

A Meta-Analytic Review of the Effect of Socioeconomic Status on Academic Performance

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Abstract

The two main purposes of the current meta-analysis were (a) to determine the relation between socioeconomic status (SES) of students and academic performance (AP) (b) and evaluate the effect of several potential moderating factors in this relation. Data covered the publications between 2010 and 2019, and the dataset consisted of 48 independent studies that included 62 different samples, and the total sample was 386.601. Findings revealed that the relation between SES and academic performance represented a moderate positive correlation. All moderators, type of SES measure, academic performance scale, location, grade level, subjects of academic performance, and year, produced significant effects, respectively. These findings were discussed for every category of moderators with the related literature.

Keywords

socioeconomic status, academic performance, moderation effects, meta-analysis

Introduction

The effect of socioeconomic status (SES) on students' academic performance (AP) has been discussed widely among social researchers since the impressive report of Coleman et al. (1966). After that report, SES has probably been the most widely used demographical variable in education research (Sirin, 2005) to understand the relation between SES and other variables in focus. It also helps researchers describe educational gaps more accurately as a valid standard reference. Hence, the link between SES of students and academic performance has become an effective researching approach to examine (Organization for Economic Cooperation and Development [OECD], 2018). There are numerous definitions of SES in the literature from every discipline, such as sociology, economics, health, or education. In the present meta-analysis, SES is considered in the context of education, and we focused on the relation between SES of students and their academic performance.

SES as defined by American Psychological Association (APA, 2019) is *the social standing or class of an individual or group*. That definition refers to a measure of one's combined economic and social status and includes education, income, and occupation as the three common indicators of SES (Baker, 2014). Another definition made by Oxford Reference (2019) also emphasizes the combination of occupational, economic, and educational criteria that are closely related to the position of persons in society. In the discipline of sociology, the term refers similar meanings as one's social position as determined by income, wealth, occupational possession and prestige, and educational attainment (Scott & Marshall, 2005). By regarding those definitions,

parental occupation, parental income, and parental educational attainment can generally be seen as three common indicators of the SES of students.

Literature Review on SES and Academic Performance Relation

The socioeconomic background of students is usually examined by the researchers in relation to academic performance (Caro, 2009; Cedeño et al., 2016; Liu et al., 2019), as the SES is seen as a predictor of academic performance. Actually, the growing body of independent research has obviously shown that there are deficiencies for students from lower income families and those deficiencies are related to academic performance (Farah & Hackman, 2012; Stevens et al., 2009; von Stumm, 2017). It is also possible to find out inconsistent results on the relation between SES and academic performance. While some studies have found strong relation to those two variables (Adegoke & Osokoya, 2015; Tomul & Savasci, 2012; Zuzovsky, 2010), some others have not revealed any significant relation (Gobena, 2018; Koban Koc, 2016; Zhao et al., 2012). Those differences may occur from the context (location, SES types, culture etc.) of the study conducted. Because of

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those differences, researchers have tended to use different methods such as meta-analysis or meta-synthesis to better understand the relation between SES of students and academic performance.

White (1982) has conducted the first meta-analysis on this subject by considering almost 200 studies published before 1980. In his meta-analysis, he focused on the relation between SES and academic performance and showed that the relation differs significantly with a number of factors, such as the type of SES measure and academic performance measures. For instance, family characteristics are substantially correlated with academic performance when the unit of analysis is individual. A large number of new empirical studies have explored the same varied relation up to now, since the publication of White's meta-analyses. Another meta-analysis study conducted by Sirin (2005) aimed to examine the relation between the two variables and replicate White's (1982) meta-analysis to see whether the SES–AP correlation had changed since White's review. Sirin (2005) found a medium to strong SES–AP relation within a variety of moderators and the type of SES–AP measure. He also found a slight decrease in the average correlation when compared to White's review (Sirin, 2005). A recently published meta-analysis conducted by Liu et al. (2019) also focused on the relation between SES and AP in China, and they found a moderate relation between SES and AP in general. They also emphasized that the relation between the two variables gradually decreased in the past several decades.

