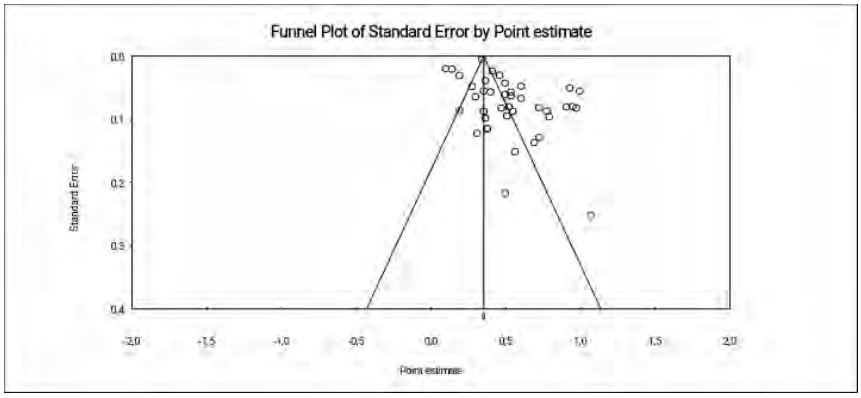

Figure 2. *Funnel Plot for the first data set*

Publication bias analyses

The funnel plot for the dataset is presented in Figure 2. Observing Figure 1, it is noted that the distribution of effect sizes by standard errors is partially symmetrical. The Begg and Mazumdar rank correlation test did not indicate publication bias (tau=.06, p >.60). However, Egger's regression test detected publication bias (t=3.02, p <.05). Additionally, the Duval and Tweedie's trim and fill analysis techniques did not reveal publication bias. Considering the results of all these tests, it was deduced that the dataset has weak publication bias.

Moderator and heterogeneity analyses

Table 2 presents the moderator and heterogeneity analyses regarding the dataset. The notable findings are as follows:

The mean effect sizes differ significantly in terms of school leadership types (Q(2)=6.51, p<.05). General school leadership (mixed), leadership models, and leadership practices were associated with school outcomes at high (ES=.59), high (ES=.50), and medium (ES=.32) levels, respectively. The mean effect sizes also significantly vary concerning school outcome types (Q(3)=16.98, p<.05). School leadership is linked to organizational outcomes at a high level (ES=.63), teacher outcomes at a high level (ES=.46), and student outcomes at a medium level (ES=.36).

Additionally, the mean effect sizes of the meta-analysis studies differ significantly in terms of quality levels (Q(1)=21.54, p<.05). Meta-analysis studies with high quality produced medium-level effect sizes (ES=.30), whereas studies with medium-level quality yielded high-level effect sizes (ES=.60). Furthermore, studies from Turkey (ES=.52) produced larger effect sizes than studies from mixed countries

(ES=.44).

Table 2.
Moderator and heterogeneity analyses

Group	*k*	*ES(Fz)*	*LL*	*UL*	*Q(b)*	*df (Q)*	*p*
School leadership							
Leadership model	15	.50	.41	.59			
Leadership practices	6	.32	.16	.47			
Mixed	19	.59	.51	.68	9.93	2	.01
Outcomes							
Organizational outcomes	21	.63	.55	.71			
Teacher outcomes	6	.46	.31	.60			
Student outcomes	11	.36	.25	.46			
Mixed	2	.50	.26	.75	16.98	3	.<01
Leadership status							
Principal	21	.54	.43	.64			
Teacher	6	.47	.28	.66			
Mixed	2	.26	-.06	.59			
Unknown	11	.57	.43	.72	3.16	3	.37
Education level							
K12	23	.46	.38	.53			
Higher	7	.57	.43	.71			
Mixed	2	.74	.50	.99			
Unknown	8	.58	.44	.71	7.01	3	.07
Country location							
Multi-county	28	.49	.40	.57			
Turkey	11	.60	.46	.73			
Indonesia	1	.52	.06	.98	1.09	2	.38
Research quality							
High quality	11	.30	.20	.41			
Medium quality	29	.60	.53	.66	21.54	1	.<01
Publication Bias status							
No	30	.53	.45	.60			
Negligible	5	.40	.21	.59			
Yes	1	.50	.12	.87			
Unknown	4	.59	.38	.79	2.01	3	.57
Publication type							
Article	1	.52	.13	.92			
Mixed	39	.51	.45	.58	.01	1	.97

No: There is no publication bias; Yes: There is publication bias; Negligible: There is publication bias but negligible; Unknown: There is no information.

