



Original

What does the social and emotional learning interventions (SEL) tell us? A meta-analysis[☆]

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ARTICLE INFO

Article history:

Received 20 September 2021

Accepted 29 January 2022

Keywords:

SEL
interventions
meta-analysis

Palabras clave:

SEL
intervenciones
metaanálisis

ABSTRACT

This meta-analysis study aimed to examine the effects of 51 social and emotional learning (SEL) interventions conducted in Turkey between 1997 and 2021. The results were discussed under three categories: social-emotional skills, externalizing problems, and internalizing problems. The effects of the interventions were investigated in terms of eight moderator variables: intervention format, types of measurement, experimental design, educational level, average age, percentage of females, number of sessions, and duration of sessions. The findings showed that SEL interventions in Turkey improved students' social-emotional skills [ES(SE)=0.81(.10), 95% CI (0.60 - 1.03)] and significantly reduced their externalizing [ES(SE)=0.78(.18), 95% CI (0.41 - 1.14)] and internalizing problems [ES(SE)=0.95(.19), 95% CI (0.57 - 1.32)].

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¿Qué significan las intervenciones de aprendizaje social y emocional (SEL)? Un meta-análisis

RESUMEN

En este estudio de metanálisis, se han evaluado los efectos de 51 intervenciones de aprendizaje social y emocional (SEL) realizadas en Turquía entre 1997-2021. Los resultados que se discuten se refieren a las intervenciones en tres categorías: habilidades sociales y emocionales, problemas de externalización y problemas de internalización. Se han evaluado los efectos de las intervenciones en términos de ocho variables moderadoras: formato de intervención, tipo de medición, diseño experimental, nivel educativo, edad media, porcentaje de mujeres, número de sesiones y duración de la sesión. Los hallazgos de este metanálisis han mostrado que las intervenciones SEL en Turquía han mejorado las habilidades sociales y emocionales [ES(SE)=0.81(.10), 95% CI (0.60 - 1.03)] de los estudiantes y han reducido significativamente sus problemas de externalización [ES(SE)=0.78(.18), 95% CI (0.41 - 1.14)] y problemas de internalización [ES(SE)=0.95(.19), 95% CI (0.57 - 1.32)].

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Introduction

Researchers and educators describe SEL skills as the “missing piece” for educational approaches that focus on a rather elusive

goal as “success for all”, and they advocate that any education system that lacks these priority features cannot be effective in raising healthy citizens (Elias et al., 1997). SEL focuses on five core competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (CASEL, 2015). Based on these basic competencies, social and emotional learning skills enable students to be aware of and manage their emotions, consider the emotions of others, make conscious decisions, be conscious of their behaviors, and learn that they are responsible for their behaviors.

PII of original article:S1136-1034(22)00009-0.

[☆] Please cite this article as: Ağırkan M, Ergene T. ¿Qué significan las intervenciones de aprendizaje social y emocional (SEL)? Un meta-análisis. Revista de Psicodidáctica. 2022;27:97–108. <https://doi.org/10.1016/j.psicod.2022.01.001>

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SEL interventions

SEL interventions focus on general prevention interventions that aim to reduce behavioral problems by improving social-emotional skills (Greenberg et al., 2003). According to meta-analysis studies examining the effect of SEL interventions, in addition to improving prosocial behaviors and academic achievement, interventions have effects on reducing behavioral problems and preventing risky behaviors such as drug use and bullying. For example, a study examining the effects of 213 school-based intervention programs reports that these programs aimed at improving social and emotional skills contribute to students' SEL skills, their attitudes towards self and others, their positive social behaviors and academic achievement, and to reduce their behavioral problems and emotional distress (Durlak et al., 2011). Sklad et al. (2012) conducted a meta-analytical review of 75 recently published studies that reported the effects of school-based SEL interventions and found that these interventions had overall beneficial effects on all seven main categories: social skills, antisocial behavior, substance abuse, positive self-image, academic achievement, mental health, and prosocial behavior. A total of 45 studies involving 496,299 participants reported a significant improvement in participants' social and emotional adjustment, behavioral adjustment, and reduction of internalizing symptoms (Goldberg et al., 2019). In another meta-analysis examining 82 school-based universal interventions (Taylor et al., 2017) were found to increase students' SEL skills, attitudes, positive social behaviors, and academic achievement, and to reduce behavioral problems, substance abuse, and emotional distress. However, the effect of positive results continued for a long time (at least six months).

Developing SEL competencies is a hot topic in many countries, and studies on SEL interventions are common mainly in the USA. However, the "cultural specificity" makes it unclear to what extent SEL interventions are effective for students in international contexts (Sklad et al., 2012). Adaptation studies of evidence-based SEL interventions are not much common in many countries. The most comprehensive evidence in this regard is related to studies on SEL interventions developed in the USA. The transferability and sustainability of these programs in various social and cultural contexts have not been rigorously evaluated in many cases (Wigelsworth et al., 2016). Most evidence-based interventions have not been adopted or disseminated at the country level. The development of individual programs rather than comprehensive approaches has been adopted (Barry et al., 2017).

SEL interventions in Turkey

In Turkey, educators, researchers and policymakers have recently focused on improving students' social-emotional learning competencies. With the conceptual emergence of SEL in the 1990s, there has been a considerable increase in studies on SEL in Turkey recently (Ağırkan & Ergene, 2021). The adoption of student-centered education and giving priority to the social-emotional development of students, especially with the "constructivism" approach implemented since 2005, are expressed as factors that increase the interest in SEL in Turkey (Martin, 2012).

Various evidence-based SEL interventions have been adapted in Turkey. The *Second Step Program*, which was adapted by the Social Emotional Learning Academy in 2011, has been implemented in 55 schools as of 2019. The *Lions Quest Life Skills* program, which was adapted by Boğaziçi University Peace Education Application and Research Center (BUPERC) in 2008, has been implemented in 460 schools as of 2019. Researchers have also adapted SEL programs such as PATHS (Bilir-Seyhan et al., 2019), *First Step* (Karaoğlu, 2011), *Lions Quest* (Göl-Güven, 2017) and *Strong Start SEL Curriculum* (Becerem-Özdemir & Zembat, 2016). Besides researchers have

developed programs containing SEL competencies for use in intervention studies (e.g., Ceylan & Yiğitalp, 2018; Kılıçoğlu-Akbulut, 2016).