In those meta-analyses, there is considerable emphasis on the types of SES measure and academic performance measurement, since the measurement types may give different results. However, most studies indicated that children from low-SES families do not perform well compared to children from high-SES families (Graetz, 1995). In his study, Reardon (2011) tried to estimate the extent of the achievement gap and found that it grew 40 to 50% in just 31 years from 1970 to 2001. That means the achievement of low-SES students was at least 2.6 years behind high-SES students in the 1970s, and this gap increased to 3.8 years by 2001. In other words, the achievement gap between high-SES and low-SES students has continued and also widened (Reardon, 2011). This finding is an example of the increase in SES–AP relation by years. The learning deficits or achievement gaps can also be seen in the context of international large-scale assessments, such as the Program for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMMS). For instance, PISA 2015 results indicated that learning deficits are still largest for poor people, and students' family backgrounds remain the largest predictors of learning outcomes in nearly all countries (World Bank, 2018). This is the case for the TIMMS results as the parents' level of education and home resources are important predictors of

students' mathematics and science achievement (Topcu et al., 2016). Although the SES–academic performance literature always presents a positive association between SES of student and performance, the magnitude of this relationship is contingent on varying social contexts and education systems. Therefore, a reconfirmation is necessary with a meta-analysis for the relationship between SES and AP. The purpose of the present meta-analysis is to investigate the effect of SES of students on academic performance in all education stages and the possible potential moderators on this effect, including type of SES measure, subjects of academic performance, type of academic performance scale, year, grade level, and location. Detailed information about potential moderators is presented in the following section.

Conceptualization of Key Moderators

Type of SES Measure

There is an emphasis on the types of SES measures while the findings of SES studies are interpreted since the measurement types may give different results. As SES is a formative indicator, it is generally measured in included independent studies by income of families (Bae & Wickrama, 2015; Blums et al., 2017), parental occupation and parental education (Kusaeri et al., 2018; Nesbitt et al., 2013; Tynkkynen et al., 2012), and home resources (Long & Pang, 2016; Tan, 2015; Zuzovsky, 2010). In other words, higher SES families have greater access to financial capital (material resources), a greater amount of human capital (education), and more social capital (useful social connections). In the present meta-analysis, we considered SES variables within five categories as SES index (studies that combined income, education, occupation, or home resources), family income, parental education level, parental occupation, and home resources to examine potential moderating effects of SES measure.

Type of Academic Performance Scale

There are also inconsistent results in the SES and academic performance literature based on the scales used for measuring academic performance. Considering the results of international (PISA, TIMMS or Progress in International Reading Literacy Study [PIRLS]) and research-based scales developed by the researchers, the relation between SES and AP seems to be higher than national (Test of Word Reading Efficiency—Second Edition [TOWRE-2] or WJ-III Tests of Achievement) and grade point average (GPA) scales (Long & Pang, 2016; Marks & Pokropek, 2019; Suphi & Yaratana, 2012; Zhao et al., 2012). In this study, we coded academic performance scales into four categories as international, national, research-based, and mixed ones (including various scales) to examine potential moderating effects of types of

academic performance scales. This categorization is compatible with the categorization of independent studies.

Location

The relation between SES and AP may vary with the conducted location of studies. In this study, we coded five categories of location: (a) United States, (b) China, (c) Turkey, (d) other, and (e) mixed. If the number of studies on SES and AP relation is less than five, we put them in the “other” category. If the study was conducted in more than one country, we put it into the “mixed” category.

Grade Level

Grade level is also an important moderator for SES–AP relation, and various findings on the grade effect can be found in the literature (Cilasun, 2013; Destin et al., 2012; Peng et al., 2019; Sirin, 2005). For instance, in their study, Marks and Pokropek (2019) found that grade and time spent on learning mathematics at school significantly reduce the effects of family income in many countries. In another study, Peng et al. (2019) also indicated that time spent on education might reduce the relation between SES and academic achievement by improving equity. In this study, grade is considered in four main stages, based on Standard Classification of Education (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2011), as preprimary, primary, high school, and higher education. We also added one dimension as “mixed” for studies conducted in various grade levels.

