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Investigating the Effectiveness of Social Skills Training in Early Childhood in Türkiye: A Meta Analysis and Meta Regression Study

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This study was conducted to examine the effect of social skills training practices applied to children in early childhood on the social skills of the children trained by using meta-analysis method. The sample consisted of data obtained from 17 independent samples representing 869 participants from master's and doctoral studies in line with the inclusion criteria. The comprehensive Meta-Analysis software in the MAJOR package of Jamovi version 1.6.15 was used for meta-analysis. With this program, the results of 17 separate studies were synthesized, and effect sizes were determined. In addition, it was examined by meta regression analysis whether there were differences in effect sizes between the publication types and publication years of the 17 studies (before 2016 and after 2016). As a result of the analysis, the random effects model shows a value of 0.862. The analysis shows that the confidence interval varies between 0.43 and 1.28 and the significance level is $p < 0.001$. The fact that the effect value is 0.862 means that the Social Skills levels of the children in the experimental group increased significantly as a result of training and similar practices within the scope of the comparison of the experimental and control groups. In terms of publication type, doctoral dissertations show a larger effect size (EB=1.41) than master's theses (E =0.690), and the confidence intervals overlap. Considering the years of publication, there are differences in effect sizes between different years (Q=88.61, df =1, p=0.024). In particular, after 2016, it was determined that it showed the strongest positive effect (EB=1.37) with a high level of residual heterogeneity (I^2 = 79%).

Introduction

Early childhood years are very important for brain development. Especially in the first three years, 80% of brain development takes place. During this period, the communication established with the baby and the child, the warm loving environment affects this development critically positively. The social development of babies and children who feel safe will also be healthy (Dubois, 2023; Wen et al., 2020).

Alongside the overall importance of early childhood development, this period is also crucial

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for social development. Çağdaş and Seçer-Şahin (2002) emphasize that an individual's ability to adapt to their physical and social environment is essential for leading a happy, healthy, and successful life. On the other hand, researchs (Dinçer et al., 2025; Kayılı, 2020; Kayılı & Arı, 2016; Samancı & Uçan, 2017) emphasize that social development is too important to be postponed. They argue that failure to acquire essential social skills during early childhood may negatively affect an individual's later life. Moreover, they highlight that childhood is the period during which social development occurs most intensively and leaves the most lasting impact. When examining the process of social development, it becomes clear that from the moment children are born, they are in constant interaction with their families, the smallest unit of society. A child's initial social interactions begin with their mother and father and gradually expand to include other close individuals (Çağdaş & Seçer-Şahin, 2002). As development progresses, the role of the family, which is central in early socialization, is later complemented by preschool education. Through preschool education, children learn to cooperate, share, socialize, and act collectively, theskills that are essential for preparing them for primary school. One of the primary goals of preschool education is to stimulate children's interest in learning and to help them discover and develop their existing skills and abilities. The preschool years are widely regarded as the period during which children are most receptive to learning (Yağcı et al., 2023). Therefore, as with other developmental domains, preschool education and institutions play a critical role in fostering social development. In preschool institutions, children have the opportunity to interact with many peers in a shared environment, which makes it easier to detect developmental delays or skill deficiencies. These institutions are of great importance in identifying such issues early and in providing timely interventions and supportive educational services**.** One of the most important functions of early childhood education institutions is to support children's socialization and enhance their social skills (Kayılı, 2020).

Social skills are critically important for individuals to establish healthy and harmonious relationships within society, regulate their emotions, and exhibit appropriate behaviors in social settings (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2023). Early childhood and the primary school years are among the most developmentally appropriate periods for the acquisition and reinforcement of these skills. Therefore, efforts to promote social skills in children are considered a significant investment at both the individual and societal levels (Domitrovich et al., 2017; Jones et al., 2021).