The SEL interventions implemented in Turkey have been developed by researchers rather than evidence-based school and classroom-based programs. These programs mostly focus on the prevention of behavioral problems along with the development of social and emotional skills. Most of the interventions were conducted in experimental and quasi-experimental designs to test the effectiveness of the developed programs. However, as in the studies conducted in western societies, it is striking that factors such as socioeconomic level, ethnic group, place of residence (rural-suburban-urban) were not adequately covered, and the follow-up tests were not mostly performed.

The present study

The international evidence for the development of SEL skills emphasizes the importance of provide a synthesis of the effectiveness of interventions in Turkey. Therefore, a meta-analysis of studies conducted in Turkey is needed to reveal the effectiveness of SEL interventions from a broader perspective. The literature provides no research that reveals the effectiveness of SEL interventions in Turkey, as in the meta-analysis studies conducted in western societies (e.g., Durlak et al., 2011; Sklad et al., 2012; Taylor et al., 2017). The main purpose of this study is to fill this gap by making a meta-analysis of SEL interventions in Turkey. Our meta-analysis is the first large-scale study to examine the potential effects of SEL interventions in Turkey.

Method

Inclusion criteria

A total of 1014 studies on SEL interventions were reached during the review process, and some criteria were determined to standardize a methodological approach. The inclusion criteria were as follows: (a) aiming at developing at least one SEL skill (self-management, self-awareness, social awareness, communication skills, responsible decision-making); (b) being an intervention study; (c) being conducted in Turkey; (d) including school, classroom or group-based intervention; (e) recruiting participants from primary to high school; (f) consisting of students who have not been diagnosed with any special educational needs; (g) having a pre-post with control group (equivalent group: experimental design) or pre-post with control group (nonequivalent group: quasi-experimental design); and (h) containing sufficient analysis results to allow calculation of effect sizes.

Selection procedure

First, the following terms were searched using the Web of Science, PsycINFO, PubMed, and Google Scholar databases: "social and emotional learning", "social-emotional learning", "social and emotional skills", "social-emotional skills", "social skills", "emotional skills", "Turkey" and "intervention". These keyword groups were applied to the titles and abstracts of the studies. At this stage, 1014 works were reached, and 918 of them were excluded. To test eligibility for inclusion in the meta-analysis, the full text of 98 studies was reviewed in detail. As a result of this review, 47 studies were excluded, and 51 studies were included in the meta-analysis (November 23, 2021). We excluded 47 studies due to the following reasons: (a) three studies were not accessed; (b) fifteen studies did not have sufficient data to calculate the effect size; (c) two studies reported only adjusted data. Although we tried to contact the

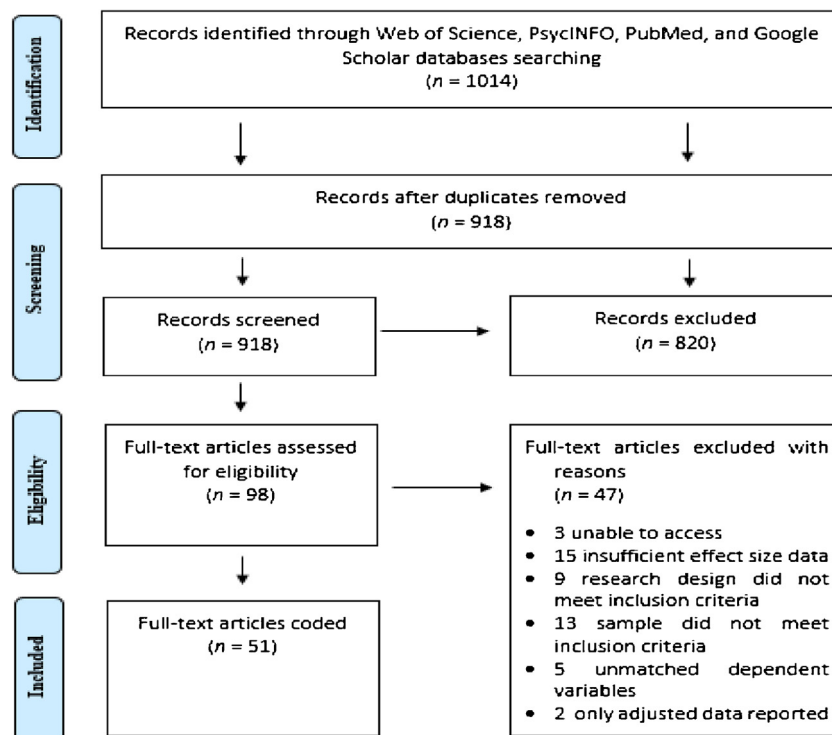


Figure 1. PRISMA flow diagram.

authors to obtain data on the studies, but we did not receive any response; (d) nine studies did not meet the research design criteria (they were not in experimental and quasi-experimental design); (e) thirteen studies did not meet the sampling criteria (consisting of students diagnosed with special educational needs); (f) five studies did not match the dependent variables in other studies (only used in that study) because at least two studies were required to calculate the overall effect size for any outcome category in the meta-analysis. Figure 1 summarizes the different stages and results of the selection procedure.

Study coding

At this stage, we followed a coding procedure to examine the main features of the studies. Therefore, we created an encoding file with 13 columns (Table 1). The publication information part included the publication year and the name of the author(s). The intervention information part consisted of the intervention format, types of measurement, experimental design, number of sessions, and duration of sessions. Participant information part included educational level, average age, number of female/male, and the total number of participants. We also indicated the descriptive features of the studies in Table 2 to make the study more reader friendly. The reliability of the coding was estimated with a randomly selected 25% sample of the studies. Kappa coefficients corrected for chance fit were acceptable (mean κ : 0.87) among all codes reported. The Kappa coefficient (κ) is a statistic used to measure inter-rater reliability (and intra-rater reliability).

Independent variables

SEL interventions

The independent variables were SEL interventions. The interventions aimed to develop at least one of the five core skills (self-management, self-awareness, social awareness, communication skills, and responsible decision-making skills).

Dependent variables

The dependent variables were SEL skills, internalizing and externalizing problems. Although some variables (e.g., locus of control, internet addiction, school climate perception, parental relations, life satisfaction) were encountered during the reviewing phase, they were not included in the category of dependent variables because there were not enough studies. Although meta-analysis requires no limitation in terms of the number of studies, at least two studies are needed to calculate the overall effect size (Borenstein et al., 2021). All effect sizes obtained in the dependent variables of the study reflected the SEL evaluations of the researchers, teachers, or parents.

Social-emotional skills

This outcome category included at least one of the SEL skills. These skills were classified according to Zins et al. (2004)'s person-centered basic SEL competencies (e.g., identifying and recognizing emotions, self-awareness, self-efficacy, empathy, problem solving, communication, social participation and building relationships, and working collaboratively).