Subjects of Academic Performance

The results in the SES and academic performance literature are not consistent within the academic performance subjects. Although some of the results reveal that the different subjects may significantly moderate the relation between SES and subjects of academic performance (Ozel et al., 2013; Sirin, 2005), some others indicate that SES explains similar variation in different subjects (Ministry of National Education [MoNE], 2017, 2019; Xuan et al., 2019). In the current meta-analysis, we coded subjects of academic performance as language (including Turkish and English), Science, Mathematics, and mixed (all the subjects or few of the subjects together) to examine potential moderating effects of subjects of academic performance.

Year

Years may be seen as potential moderator to examine the relation between SES and AP, since that relation may change over time. For instance, in a recent meta-analysis, Liu et al. (2019) found that the relation between SES and

AP gradually decreases with the progression of years in China. Sirin (2005) also found a gradually decreasing relation in the United States. In this meta-analysis, years were taken into account as potential moderator to explain the relation between SES and AP. As the researchers mostly studied before 2010, we set the period from 2010.

Method

Beginning in the 1970s, meta-analysis is the method that combines effect sizes from different studies researching the same question to get better estimates of the population effect sizes (Field, 2009). It requires systematic treatment of relevant studies and produces a measure of overall impact or the relation of the construct of interest (Robinson et al., 2008). Meta-analyses help researchers combine the statistical results of independent studies conducted in a specific field or subject and give a chance to make statistical analyses on those results to reach an extensive finding (Borenstein et al., 2009; Dincer, 2018; Lipsey & Wilson, 2001). As the present study aimed at examining the effect of SES of student on their academic performance, meta-analyses were conducted as the best way to find out the effect sizes and understand the trend in substantive findings across SES–academic performance studies.

Data Collection

Data consisted of articles and national and international reports that were retrieved from the Academic Search Complete, ERIC, ULAKBIM (a database for articles indexed by TUBITAK-ULAKBIM), and THEC Academic databases. The keyword searches included the following terms both in Turkish and in English: *socio economic status, SES, socio economy, income, poverty, student performance, academic performance, success, achievement, achievement gap, educational gap*. The keywords were searched by both the researchers and were also saved to analyze and compare the potential publications to be included in the meta-analyses. Data covered the publications between 2010 and 2019. The last search dated back to October 2019.

Inclusion Criteria

The criteria set for the study are as follows:

1. The study focused on the relation between SES and academic achievement.
2. The study provided plenty of statistical data to calculate the correlations between SES and academic achievement, such as r , N , and R^2 .
3. The written language of independent studies should be Turkish or English.

Table 1. Overview of the Characteristics of the SES–Academic Performance Studies.

| Year | <i>f</i> | % | Type of report | <i>f</i> | % |
|----------------------------------|----------|-------|------------------------------------|----------|-------|
| 2010-2014 | 15 | 31.25 | Institutional report | 3 | 6.25 |
| 2015-2019 | 33 | 68.75 | Article | 45 | 93.75 |
| Total | 48 | 100 | Total | 48 | 100 |
| Grade level | | | Location | | |
| Preprimary | 4 | 8.33 | United States | 8 | 16.67 |
| Primary | 16 | 33.34 | China | 6 | 12.50 |
| High School | 18 | 37.50 | Turkey | 15 | 31.25 |
| Higher education | 6 | 12.50 | Other | 16 | 33.33 |
| Mixed | 4 | 8.33 | Mixed | 3 | 6.25 |
| Total | 48 | 100 | Total | 48 | 100 |
| Subjects of academic performance | | | Type of academic performance scale | | |
| Language | 16 | 33.33 | International | 12 | 25.00 |
| Science | 2 | 4.17 | National | 6 | 12.50 |
| Mathematics | 12 | 25 | Based on research | 10 | 20.83 |
| Mixed | 18 | 37.50 | Grade point average | 16 | 33.34 |
| Total | 48 | 100 | Other | 4 | 8.33 |
| | | | Total | 48 | 100 |

- The study sample included students from preprimary to higher education except private and vocational high schools.
- Studies should have been published between 2010 and 2019.

The data pool consisted of 544 independent studies (ULAKBIM, 79; THEC Academic, 98; ERIC, 133; and Academic Research Complete, 234) after keyword searches. In the first phase, researchers examined the “Titles” and “Abstracts” of those independent studies, and 152 of them were chosen to include meta-analysis. Then, by considering the inclusion criteria, researchers examine 152 studies comparatively, and 104 of them were excluded because of some deficiencies such as not having plenty of data for statistical analysis, inappropriate sampling, or duplicated studies. After that process, the dataset of this study consisted of 48 independent SES–academic performance studies.