Recent researchs (Mahoney et al., 2021; Taylor et al., 2017) have demonstrated that social-emotional learning (SEL)-based intervention programs have a positive impact on children's peer relationships, self-regulation skills, and academic achievement. In this context, the effective implementation of structured social skills training programs for children is regarded as a valuable tool for supporting those who are developmentally at risk.
In the context of Turkey, there has been a noticeable increase in the number of studies focusing on social skills in recent years. Particularly during the preschool and early primary school periods, issues such as introversion, aggression, peer relationship problems, and social exclusion, often stemming from deficits in social skills, have drawn the attention of both practitioners and researchers to this field (Kapçı & Aydın, 2020; Gözmen & Uyanık Balat, 2022). Additionally, the emphasis on supporting social-emotional skills in the Ministry of National Education's 2023 Education Vision and the subsequent revisions to the Basic Education Curriculum has further reinforced these developments (MoNE, 2023).

A variety of social skills training programs—either developed or adapted in Turkey—are currently being implemented across different age groups and contexts. Among these are

group-based social skills training programs (Öğülmüş, 2021), drama-supported intervention programs (Yavuzer & Dağlıoğlu, 2022), cognitive-behavioral-based programs, and school-based SEL approaches. However, a review of empirical studies in the field reveals considerable variation in the reported effectiveness of these programs, indicating that a comprehensive framework has yet to be established. This situation highlights the need for a meta-analytic study that systematically examines the effectiveness of social skills training programs. By synthesizing findings from independent experimental and quasi-experimental studies in the literature, such a study would not only determine the overall effect size but also analyze the influence of moderator variables such as sample age, program duration, and type of implementer. This would allow for a more comprehensive evaluation of the existing research in this field.

The purpose of this study is to analyze the impact of social skills training provided to children in early childhood on their social skills, using a meta-analysis method to comprehensively review previous studies related to this topic. Within the framework of this general aim, answers to the following questions have been sought:

(1) What are the effect sizes found in the meta-analysis results of studies investigating the impact of social skills training on the social skills of children in early childhood?
(2) Do the effect sizes of studies investigating the impact of social skills training on the social skills of children in early childhood vary according to the type of publication?
(3) Do the effect sizes of studies investigating the impact of social skills training on the social skills of children in early childhood vary according to the year of publication?

Method

Research Model

In this study, the meta-analysis method—one of the systematic synthesis approaches—was employed, and quantitative data obtained from independent studies were analyzed and interpreted using statistical procedures. For the meta-analytic review, sources were accessed through the Turkish Higher Education Institution (HEI) Theses Database, Web of Science, and the TR Index platforms. Relevant data were collected through keyword-based searches within these databases, using terms such as “Early Childhood,” “Social Skills,” and “Social Skills Training Practices.” The comprehensiveness of the findings was enhanced by reviewing the reference lists of selected studies and prior meta-analyses. All identified studies were assessed for eligibility according to predetermined inclusion and exclusion criteria.

Data Collection

The data collection process began with a comprehensive and systematic search of databases such as HEI Theses, Web of Science, and TR Index. To formulate the search strategy, keywords such as “Early Childhood, Social Skills, Social Skills Training Practices” were identified. Inclusion criteria were used to determine whether the studies obtained would be included in the research. In this regard, the studies to be included in the research were determined to be studies conducted between 2007 and 2024, studies related to educational practices that support children’s social skills in early childhood in Turkey, studies that provide quantitative data on children's social skills, studies conducted with typically developing children, studies published as master's theses, doctoral theses, or peer-reviewed journal articles, and studies that use the Social Skills Assessment Scale (SSAS) developed by

Avcıoğlu (2007) for children aged 4-6 as a measurement tool. Among the criteria identified, the reason for selecting the Social Skills Assessment Scale (SSAS) as the assessment scale is that it is the most widely used assessment scale in studies on social skills education practices.

To enhance the comprehensiveness of the search, citation tracking was conducted on seminal studies identified during the initial search, including both backward and forward citation analysis. This process ensured a more thorough inclusion of relevant literature by identifying additional key studies that may not have been captured through database keyword searches alone.