Externalizing problems

This outcome category included symptoms such as verbal or physical aggression, bullying, risk taking, and criminal acts. These symptoms were classified according to Achenbach's CBCL Externalization Scale (Achenbach, 2009).

Internalizing problems

This outcome category included symptoms such as depression, anxiety, stress, and social withdrawal. These symptoms were classified according to Achenbach's CBCL Externalization Scale (Achenbach, 2009).

Table 1
Descriptive information of included studies

Year	Study	Document type	Intervention format	Measurement type	Research design	Duration of session	Number of session	Educational level	Average age	Female/ Male	N
1997	Altinoglu-Dikmeer	Master thesis	Researcher	SSRQ	Experimental	60	12	HS	15	-/-	14
2018	Altunbas & Ozabacı	Article	Researcher	SSRQ	Quasi-experimental	40	12	ES	10	15/24	39
2011	Arda	Master thesis	Researcher, Teacher and Parent	TRS	Experimental	40	44	ES	6	49/46	95
2011	Ayyildiz	Doctoral dissertation	Researcher	TRS	Quasi-experimental	30	30	ES	6	35/32	67
2010	Baydan	Doctoral dissertation	Researcher	SSRQ	Experimental	40	8	ES	11	16/16	32
2016	Beceren-Ozdemir & Zembat	Article	Researcher, Teacher and Parent	TRS	Experimental	45	12	ES	5	20/20	40
2019	Bilir-Seyhan et. al.	Article	Researcher and Teacher	TRS	Quasi-experimental	20	33	ES	5	266/299	565
2020	Cantekin & Gultekin	Article	Researcher	TRS	Experimental	-	24	ES	6	17/23	40
2017	Capan-Erarslan & Owen	Article	Researcher	SSRQ	Experimental	50	9	ES	11	-/-	20
2018	Cerit	Doctoral dissertation	Researcher	SSRQ	Experimental	40	7	HS	15	38/32	70
2002	Cerrahoglu	Master Thesis	Researcher	SSRQ	Experimental	60	10	MS	12	15/13	28
2018	Ceylan & Yigitalp	Article	Researcher, Teacher and Parent	TRS	Quasi-experimental	45	30	ES	6	33/23	56
2020	Demirelli & Barut	Article	Researcher	SSRQ	Experimental	90	10	MS	13	26/24	50
2008	Dereli	Doctoral dissertation	Researcher, Teacher and Parent	SSRQ	Experimental	120	22	ES	6	34/47	81
2017	Esen-Aygun	Doctoral dissertation	Researcher	SSRQ	Quasi-experimental	80	8	ES	10	36/44	80
2019	Ezmeci	Doctoral dissertation	Researcher	TRS	Quasi-experimental	75	21	ES	5	17/35	52
2016	Goktas & Ogelman	Article	Researcher and Teacher	TRS	Quasi-experimental	150	8	ES	4	92/32	124
2017	Gol-Guven	Article	Researcher	TRS	Quasi-experimental	-	-	ES	9	20/20	40
2020	Gursoy & Balci-Celik	Article	Researcher	SSRQ	Quasi-experimental	85	10	MS	13	12-Dec	24
2005	Hasdemir	Master Thesis	Researcher	SSRQ	Experimental	90	10	HS	14	12-Oct	22
2016	Karaman	Master Thesis	Researcher	TRS	Experimental	50	20	ES	5	18/26	44
2011	Karaoglu	Doctoral dissertation	Researcher, Teacher and Parent	TRS	Quasi-experimental	120	30	ES	6	Feb-14	16
2018	Kardes	Doctoral dissertation	Researcher, Teacher and Parent	TRS	Quasi-experimental	75	11	ES	7	44/24	68
2014	Kasgarlı	Master Thesis	Researcher	SSRQ	Experimental	90	8	ES	10	12-Dec	24
2015	Kayili	Doctoral dissertation	Researcher, Teacher and Parent	TRS	Experimental	40	64	ES	4	24/26	50
2016	Kilicoglu-Akbulut	Doctoral dissertation	Researcher	SSRQ	Experimental	100	9	MS	11	12-Oct	22
2017	Kilic & Gungor-Aytar	Article	Researcher	TRS	Experimental	50	24	ES	5	31/24	55
2019	Kinik & Odaci	Article	Researcher	SSRQ	Experimental	90	10	MS	13	16/16	32
2017	Koruklu et. al.	Article	Researcher	SSRQ	Quasi-experimental	40	12	MS	10	-/-	152
2006	Kozanoglu	Master Thesis	Researcher	SSRQ	Quasi-experimental	75	11	HS	15	13/17	30
2019	Kucukozdemir	Master Thesis	Researcher and Teacher	TRS	Experimental	40	12	ES	5	73/73	146
2013	Kurtoglu	Doctoral dissertation	Researcher	SSRQ	Experimental	100	12	MS	13	28/32	60
2013	Kuru-Turasli & Zembat	Article	Researcher	TRS	Experimental	30	12	ES	6	20/20	40
2017	Liman	Doctoral dissertation	Researcher	TRS	Experimental	60	30	ES	6	20/20	40
2018	Ozbicer	Doctoral dissertation	Researcher	SSRQ	Quasi-experimental	120	10	HS	16	Oct-14	24
2017	Parmaksiz & Hamarta	Article	Researcher	SSRQ	Experimental	75	10	MS	12	17-May	22
2015	Sahin & Omeroglu	Article	Researcher	TRS	Experimental	45	36	ES	5	16/24	40
2008	Sarica	Master Thesis	Researcher	SSRQ	Quasi-experimental	90	8	HS	15	16/16	32
2017	Sertelin-M. & Yavuzer	Article	Researcher	SSRQ	Quasi-experimental	90	12	MS	13	09-Sep	18
2007	Sertelin-Mercan	Doctoral dissertation	Researcher	SSRQ	Quasi-experimental	90	12	MS	13	09-Sep	18
2016	Sevgen	Master Thesis	Researcher	TRS	Experimental	-	10	ES	5	33/31	64
2011	Simsek	Master Thesis	Researcher	SSRQ	Experimental	90	10	HS	16	22-Dec	34
2010	Tagay et. al.	Article	Researcher	SSRQ	Experimental	45	15	MS	13	22/22	44
2013	Topaloglu	Doctoral dissertation	Researcher and Teacher	TRS	Experimental	240	20	ES	5	22/18	40
2012	Totan & Kabasakal	Article	Researcher	SSRQ	Experimental	45	10	MS	12	20/20	40
2011	Tufan	Master thesis	Researcher	SSRQ	Experimental	75	10	HS	15	14/16	30
2018	Ulasan	Doctoral dissertation	Researcher	SSRQ	Experimental	60	8	MS	13	12-Dec	24
2005	Ulutas	Doctoral dissertation	Researcher	TRS	Experimental	45	24	ES	6	60/60	120
2010	Uz Bas	Article	Researcher	SSRQ	Experimental	40	10	ES	9	26/25	51
2004	Uzamaz & Guclay	Article	Researcher	SSRQ	Experimental	90	9	HS	14	16-Dec	28
2006	Yildirim	Master Thesis	Researcher and Teacher	SSRQ	Experimental	90	10	HS	15	12-Dec	24