Coding Process

Coding is necessary in meta-analysis since it allows researchers to make complex data clearer and appropriate for processing (Karadag et al., 2016). In this study, a coding form was developed in Excel by the researchers which include some basic characteristic information about independent studies. Coding form consisted of identification of study, type of SES measure, subjects of academic performance, type of academic performance scale, year, grade

level, location, and type of report categories, which were also considered as potential moderators except ID of the study and type of report. Dataset of this study consisted of 48 independent studies. The dataset included 62 different samples, and the total sample is 386.601. The sample ranged from 114 to 32.370. The dataset produced $k = 203$ effect sizes. Descriptive statistics are presented in Table 1. Supplemental Appendix 1 includes a summary of studies in the meta-analysis.

Data Analysis

Three ways are followed in choosing a unit of analysis in meta-analysis. The first way is to use each study as the unit of analysis. The second one is to consider each correlation as the unit of analysis. The third includes changing “study” or “correlation” analysis units according to the characteristics of categories or structures (Lipsey & Wilson, 2001; Sirin, 2005). In the current dataset, SES and AP relation was reported as multi correlations in most of the independent studies ($k = 30$). Thus, we chose correlation as the unit of analysis.

Meta-analyses were performed using the program Comprehensive Meta-Analysis (CMA 2.2). Since the diversity of basic research characteristics in the meta-analysis datasets (Karadag et al., 2015), we conducted statistical analyses under the random effects model. Pearson correlation coefficient (r) was calculated as an effect size for each study. Cohen and Dacanay’s (1992) value intervals were considered for the evaluation of

effect sizes. Value intervals are categorized as .10 (Small), .30 (Medium), .50 (Large), and .70 (Very large).

Validity and reliability of mean size effects are related to publication bias (Ustun & Eryilmaz, 2014). Publication bias may occur when the studies in published literature are systematically unrepresentative of the population of completed studies (Rothstein et al., 2005). There are also some strengths and weaknesses of different publication bias tests. (Kepes et al., 2012). Here, we first checked the publication bias by examining the funnel plot distribution related to effect sizes. Then, Duval and Tweedie's (2000) trim-fill (DTTF) statistical test was performed and interpreted. In this study, moderator analysis was conducted to control the variation between mean effect sizes. According to the codes used in this study, type of SES measure, subjects of academic performance, type of academic performance scale, year, grade level, and location were used as moderator variables.

Heterogeneity, in meta-analytic statistics, refers to the sampling error or the variation of outcomes between independent studies (Borenstein et al., 2009). Here, I^2 statistical technique, a simple expression of the inconsistency of studies' results, was used to decide whether the results are heterogeneous or not (Higgins & Thompson, 2002). The results were examined by considering the value intervals suggested by Higgins et al. (2003) as 25% to 50%, low; 51% to 75%, medium; and upper than 76%, high. Q between groups test was used to check the statistical variation effect sizes distribution according to categoric moderators (Ustun & Eryilmaz, 2014). For continuous moderators, meta-regression technique was performed (Borenstein et al., 2009).

Results

In the meta-analysis, publication bias is a critical issue that should be checked before following the analysis process. In this study, the researchers followed two steps to check the publication bias. The first step included the funnel plot distribution related to effect sizes of the dataset by transforming r values into Fisher's Z. Figure 1 shows the funnel plot distribution.

As seen in Figure 1, the effect sizes showed symmetric distribution on the funnel plot which represents no publication bias according to Fisher's Z values for the effect size of the related studies. Since (r) value intervals are mainly used as references in other statistical analyses, comments were made by considering r values in this study. In addition to the funnel plot, DTTF test, another way of testing and adjusting publication bias, was conducted on dataset of the study, and the results are presented in Table 2.