Discussion, Conclusion and Recommendations

This study synthesized the results of 23 meta-analysis studies using the second-order meta-analysis method.

School leadership effectiveness

This study revealed a strong relationship between school leadership and school outcomes, accounting for 21.2% of the variance in school outcomes. A comparison between school leadership models and school leadership practices suggests that school leadership models have a more robust relationship with school outcomes than school leadership practices. Specifically, school leadership models explain 20.3% of the variance regarding organizational outcomes, while school leadership practices explain 10.2%.

Furthermore, school leadership exhibits a high-level relationship with organizational and teacher outcomes, while its relationship with student outcomes is at a medium level. In other words, school leadership demonstrates a stronger connection with organizational and teacher outcomes compared to student outcomes. These results align with Tan et al. (2020). However, it's worth noting that the relationship between school leadership and student outcomes reported in this study is at a medium level, contrasting with the findings of Wu and Shen (2021) and Scheerens (2012b), who reported this relationship at a low to medium level. The variance in these relationships might stem from the inclusion of various student outcomes in this study, such as attainment, learning attitudes, student satisfaction, and other factors beyond academic achievement.

The study indicates that school leadership is more effective in shaping organizational behavior and processes. Moreover, the impact of school leadership on teacher behaviors is notably significant. School leaders primarily influence the school's culture, climate, and teacher attitudes and behaviors. The effect of school leadership on student outcomes is comparatively lower and occurs through school processes and teacher behaviors. To enhance student outcomes, school administrators should focus on behaviors aimed at activating organizational processes and improving teacher attitudes.

School leadership effectiveness and moderator variables

Identifying the quality of studies included in meta-analysis studies is crucial for interpreting the magnitude of effect sizes (Kung et al., 2010). This study reveals that mean effect sizes differ based on the quality of research studies. High-quality studies produced smaller effect sizes, whereas studies with medium-level quality yielded larger effect sizes. This trend might be linked to the school outcome types of high-quality studies. Specifically, this study included eleven effect sizes with high-quality ratings. Most of these high-quality studies focused on student outcomes (k=7). Consequently, the relationship between school leadership and student outcomes resulted in smaller effect sizes compared to other school outcome types (Table 2). This disparity could be attributed to the predominance of high-quality studies addressing student outcomes.

In this study, the relationship between school leadership and school outcomes did not vary concerning leadership status, school level, location, or publication bias status. These findings partially align with those of Tan et al. (2020). Tan et al. (2020) observed differences in terms of leadership status (principal and mixed). However, it's worth noting that teacher leadership was included in the leadership status categories

(principal and mixed) in this study, which might explain the variance. On the other hand, the relationship between school leadership and school outcomes is stronger in studies from Turkey but weaker in studies from mixed locations (representing various countries).

Implications for practice

The effectiveness of school leadership demonstrates a stronger correlation with organizational and teacher outcomes compared to student outcomes. Moreover, the effectiveness of school leadership is primarily evaluated through student outcomes (Scheerens, 2012b). The primary aim of in-school processes and activities is to enhance the quality of student outcomes. Therefore, school systems require effective school leaders to achieve this goal. In this regard, school leaders are essential for realizing the educational vision, mission, and values of schools. Implementing in-service training programs can enhance school administrators' leadership practices. These training programs can be designed based on the integral leadership model, encompassing both transformational and instructional approaches.

Additionally, the criteria for selecting school administrators are crucial in achieving the educational vision and mission of schools. Projects and initiatives conducted at the school or regional level, aimed at realizing the educational vision and mission of schools, can be utilized as selection criteria for school administrators.

Limitations and Recommendations for Future Research

This study is restricted to research studies published in English and Turkish between 2015 and 2022. Future second-order meta-analysis studies might encompass unpublished meta-analysis studies and studies published in other languages. Additionally, this study is limited to school outcomes. Subsequent research could delve into in-

school processes, such as communication, motivation, and conflict resolution. Finally, a more analytical approach could be adopted to analyze the relationship of leadership models with school outcomes independently from each other (e.g., examining the connection between school outcomes and transformational school leadership or instructional school leadership).