Table 2
Descriptive characteristics of studies

General publication features	n	%
Date of document		
1997-2011	18	35.2
2012-2021	33	64.8
Document type		
Article	21	41.2
Doctoral dissertation	17	33.3
Master thesis	13	24.5
Intervention format		
Researcher	39	76.4
Researcher and Teacher	5	9.8
Researcher, Teacher, and Parent	7	13.7
Measurement type		
Student self-report questionnaire (SSRQ)	30	58.8
Teacher report of student (TRS)	21	41.1
Research design		
Experimental	34	66.7
Quasi-experimental	17	33.3
Educational level of Participants		
Elementary school (ES)	28	54.9
Middle school (MS)	13	25.5
High school (HS)	10	19.6
Gender		
Female	1402	50.3
Male	1383	49.7

Moderator variables

The moderator variables of the study were intervention format, experimental design, types of measurement, educational level, average age, percentage of females, number of sessions, and duration of sessions. While determining the moderator variables, we have included the variables that we think may affect the strength and direction of the relationship between the dependent and independent variables that we discussed at the coding stage.

Analysis plan and calculation of effect size

We used Lipsey and Wilson (2001)'s techniques to calculate effect sizes and the CMA 3.0 software for statistical analysis. We used the random-effects model in the analysis. The random-effects model is a statistical model where the model parameters are random variables, and it includes sampling error at the study level (Lipsey & Wilson, 2001). All effect sizes in the study were reported as Hedge's *g* (Hedges & Olkin, 1985). Hedge's *g* is a measure of effect size that represents the standardized difference between means and corrects bias in small samples (less than 20 participants). It is computed as the standardized mean difference between the change scores of the treatment and the control groups. The each study, this index was calculated subtracting the mean pretest–posttest difference of the control group from the mean pretest–posttest difference of the treatment group and dividing this difference by the pooled standard deviation of both groups in the pretest (Morris, 2008). In Hedge's *g*, effect sizes are expressed as small (0.2 - 0.49), medium (0.5 - 0.79) and large (0.8 and above). In the meta-analysis, when setting the direction of effect sizes, it is recommended that all the studies where intervention was better should be positive, and it was

Table 3
Mean effects of outcome categories

Outcome Categories	k	ES	Std. Error	95%CI		Heterogeneity			
				Lower Limit	Upper Limit	Q	df	I ²	τ ²
Social-emotional skills	39	0.81*	.10	0.60	1.03	170.76	38	77.74	0.34
Externalizing problems	12	0.78*	.18	0.41	1.14	49.71	11	77.87	0.30
Internalizing problems	10	0.95*	.19	0.57	1.32	21.19	9	57.54	0.19

*p < .050, k = Number of effect size, ES = Effect size, CI = Confidence interval, Q = Cochran's Q, I² = Higgins's I², τ² = Tau-squared.

worse should be negative (Borenstein et al., 2021). It was observed that there was an increase in the post-test scores of the intervention groups compared to the pretest scores in the studies that measured the social emotional skills that we included in the meta-analysis. In studies where the externalizing and internalizing problems were measured, it was observed that there was an decrease in the post-test scores compared to the pre-test scores of the intervention groups. Therefore, we set effect directions in two categories: positive effect direction (social-emotional skills), and negative effect direction (externalizing and internalizing problems). When a study reported more than one outcome, we calculated separate effect sizes for each study, resulting in 61 ES from 51 studies. Regarding heterogeneity, we used the Q and I² test statistics. The Q value is used to evaluate whether there is statistically significant heterogeneity, and the I² value presents the degree of heterogeneity (Lipsey & Wilson, 2001). The I² value is measured as a percentage from 0% to 100% [small (25%), medium (50%), and large (75%)] (Higgins et al., 2003).

We used analog ANOVA and meta-regression analyzes to detect heterogeneity between studies. Performing moderator analyzes requires at least 10 studies for each moderator (Borenstein et al., 2021). According to López-López et al. (2014), meta-regression analysis require a sample of at least 20 effect sizes in order to provide stable estimates with adequate statistical power. As such, meta-regression analysis were conducted for outcomes with at least 20 included effect sizes (only social emotional skills) in this meta-analysis. We used moderator analyzes for variables that met this criterion. We used analog ANOVA for categorical variables and meta-regression analysis for continuous variables. We performed the mixed-effects model to test the statistical significance of the moderator variables. Q_W and Q_E statistics were computed to assess model misspecification for ANOVAs and meta-regressions, respectively. In addition, an estimate of the proportion of variance accounted for by the moderator variable R² was calculated.

Results

In this study, we calculated the mean ES of SEL interventions for the three outcome categories (Table 3). Mean ESs ranged from 0.78 to 0.95, and all measures of ES showed that interventions were significantly effective. Q values were significant (p < .050), and I² values indicated that the studies were significantly heterogeneous (ranging from 57.54 to 77.87).

Social-emotional skills

We used 39 effect sizes with a random-effects model to examine the overall impact of SEL interventions on social-emotional skills (Figure 2). In this outcome category, mean effect size and heterogeneity were high [ES(SE) = 0.81(.10), 95% CI = (0.60 - 1.03), p < .001, I² = 77.74].