As seen in Table 2, there is no publication bias in the dataset and sub-dataset. By considering both the funnel plot and DTTF test, it can be inferred that there is no publication bias for the effect size of the related studies. The average effect size indicated that there is a moderate positive correlation

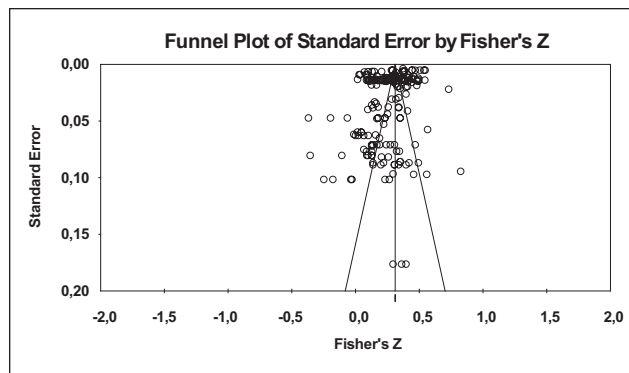


Figure 1. Funnel plot of the dataset.

Table 2. Duval and Tweedie (2000) Trim-Fill (DTTF) Test for the Dataset.

| Dataset | Excluded study | Effect size and 95% interval | | | Q(Total) |
|-----------|----------------|------------------------------|------|------|-----------|
| | | ES | LL | UL | |
| Observed | | 0.25 | 0.23 | 0.27 | 21,232.98 |
| Corrected | 0 | 0.25 | 0.23 | 0.27 | 21,232.98 |

Note. ES = Effect Size; LL = Low Limit; UL = Up Limit.

(Effect Size [ES] = $r = .25$; Low Limit [LL] = $.23$; Up Limit [UL] = $.27$) between SES and academic performance as presented in Table 3. I^2 value showed that the dataset is highly heterogeneous ($I^2 = 99.05$), and the total variance of the dataset is ($Q = 21,232.98$). The effect sizes showed a distribution between $ES = -.35$ and $ES = .68$.

Moderation Effects

To examine the moderation effects between SES and academic performance, we used type of SES measure, subjects of academic performance, type of academic performance scale, year, grade level, and location as moderator variables. We also examine the subcategories of each moderator (see Table 1). Table 3 represents the findings of moderator analysis of the effect of SES on student's academic performance.

Type of SES Measure

As seen in Table 3, the moderation effect of the SES measure produced 61 correlations for the SES index, 31 correlations for family income, 13 correlations for parental occupation, 54 correlations for parental education level, and 44 correlations for home resources. The average effect size between SES and academic performance was also significant for the types of SES measure. Effect sizes are in order of high to low: parental occupation $r = .31$; SES index $r = .30$; home resources $r = .25$; family income $r = .20$; and parental education level $r = .20$.

Table 3. Moderator Analysis of the Effect of SES on Student's Academic Performance.

| Group | k | ES | LL | UL | Q (between group) | df | p |
|------------------------------------|-----|------|-------|------|-------------------|----|-----|
| Type of SES measure | | | | | | | |
| SES index | 61 | 0.30 | 0.27 | 0.33 | | | |
| Family income | 31 | 0.20 | 0.15 | 0.25 | | | |
| Parental occupation | 13 | 0.31 | 0.25 | 0.38 | | | |
| Parental education level | 54 | 0.20 | 0.16 | 0.23 | | | |
| Home resources | 44 | 0.25 | 0.21 | 0.29 | 25.47 | 4 | .00 |
| Type of academic performance scale | | | | | | | |
| International achievement test | 88 | 0.28 | 0.25 | 0.31 | | | |
| National achievement test | 14 | 0.19 | 0.12 | 0.26 | | | |
| Research-based achievement test | 28 | 0.28 | 0.23 | 0.33 | | | |
| Other tests ^a | 27 | 0.27 | 0.21 | 0.32 | | | |
| GPA or CGPA | 46 | 0.17 | 0.13 | 0.21 | 24.38 | 4 | .00 |
| Location | | | | | | | |
| United States | 16 | 0.23 | 0.17 | 0.28 | | | |
| China | 30 | 0.18 | 0.13 | 0.22 | | | |
| Turkey | 45 | 0.26 | 0.23 | 0.30 | | | |
| Other countries | 106 | 0.27 | 0.25 | 0.29 | | | |
| Mixed | 6 | 0.30 | 0.21 | 0.38 | 17.02 | 4 | .00 |
| Grade level | | | | | | | |
| Preprimary | 23 | 0.31 | 0.22 | 0.33 | | | |
| Primary | 47 | 0.28 | 0.27 | 0.35 | | | |
| High school | 100 | 0.26 | 0.23 | 0.28 | | | |
| Higher education | 24 | 0.05 | -0.02 | 0.11 | | | |
| Mixed | 9 | 0.23 | 0.14 | 0.31 | 53.04 | 4 | .00 |
| Subjects of academic performance | | | | | | | |
| Language | 92 | 0.25 | 0.23 | 0.28 | | | |
| Science | 57 | 0.26 | 0.22 | 0.30 | | | |
| Mathematics | 10 | 0.37 | 0.29 | 0.45 | | | |
| Mixed | 44 | 0.20 | 0.16 | 0.24 | 14.59 | 3 | .00 |