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Appendix 1

The characters of the studies study	ES (r)	LL	UL	k	Grade	Culture	Report	Status
Alanoğlu, & Karabatak (2022)	.65	.54	.71	20	K12	Mixed	Mixed	Principals
Akın-Mart, & Tulunay-Ateş (2021).	.38	.28	.48	38	K12	Mixed	Mixed	Mixed
Ertem (2021).	.54	.47	.61	21	K12	Turkey	Mixed	Principals
Alanoglu (2021).	.39	.35	.43	24	K12	Mixed	Mixed	Principals
Goktas (2021)	.49	.39	.57	15	K12	Turkey	Mixed	Principals
Yılmaz, & Jafarova (2019).	.60	.40	.64	11	K12	Mixed	Mixed	Principals
Sutresna, & Wijayanti (2020).	.48	.35	.58	16	K12	Indonesia	Article	Principals
Karadağ (2020).	.27	.18	.35	39	K12	Mixed	Mixed	Principals
	.30	.07	.50	5	K12	Mixed	Mixed	Principals
	.34	.24	.43	35	K12	Mixed	Mixed	Principals
Tan, et. al (2021).	.14	.10	.18	108	K12	Mixed	Mixed	Mixed
Liebowitz, & Porter (2019).	.36	.15	.58	51	K12	Mixed	Mixed	Principals
	.35	.17	.53		K12	Mixed	Mixed	Principals
	.79	.52	1.06		K12	Mixed	Mixed	Principals
	.10	.06	.14		K12	Mixed	Mixed	Principals
Akar (2018).	.76	.71	.81	9	Mixed	Turkey	Mixed	Principals
	.44	.30	.57	11	Mixed	Turkey	Mixed	Principals
Çoğaltay & Karadağ(2016)	.75	.67	.81	9	K12	Turkey	Mixed	Principals
	.35	.28	.41	7	K12	Turkey	Mixed	Principals
	.43	.38	.49	25	K12	Turkey	Mixed	Principals
	.73	.68	.77	5	K12	Turkey	Mixed	Principals
	.36	.15	.53	5	K12	Turkey	Mixed	Principals
	.50	.36	.62	9	K12	Turkey	Mixed	Principals
Cakmak, et. al (2015).	.46	.39	.52	121	Unknown	Mixed	Mixed	Unknown
Öztekin, et. al (2015)	.49	.40	.57	25	Unknown	Mixed	Mixed	Unknown
	.54	.44	.63	19	Higher	Mixed	Mixed	Unknown
Uslu & Oklay (2015).	.74	.66	.80	20	Unknown	Mixed	Mixed	Unknown
Öztürk, & Ay (2015).	.46	.07	.73	5	Unknown	Mixed	Mixed	Unknown
Koçyiğit (2015).	.51	.26	.70	5	Unknown	Mixed	Mixed	Unknown
İşçi et. al (2015).	.46	.36	.55	34	Unknown	Mixed	Mixed	Unknown
	.62	.44	.75	10	Higher	Mixed	Mixed	Unknown
Danişman et.al (2015).	.34	.18	.48	12	Higher	Mixed	Mixed	Unknown
	.29	.17	.40	22	Unknown	Mixed	Mixed	Unknown
Armağan & Erzen (2015).	.66	.54	.73	7	Unknown	Mixed	Mixed	Unknown

Shen, et.al (2020).	.19	.13	.25	21	K12	Mixed	Mixed	Teacher
Balwant (2016).	.47	.34	.60	22	Higher	Mixed	Mixed	Teacher
	.72	.65	.80		Higher	Mixed	Mixed	Teacher
	.62	.53	.70		Higher	Mixed	Mixed	Teacher
	.19	.05	.33		Higher	Mixed	Mixed	Teacher
Uysal & Sarier (2019).	.33	.32	.34	26	K12	Turkey	Mixed	Teacher