Externalizing problems

We used 12 effect sizes with a random-effects model to examine the overall impact of SEL interventions on externalization problems (Figure 3). In this outcome category, the mean effect size

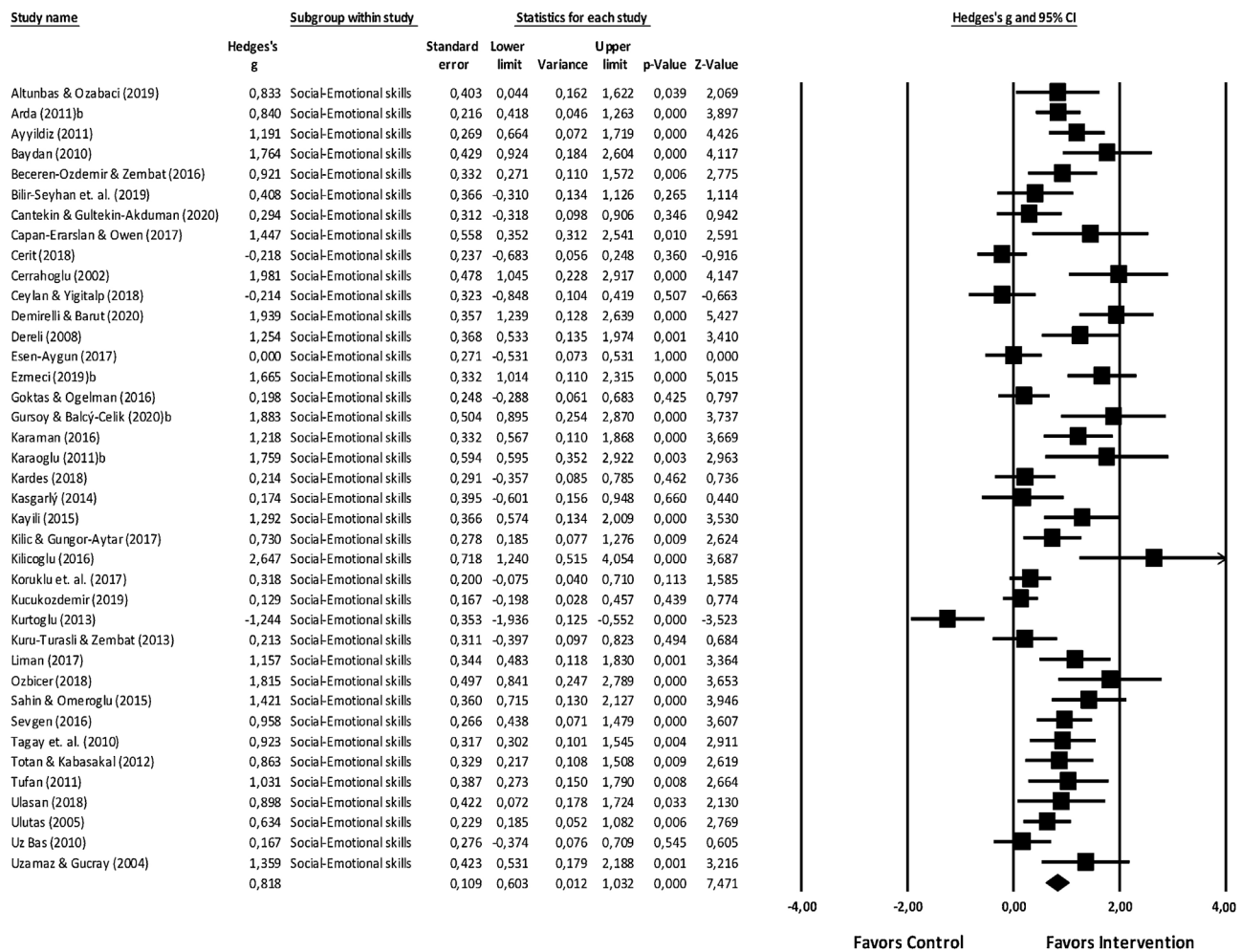


Figure 2. Forest plots (social-emotional skills). Altunbaş and Özabacı (2019), Ayyıldız (2011), Baydan (2010), Cantekin and Akduman (2020), Çapan-Eraslan and Korkut-Owen (2017), Cerit (2018), Cerrahoglu (2002), Demirelli and Barut (2020), Dereli (2008), Esen-Aygün (2017), Göktaş and Gülay-Ogelman (2016), Karaman (2016), Kardeş (2018), Kaşgarlı (2014), Kayılı (2015), Kılıç and Gungör-Aytar (2017), Koruklu et al. (2017), Küçüközdemir (2019), Kurtoğlu (2013), Kuru-Turaşlı and Zembat (2013), Liman (2017), Özbiçer (2018), Şahin and Ömeroğlu (2015), Sevgen (2016), Tagay et al. (2010), Totan and Kabasakal (2012), Tufan (2011), Ulaşan (2018), Ulutaş (2005), Uz-Baş (2010), Uzamaz and Gücray (2004)

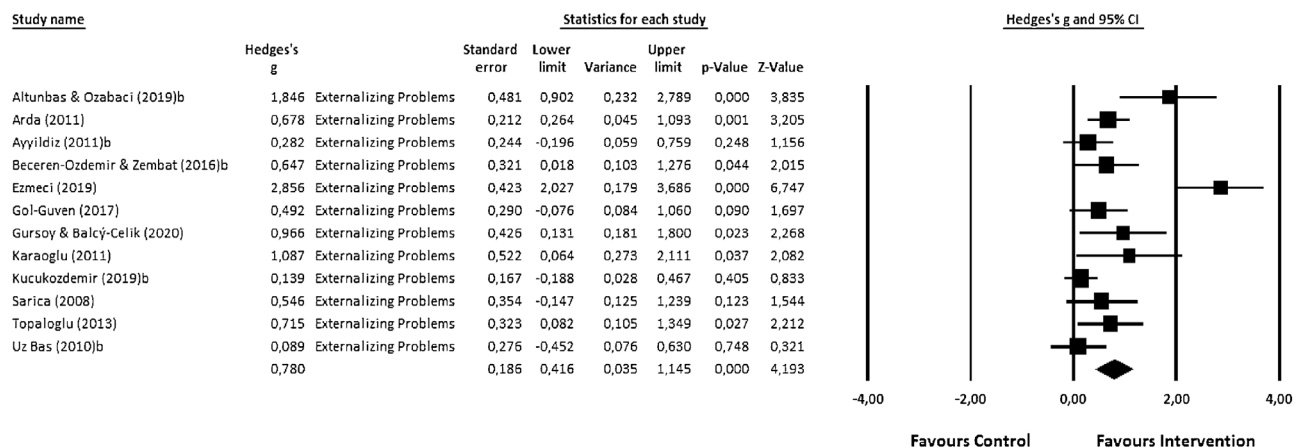


Figure 3. Forest plots (externalizing problems). Altunbaş and Özabacı (2019), Arda (2011), Ayyıldız (2011), Ezmeçi (2019), Gürsoy and Balçý-Çelik (2020), Sarıca (2008), Topaloğlu (2013)

was medium, and heterogeneity was high [ES(SE)=0.78(.18), 95% CI=(0.41 - 1.14), $p = .003$, $I^2 = 77.87$].