Note. CGPA = Cumulative Grade Point Average; ES = Effect Size; GPA = Grade Point Average; LL = Low Limit; SES = socioeconomic status; UL = Up Limit.
^aOther tests include Woodcock-Johnson Test of Achievement and Test of Word Reading Efficiency-Second Edition (TOWRE-2).

Type of Academic Performance Scale

As seen in Table 3, the moderation effect of type of academic performance scale produced 88 correlations for international achievement test, 14 correlations for national achievement test, 28 correlations for research-based achievement test, 27 correlations for other tests, and 46 correlations for GPA or cumulative Grade Point Average (CGPA). The average relation between SES and academic performance was significant for the five types of academic performance scales. Effect sizes are in order of high to low: international achievement test, $r = .28$; research-based achievement test, $r = .28$; other tests, $r = .27$; national achievement test, $r = .19$; and GPA or CGPA, $r = .17$.

Location

As seen in Table 3, the moderation effect of location produced 18 correlations for the United States, 30 correlations for China, 45 correlations for Turkey, 106 correlations for

other countries, and 6 correlations for mixed locations. The average effect size between SES and academic performance was significant for location. Effect sizes are in order of high to low: mixed location, $r = .30$; other countries, $r = .27$; Turkey, $r = .26$; United States, $r = .23$; and China, $r = .18$.

Grade Level

As seen in Table 3, the moderation effect of grade level produced 23 correlations for preprimary level, 47 correlations for primary level, 100 correlations for high school, 24 correlations for higher education level, and 9 correlations for mixed grade levels. The average relation between SES and academic performance was significant for each grade level. Effect sizes are in order of high to low: preprimary level, $r = .31$; primary level $r = .28$; high school level, $r = .26$; mixed grade levels, $r = .23$; and higher education level, $r = .05$. Higher education grade level presented the weakest relation.

Table 4. Meta-Regression Analysis by Years.

| Year | β | SE | LL | UL | Z | p |
|-----------|---------|-------|--------|-------|-------|-----|
| Slope | .01 | 0.004 | 0.003 | 0.019 | 2.65 | .01 |
| Intercept | -22.28 | 8.5 | -38.94 | -5.61 | -2.62 | .01 |

Note. LL = Low Limit; UL = Up Limit.

Subjects of Academic Performance

As seen in Table 3, the moderation effect of subjects of academic performance produced 92 correlations for language, 57 correlations for science, 10 correlations for mathematics, and 44 correlations for mixed subjects. The average effect size between SES and students' academic performance was significant for each subject of academic performance. Effect sizes are in order of high to low: mathematics, $r = .37$; science, $r = .26$; language, $r = .25$; mixed subjects, $r = .20$.

Year

As the year is a continuous moderator variable, we conducted meta-regression for examining the relation between SES and academic achievement within the context of year. Meta regression analysis is presented in Table 4.

As seen in Table 4, the moderating effect of year was significant ($\beta = .01$, $p = .01$). To understand the trend, regression graphic was presented (see Supplemental Appendix 2). The regression graphic indicated that with the progression of years, the relation between SES and academic performance steadily increases.

Discussion and Conclusion

The two main purposes of the current meta-analysis study were (a) to determine the relation between SES and academic performance based on research published between 2010 and 2019 (b) and evaluate the effect of several potential moderating factors in this relation. Findings revealed that the relation between SES and academic performance was 0.25. All moderators, type of SES measure, academic performance scale, location, grade level, subjects of academic performance, and year produced significant effects.