Appendix 1

The characters of the studies

study	**Leadership Consruct**	**Outcome**	**Quality**	**Bias**	**year range**
Alanoğlu, & Karabatak (2022)	Transformational	Learning Schools	Medium	No	2000-2020
Akın-Mart & Tulunay-Ateş (2021).	Technological	Combined	High	No	2010-2019
Ertem (2021).	Mixed	Combined	Medium	No	2010-2018
Alanoglu (2021).	Instructional	Teacher Self-Efcacy	Medium	No	2000-2020
Goktas (2021)	Transformational	Teacher Job Satisfaction	Medium	No	2010-2020
Yılmaz, & Jafarova (2019).	Mixed	School Effectiveness	Medium	No	1990-2016
Sutresna, & Wijayanti (2020).	Transformational	Teacher Performance.	Medium	Negligible	2013-2020
Karadağ (2020).	Transformational	Students' Achievement	High	No	2008-2018
	Distributed	Students' Achievement	High	No	2008-2018
	Instructional	Students' Achievement	High	No	2008-2018
Tan, et. al (2021).	Leadership Practices	Student Outcomes	High	No	2000-2018
Liebowitz, & Porter (2019).	Principal Behaviors	Teacher Well-Being	High	Negligible	2001-2019
	Principal Behaviors	Teaching Practices	High	Negligible	2001-2019
	Principal Behaviors	Organizational Health	High	Negligible	2001-2019
	Principal Behaviors	Student Achievement	High	Negligible	2001-2019
Akar (2018).	Ethical	Organizational Justice	Medium	No	2008-2018

	Ethical	Organizational Commitment	Medium	No	2008-2018
Çoğaltay & Karadağ(2016)	Mixed	Organizational Justice	Medium	No	2000-2013
	Mixed	Organizational Citizenship	Medium	No	2000-2013
	Mixed	Organizational Commitment	Medium	No	2000-2013
	Mixed	Organizational Trust	Medium	No	2000-2013
	Mixed	Organizational Performance	Medium	No	2000-2013
	Mixed	Organizational Climate	Medium	No	2000-2013 before
Cakmak, et. al (2015).	Mixed	Job Satisfaction	Medium	Yes	1990-2014
Öztekin, et. al (2015)	Mixed	Organizational Commitment	Medium	No	before 1990-2014
	Mixed	Organizational Commitment	Medium	No	before 1990-2014
Uslu & Oklay (2015).	Mixed	Organizational Trust	Medium	No	1990-2014
Öztürk, & Ay (2015).	Mixed	Organizational Citizenship	Medium	No	before 1990-2014
Koçyiğit (2015).	Mixed	Organizational Culture	Medium	No	2000-2013
İşçi et. al (2015).	Mixed	Organizational Climate	Medium	No	before 1990-2014
	Mixed	Organizational Climate	Medium	No	before 1990-2014
Danişman et.al (2015).	Mixed	Organizational Performance	Medium	No	2000-2014
	Mixed	Organizational Performance	Medium	No	2000-2014
Armağan & Erzen (2015).	Mixed	Organizational Justice	Medium	No	1990-2014
Shen, et.al (2020).	Teacher Leadership	Student Outcomes	High	No	1997-2018
Balwant (2016).	Transformational Instructor-Leadership	Student Motivation	Medium	Unknown	1997-2014
	Transformational Instructor-Leadership	Perceived İnstructor Credibility	Medium	Unknown	1997-2014
	Transformational Instructor-Leadership	Satisfaction With Leader	Medium	Unknown	1997-2014

	Transformational Instructor-Leadership	Academic Performance	Medium	Unknown	1997-2014
Uysal & Sarier (2019).	Teacher Leadership	Student Outcomes	High	No	2000-2017

Appendix 2
Studies excluded and selected due to overlap

Excluded	Included	Outcome
Köybaşı Şemin (2022) and Tosuntaş, & Danişman (2015)	Alanoğlu, & Karabatak (2022)	Learning Schools
Uysal & Sarıer (2018)	Alanoglu (2021) and Tan, et. al (2021) and Karadag (2020)	Student Outcomes
Karadağ, et al (2015)	Karadağ (2020)	Student Outcomes
Coğaltay, et. al (2016) and Çoğaltay, & Karadağ (2016)	Goktaş (2021)	Job Satisfaction
Selvitopu, & Kaya (2017)	Çoğaltay, & Karadağ (2016)	Organizational Commitment