Internalizing problems

We used a random-effects model of 10 effect sizes to examine the overall impact of SEL interventions on internalizing problems

(Figure 4). Mean effect size was high, heterogeneity was moderate [ES(SE)=0.95(.19), 95% CI=(0.57 - 1.32), $p < .001$, $I^2 = 57.54$].

Moderator analyses

Q and I^2 values indicated heterogeneity between studies. The Q values for the three outcome categories were significant ($p < .050$),

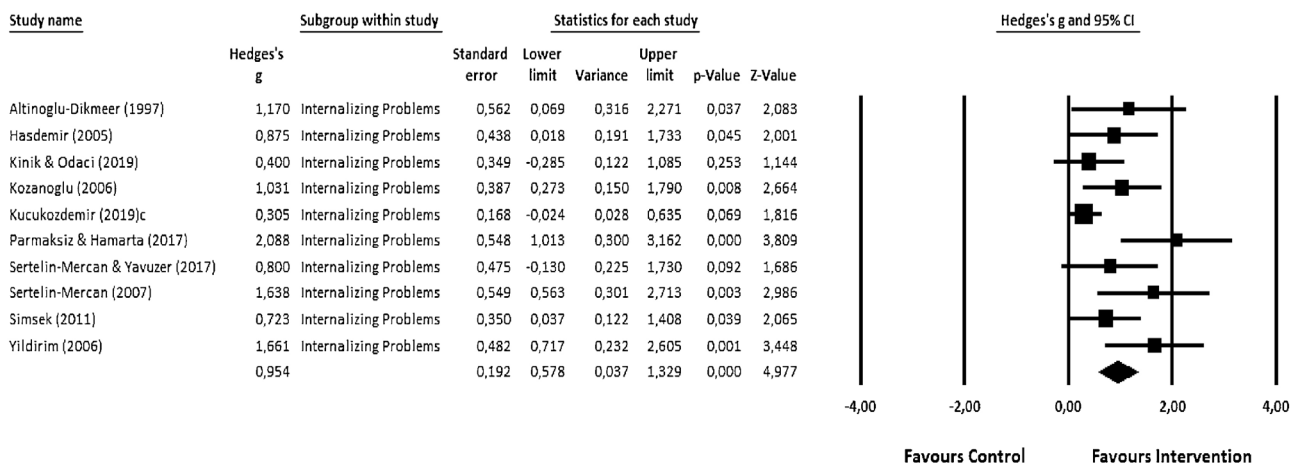


Figure 4. Forest plots (internalizing problems). Altinoğlu-Dikmeer (1997), Hasdemir (2005), Kinik and Odacı (2019), Kozanoğlu (2006), Parmaksız and Hamarta (2017), Sertelin-Mercan and Yavuzer (2017), Sertelin-Mercan (2007), Şimşek (2011), Yıldırım, 2006

Table 4
Analog ANOVA analysis based on mixed-effects model (social-emotional skills)

Moderators	k	ES	Std. Error	95% CI		.05 confidence level X ²	Q _B (df)	Q _W (df)
				Lower Limit	Upper Limit			
<i>Intervention format</i>								
Researcher	29	0.89	0.14	0.63	1.16			
Researcher and teacher	3	0.18	0.13	-0.07	0.44	5.99	15.62(2)	146.69(36)
Researcher, teacher and parent	7	0.79	0.23	0.35	1.24		p<0.001*	p<0.001*
<i>Educational level</i>								
Elementary school	26	0.73	0.11	0.53	0.95		0.88(2)	169.55(36)
Middle school	9	1.06	0.35	0.37	1.75	5.99	p=0.642	p=0.547
High school	4	0.94	0.51	-0.04	1.93			
<i>Measurement type</i>								
SSRQ	20	0.91	0.19	0.53	1.30		0.56(1)	170.73(37)
TRS	19	0.74	0.12	0.51	0.98	3.84	p=0.454	p=0.883
<i>Research design</i>								
Experimental	27	0.85	0.13	0.58	1.11		0.17(1)	169.68(37)
Quasi-experimental	12	0.75	0.20	0.36	1.14	3.84	p=0.679	p=0.299

*p < .050, k = Number of effect size, ES = Effect size, CI = Confidence interval, Q_B = between-categories statistic, Q_W = within-categories statistic, df = degrees of freedom.

and the I² values were moderate to high. We performed analog ANOVA and meta-regression analysis to identify possible sources of heterogeneity. Possible moderators for analog ANOVA were intervention format, educational level, research design, and types of measurement. Regarding meta-regression, possible moderators were average age, the number of sessions, percentage of females, and duration of sessions.

Table 4 represents results from analog ANOVA analysis based on a random-effects model. The intervention format variable for social-emotional skills was a significant moderator (Q = 15.62, p < .050). However, the educational level, types of measurement, and experimental design variables were not significant moderators.

Table 5 presents the results of analog ANOVA analysis based on a random-effects model. Regarding externalizing problems, none of the moderators (experimental design, intervention format, educational level, and types of measurement) were significant.

Table 6 presents results of analog ANOVA analysis based on a random-effects model. For internalizing problems, educational level variable (Q = 9.67, p < .050), and types of measurement variable (Q = 9.50, p < .050) were a significant moderators. However, intervention format and experimental design were not significant moderators.

Table 7 presents results of simple meta-regression analysis based on a random-effects model. In meta-regression analysis, none of the variables (average age, number of sessions, duration of sessions, and percentage of females) were significant moderators for social-emotional skills.

Publication bias analyses

Although meta-analysis can be used for synthesizing different research findings, the validity of the findings is a controversial issue in terms of publication bias. We examined the possible effect of publication bias using the Egger regression test and the trim and fill method. The Egger regression test is the use of the inverse of the standard error for bias analysis, and the statistical significance of the regression intersection indicates publication bias (Egger et al., 1997). For this test, we calculated the intersections of each outcome category in the meta-analysis. None of the intercept values in the outcome categories were statistically significant. Social-emotional skills [intercept(SE) = 5.76(1.52), 95% CI = (3.45 - 8.07), t = 5.06, df = 37, p > .050], externalizing problems [intercept(SE) = -0.36(4.63), 95% CI = (-10.68 - 9.95), t = 0.07, df = 10, p > .050] and internalizing problems [intercept(SE) = 3.52(6.23), 95% CI = (-11.73 - 18.78), t = 0.56, df = 8, p > .050]. In trim and fill analysis, effect sizes are expected to be equally distributed on both sides of the overall effect (Duval & Tweedie, 2000). According to the Duval and Tweedie's trim and fill analysis, the difference between the effect sizes changed insignificantly when three studies on social-emotional skills, one study on externalizing problems, and two studies on internalizing problems were added (Figure 5). Adjusting for publication bias resulted in the addition of one trimmed studies and an adjusted mean effect size of 0.82 (95% CI = 0.47 - 1.18) for externalizing problems. Similarly, the addition of two trimmed studies resulted in an adjusted mean effect size of 0.88 (95% CI = 0.51