The Relation Between SES and Academic Performance

This study indicated that there is a significant correlation between SES and academic performance. As the values suggested by Cohen and Dacanay (1992) considered, the relation between students' SES and academic performance represents a moderate positive correlation. Similar findings in the literature can be found. For instance, Sirin (2005) reviewed the journal articles on SES and academic

achievement published between 1990 and 2000 and found a medium to strong SES-achievement relation. He also replicated White's (1982) study and found that the magnitude of the SES-academic achievement relationship is not as strong as White's finding. A recent meta-analysis, conducted by Liu et al. (2019), also revealed a moderate relation between SES and academic achievement in general. Our findings are in line with those previous meta-analyses. In another perspective, Marks and Pokropek (2019) focused on school differences in student performance within the context of SES and found that socio economic background was not critical for the relationship between educational differentiation and student achievement, but it is not the case for country level as the degree of educational differentiation was related to socio economic inequalities. Independent studies also show inconsistent results on the relation between SES and academic performance. Those results may occur from the context (location, SES types, culture, etc.) of the study conducted. To sum up, regardless of how SES is defined or assessed, it affects students' academic performance gradually, and this finding supports the previous review studies (Koza Ciftci & Cin, 2017; Liu et al., 2019; Peng et al., 2019; Sarier, 2016; Sirin 2005; White, 1982).

Considering the moderation effects, types of SES measure, which is mainly assessed by the income of families, parental occupation, parental education, home resources, or SES index designed by researchers, indicated a significant moderation effect that ranged from .31 to .20. This finding indicated that different types of SES measures have divergent impacts on the relation between SES and academic performance. While parental occupation produced the highest effect size, other variables produced lower effects. This finding coincided with those of Sirin (2005) and White (1982). Sirin (2005) found that type of SES measure changed the relationship between SES and academic achievement which ranged from .25 to .47. On the contrary, a recently published meta-analysis conducted by Liu et al. (2019) found no moderation effect of SES measure type on the relation between SES and academic achievement. To sum up the finding, the present conducted meta-analysis showed that types of SES measure moderate the relation between SES and academic performance, and parental occupation plays the most important role in students' academic performance.

The moderation effect of the type of academic performance scale has been found significant. This result indicated that different types of academic performance scales

show different effect sizes on the relation between SES and academic performance. The average effect size of the type of academic performance scale ranged from .28 to .17. International tests and research-based achievement tests have the highest moderation effect on the relation between SES and academic performance. International tests, such as PISA, TIMMS, or PIRLS, have been disputed in the context of validity and reliability issues by many researchers (Carnoy & Rothstein, 2013; Feniger & Lefstein, 2014; Jerrim et al., 2018). But they still provide valuable data for national and international comparisons (Reimer et al., 2018). Another finding to be mentioned here is the lower effect of GPA and CGPA which may be explained by teachers' subjectivity behaviors in scoring the written or oral school exams. In short, this finding revealed that type of academic performance scale plays a moderating effect on the relation between SES and academic performance.

As the SES and AP relation studies were conducted in various locations, we considered "location" as a moderator variable to understand the role of location in the relation between SES and AP. An important finding here is that most SES and AP relation studies come from the United States, China, and Turkey. The relationship between SES and academic performance was the highest for the mixed location category which the independent study conducted in several different countries. This result may be interpreted as the influence of SES on academic performance is circumstantial, and the impact of SES depends on the country in which the individuals live. Turkey and United States represent a moderate positive relation between SES and AP, and China produced the lowest effect size. This result may be related to equity in education policies in those countries. For instance, China initiated reform policies and funds that focused on both low-SES and high-SES areas and implemented reforms strictly to close the gap between low- and high-SES students (Liu et al., 2019; Peng et al., 2019). In another meta-analysis conducted in the United States, Sirin (2005) considered school location as a moderator and found a weakest relation between SES and academic achievement for urban schools when compared to non-urban ones.