Table 5
Analog ANOVA analysis based on mixed-effects model (externalizing problems)

Moderators	k	ES	Std. Error	95% CI		.05 confidence level X ²	Q _B (df)	Q _W (df)
				Lower Limit	Upper Limit			
<i>Intervention format</i>								
Researcher	7	0.95	0.33	0.31	1.60	5.99	2.02(2)	56.77(9)
Researcher and teacher	2	0.36	0.28	-0.18	0.91		p=0.358	p=0.140
Researcher, teacher and parent	3	0.71	0.17	0.38	1.04			
<i>Educational level</i>								
Elementary school	10	0.79	0.21	0.38	1.21	5.99	0.63(2)	75.13(9)
Middle school	1	0.96	0.42	0.13	1.80		p=0.745	p=0.286
High school	1	0.54	0.35	-0.14	1.24			
<i>Measurement type</i>								
SSRQ	4	0.79	0.36	0.09	1.49	3.84	0.01(1)	75.17(10)
TRS	8	0.78	0.23	0.33	1.24		p=0.730	p=0.116
<i>Research design</i>								
Experimental	5	0.42	0.14	0.13	0.70	3.84	3.59(1)	54.55(10)
Quasi-experimental	7	1.11	0.34	0.45	1.76		p=0.063	p=0.152

*p < .05, k = Number of effect size, ES = Effect size, CI = Confidence interval, Q_B = between-categories statistic, Q_W = within-categories statistic, df = degrees of freedom.

Table 6
Analog ANOVA analysis based on mixed-effects model (internalizing problems)

Moderators	k	ES	Std. Error	95% CI		.05 confidence level X ²	Q _B (df)	Q _W (df)
				Lower Limit	Upper Limit			
<i>Intervention format</i>								
Researcher	8	0.98	0.18	0.63	1.33	3.84	0.01(1)	16.17(8)
Researcher and teacher	2	0.90	0.67	-0.41	2.22		p=0.918	p=0.178
<i>Educational level</i>								
Elementary school	1	0.30	0.16	-0.02	0.63	5.99	9.67(2)	11.09(7)
Middle school	4	1.15	0.39	0.38	1.93		p=0.008*	p=0.006*
High school	5	1.02	0.19	0.65	1.39			
<i>Measurement type</i>								
SSRQ	9	1.05	0.18	0.71	1.39	3.84	9.50(1)	11.10(8)
TRS	1	0.30	0.16	-0.02	0.63		p=0.002*	p=0.001*
<i>Research design</i>								
Experimental	7	0.90	0.24	0.44	1.37	3.84	0.29(1)	18.51(8)
Quasi-experimental	3	1.10	0.26	0.58	1.61		p=0.592	p=0.102

*p < .05, k = Number of effect size, ES = Effect size, CI = Confidence interval, Q_B = between-categories statistic, Q_W = within-categories statistic, df = degrees of freedom.

Table 7
Meta-regression analysis based on mixed-effects model (social-emotional skills)

Moderators	B	Std. Error	Z	95% CI		R ²	Q _E (df)	Q _R (df)
				Lower Limit	Upper Limit			
Average age	0.02	0.03	0.52	-0.04	0.08	0.00	163.19(33)	0.27 (1)
Number of session	0.01	0.01	0.88	-0.01	0.02	0.05	p<0.001	p=0.601
							151.30(33)	0.77 (1)
Duration of session	0.01	0.01	0.77	-0.01	0.01	0.00	p<0.001	p=0.381
							162.85(33)	0.59 (1)
Percentage of female	-0.02	0.01	-2.07	-0.05	-0.01	0.01	p<0.001	p=0.443
							144.50(33)	0.42 (1)
							p<0.001	p=0.383

p > .050, B = Beta coefficient, CI = Confidence interval, Z = statistic for testing the significance, Q_E = statistic for assessing the model misspecification, Q_R = statistic for assessing the significance of the meta-regression model. R² = proportion of variance explained. df = degrees of freedom.

- 1.21) for internalizing problems. Finally, the addition of three trimmed studies resulted in an adjusted mean effect size of 0.74 (95% CI = 0.49 – 0.98) for social emotional skills.

Discussion

This meta-analysis aimed to examine the overall effectiveness of SEL interventions on social-emotional skills, externalizing and internalizing problems in Turkey. To achieve this goal, we obtained a total of 61 effect sizes from 51 studies. ES's for each of the outcome categories were statistically significant, and heterogeneity between studies was moderate to high. Since SEL is a global phenomenon, the present study grows in importance given that the results can be effective when SEL interventions are applied outside western societies (e.g., in Turkey). In this respect, our study provides a national

review, supporting the positive evidence of SEL interventions in the international literature. Besides, this study reports few useful pieces of evidence.

According to the findings of the present study, SEL interventions are significantly effective on students' social-emotional skills, internalizing problems, and externalizing problems. Although these results are consistent with other meta-analyses in which the relevant outcome variables are included, they differ in terms of effect sizes. The effect sizes of social-emotional skills (ES = 0.81), internalizing problems (ES = 0.95) and externalizing problems (ES = 0.78) in our study were relatively high compared to the effect sizes in other meta-analyses (Durlak et al., 2011; Sklad et al., 2012; Taylor et al., 2017). This result may be due to the nature of SEL interventions conducted in Turkey. Most of the SEL interventions carried out in Turkey are experimental studies that test the effectiveness