As for the grade level moderator, we found that the average effect size between grade level and academic performance was significant. That means higher grade levels reduce the relation between SES and academic performance. In this study, the highest relation between SES and AP is in the preprimary grade, and the relation size reduced level by level. This finding is in line with White (1982), Marks and Pokropek (2019), and Peng et al. (2019). In their study, Peng et al. (2019) found that time spent on education might reduce the relation between SES and academic achievement by improving equity. In another study, Marks and Pokropek (2019) also found that grade and time spent on learning mathematics at school significantly reduce the effects of family income in many countries. This result may

be explained by the scholarships, free lunches, or free transportation provided by the governments for higher grade levels to improve equity. Especially, scholarships may play a critical role in improving equity for the higher education grade level. Contrary to our finding, Liu et al. (2019) did not find grade level as a significant moderator in their Chinese context meta-analysis. Sirin (2005) also found that the SES-academic achievement relationship between low- and high-SES students is most likely to remain the same. For grade level moderator, longitudinal studies can provide accurate estimates of true intraindividual change over time as Sirin (2005) suggested.

The relation between SES and students' academic performance was significant for each subject of academic performance. The SES presented a large relation to Math (.37) and medium with science (.26) and language (.25). This finding is similar to PISA exam results. Generally, PISA results show a positive association between SES and mathematics achievement in many countries (OECD, 2013, 2016, 2019). In nationwide studies, it is also emphasized that students who come from families with higher SES or whose parents had higher educational attainment achieved better in mathematics (MoNE, 2017, 2019); Some decisions are also taken to decrease the number of low achievers especially in reading, mathematics, and science in Europe (Commission of the European Communities, 2009). Our finding may be interpreted as the math, science, and language subjects are mostly rely on expensive tech-based materials that depend heavily on home resources and family income. For all those subjects, private tutoring opportunity of high-SES students may also play a critical role, and it may contribute to the inequity among students. On the contrary, unlike their peers, the low-SES students can only get limited educational resources, and tutoring or tech-based educational materials is very difficult to access for them.

The last moderator, year, included the years 2010 and 2019 in this meta-analysis and indicated that the relation between SES and academic performance increases year after year. This result may be explained with the reproduction theory, which is based on the assumption that the intergenerational reproduction of socioeconomic inequalities is strong and unchanging (Marks, 2009). Our finding is in line with reproduction theory assumptions since the relation between SES and AP increases or is stable with the progression of the year. Similar to that finding, Koza Ciftci and Cin (2017), in their meta-analysis on the effect of SES on student achievement, found a significant relation between SES and achievement by year in the Turkish context. On the contrary, SES and AP meta-analysis literature include findings supporting the assumptions of modernization theory that imply reducing social inequalities through open and developing societies with industrialization and educational expansion (Marks, 2009; Treiman et al., 2003). In a recent meta-analysis, Liu et al. (2019) found that the relation

between SES and AP gradually decreases with the progression of years in China. Sirin (2005) also found a gradually decreasing relation in the United States.

Limitations and Future Research Directions

As in every research, our meta-analysis has some limitations that should be considered by readers. First of all, this meta-analysis is limited to the data produced by 48 independent studies focused on the relation between SES and AP. There are a number of studies that did not meet our criteria to be included in meta-analyses. Hence, the researchers are encouraged to measure and evaluate possible SES-based relations in their studies and present the results clearly. Second, no matter national, international, school, or region exams, there are still validity and reliability issues that cause potential estimation errors of academic performance, especially school exams that include subjective grades rating by teachers. One more point researchers should consider is that measuring aptitude, creativity, or high-level cognition of a student is also a controversial issue and hard to resolve; however, it plays a critical role in the relation between SES and AP. Third, location was considered in country level in our meta-analysis; therefore, we could not focus on the school districts or regions that may seem a potential limitation for our study results. Researchers may focus on different variation of locations such as Europe, Asia, or Africa or poor countries versus rich ones or high achievement versus low achievement countries, since the relation between SES and AP may give different results based on those issues. Fourth, subjects of AP were dealt with four categories: (a) language (including Turkish and English), (b) science, (c) mathematics, and (d) mixed subjects. It is better to consider subjects of AP interaction with SES measures for future studies. Fifth, there were few studies available for the assessment of SES and AP relation for private and vocational high schools. It would be better to include those grade levels since they represent the two poles of SES. In addition, grade level interaction with subject contents and SES measures have the potential of relation and should be considered for future studies. Future research should consider all those limitations to further develop SES-based research.

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Supplemental Material

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