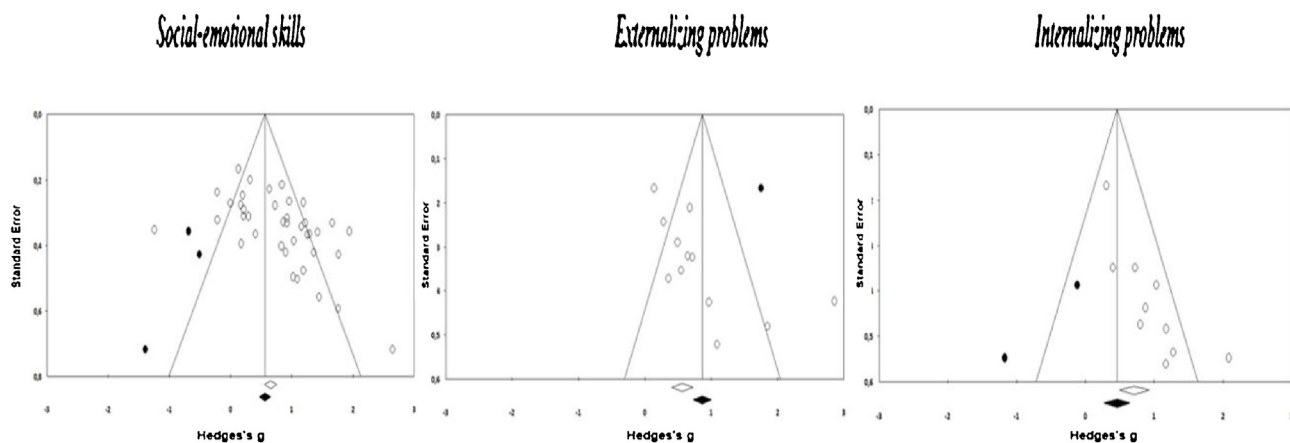


Figure 5. Funnel plots of outcome categories.

of programs developed by researchers rather than evidence-based school/class-based programs. Thus, the structured environment specific to experimental studies may have caused some scores to be observed higher than expected in favor of the experimental group. This situation, which is called the 'Hawthorne effect', can be greatly affected by the applications since the experimental group is affected by the experimental environment and may exhibit more positive behaviors than expected (Merrett, 2006).

One finding was that SEL interventions were statistically significantly highly effective in improving students' social-emotional skills. This result may be due to the purpose and content of SEL interventions. The short-term and primary goal of SEL programs is to develop students' social-emotional skills (CASEL, 2015). Similarly, regarding the content of SEL interventions, the activities aiming at the development of social and emotional skills (such as empathy, communication, problem solving, decision making) were at the forefront. Therefore, the activities carried out in intervention studies might have increased the effectiveness in developing social-emotional skills by directly contributing to the development of the related skills.

Another finding was that SEL interventions had large statistically significant effects on students' internalizing problems and moderately significant effects on externalizing problems. These results are consistent with the literature. Internalizing and externalizing problems are associated with a lack of social-emotional competencies (Ladd et al., 2006). According to meta-analysis studies, SEL interventions provide significant gains in reducing internalizing and externalizing behaviors (Candelaria et al., 2012; Durlak et al., 2011). This result might be because SEL interventions can affect the basic mechanism of internalizing and externalizing problems. Emotional dysregulation is among the symptoms of internalizing and externalizing problems (Macklem, 2008). In this context, SEL interventions may have had significant effects on the reduction of internalizing and externalizing problems, which are activities aimed at improving emotion regulation and social skills.

Regarding social-emotional skills, the intervention format variable was significant moderator. For us, the involvement of researchers developing SEL programs into interventions is an important condition for increasing the effectiveness of a program. Supporting this idea, meta-analysis studies report that out-of-school personnel (researchers) apply SEL interventions better than school members (Durlak et al., 2011; Payton et al., 2008). However, the effect sizes of the interventions in which the teachers were the implementers were relatively low. This may be due to the competence of teachers in gaining SEL skills. Besides, the content of teacher training programs in Turkey shows that the teaching of

SEL skills is not enough (TUSIAD, 2019). This situation might be the reason why the effectiveness of the interventions (in which the teachers were implementers) was relatively low.

For internalizing problems, the educational level variable was significant moderator. The effect sizes in middle school and high school were relatively higher than elementary schools. One possibility for this result may be that the middle and high school years, which coincide with the adolescence, coincide with a sensitive period in terms of internalizing problems. In this period, internalizing symptoms such as the need for acceptance, shyness, and future concerns come to the fore along with emotional change. Similarly, researchers acknowledge that students' emotional problems increase during the transition from elementary school to middle school (Chung et al., 1998). Therefore, the SEL interventions applied in this period may have produced a more effect sizes in internalizing problems.

For internalizing problems, types of measurement variable was significant moderator. Interventions involving the student self-report questionnaire were more effective than those with the teacher report of student. An important reason for this finding may be because of the difference in the number of studies. Another reason may be the difficulty in detecting the change in internalizing symptoms by the outside observer. Confirming this finding, a study examining the effectiveness of the SEL intervention on internalizing and externalizing problems reports that evaluators (teachers) exhibit significant inconsistencies (scoring below and above the average for the same participant), especially in their internalizing scores (Neth, 2019). Therefore, evaluating the change in internalizing problems based on self-report rather than an external observer may have caused a greater effect.

The present study found that moderators such as average age, number of sessions, duration of sessions, and percentage of females were not significant in any outcome categories according to meta-regression analysis. This finding differs from the significant effects observed in moderators in other meta-analyses, such as percentage of females (Klingbeil et al., 2017), average age (Blewitt et al., 2018; Durlak et al., 2011; Klingbeil et al., 2017), and duration and number of sessions (Durlak et al., 2011). From our perspective, this may be due to the predictor-criterion relationships in the model. For example, the number of women and men were very close to each other in almost all the studies we included in the analysis. This may have reduced the predictive power of the relevant variable. Similarly, the small range between the values of the relevant moderator variables in the result categories may have reduced their predictive power.

In a nutshell, these findings may be a useful guide for researchers to standardize future SEL interventions in Turkey. Also, under-

standing the potential effects and relative implications of these findings may aid in the programming and implementation of better SEL interventions in future studies. Moreover, the mean effects reported in the present study may provide a benchmark that other researchers can use to compare SEL interventions in Turkey. However, several issues limit the study findings. A limitation is that most studies consisted of master's theses and dissertations. This indicates that more research articles on interventions are needed. Another limitation is that most of the interventions in Turkey were experimental studies aimed at testing the effectiveness of programs developed by researchers rather than evidence-based school or classroom-based programs. This underlines the need for the evidence-based programs.

Since SEL is a global phenomenon, this meta-analysis outcomes provides evidence for positive effects that SEL interventions across various social and cultural contexts. Similarly, our study presents that SEL interventions do not lost their significance in the development of certain skills and reducing behavioral problems. Our findings represents that SEL interventions conducted in Turkey are an important approach to promote the social emotional skills, and reduce externalizing and internalizing problems.

Authors' contributions

The authors worked on the study design, analyzed the data, wrote the manuscript, and approved the final version of the manuscript for submission.

Funding

The authors declare that the current study was not financially supported by any institution or organization.

Data availability

The data analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest

The authors declare that they have no conflict of interest.

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