For the publications to be included in the meta-analysis the study had to be empirical, It must examine the relationship between social skills and certain antecedent or outcome variables, assumptions or inferences regarding the direction of these relationships had to be made, means, standard deviations, and sample sizes had to be reported, and publications involving key variables such as Early Childhood, Social Skills, and Social Skills Training Practices were considered fundamental.

Some studies identified during the research could not be included in the analysis because they did not measure the social skill levels of preschool children, were not based on empirical research, or lacked the required statistical reporting.

Coding

To ensure consistency and accuracy, a standardized framework was used to extract and code data from the studies. Each study was thoroughly reviewed to collect information on publication details, sample characteristics, measurement tools, effect sizes, and moderators. The coding process involved checking values such as sample size, mean values, standard deviation data, and the presence of control and experimental groups to determine the contextual characteristics of the studies. To aid comparison, information regarding measurement tools, such as the Social Skills Assessment Scale (SSAS), was also recorded.

Moderators and Meta-Regression

In this study, the moderators were identified as the publication year of the studies and their publication types. Variation in the formation of effect sizes due to moderators is examined through meta-regression analysis, which represents a more advanced stage of meta-analysis. While meta-analysis aims to combine the findings of multiple independent studies on a given topic to calculate an overall effect size, meta-regression statistically investigates which factors (moderator variables) influence this effect size (Borenstein et al., 2021).

Effect Size Estimation

Raw scores obtained from the studies were derived by comparing the Social Skills Assessment Scale scores between the control and experimental groups. In studies measuring the impact of social skills, a non-randomized control trial or a pre- and post-test design with matched groups are typically used, which include both experimental and control groups at the beginning. To calculate the effect size from quasi-experimental studies, the mean, standard deviation, and sample size are considered (Borenstein et al., 2021; Higgins & Green, 2008). For the included studies, the mean, standard deviation, and sample size were coded to calculate the effect size. In addition, for single-group pre-test and post-test studies, where

correlations are usually not reported, data entry was made by selecting “mean, sample size, paired t-value” or “mean, sample size, paired p-value.”

Since this meta-analysis contains different results from various studies, and multiple effect sizes are obtained from a single study, the dependency of the effect sizes within studies was predicted with the overall effect size. When a study contains multiple results or time points, combining the effect sizes is the recommended method for meta-analysis (Borenstein et al., 2005). Especially in the social sciences, psychology, and education, it is likely that a study may have multiple outcomes. The literature indicates that it is normal to assume connections between several studies conducted by the same research team. Studies conducted in the same country can also be considered related (Van den Noortgate et al., 2013). Furthermore, if these effect sizes come from the same study and use the same sample, they cannot be treated as independent (Becker, 2000; Gleser & Olkin, 1994). For these reasons, the overall effect size was used for the summary effect in this study (Viechtbauer, 2010).

Classification and Interpretation of Effect Size

The criterion considered for determining the statistical significance of relationships among the study variables is that the confidence intervals for the effect sizes should not contain zero within their lower and upper bounds. The threshold values referenced by Cohen (1988) and outlined in detail below are used as a reference for interpreting the strength of effect sizes (Cohen et al., 2002).

Acording to Cohen et al. (2002), when the effect size (d) falls between -0.15 and 0.15, it is considered negligible; between 0.15 and 0.40, it is considered small; between 0.40 and 0.75, medium; between 0.75 and 1.10, large; and between 1.10 and 1.45, the effect size is considered very large.

Sources and Databases Used for Screening

After applying the inclusion and exclusion criteria and calculating all necessary composites, the final dataset consisted of data derived from 17 independent samples representing a total of 869 participants, obtained from master’s theses and doctoral dissertations (see Figure 1). The research includes 14 studies covering 17 data points. This discrepancy is due to the fact that 3 of the studies reported results from two separate sample groups, effectively contributing two sets of findings each. Figure 1 presents the flowchart of the study selection process, illustrating the inclusion and exclusion criteria applied during the research.

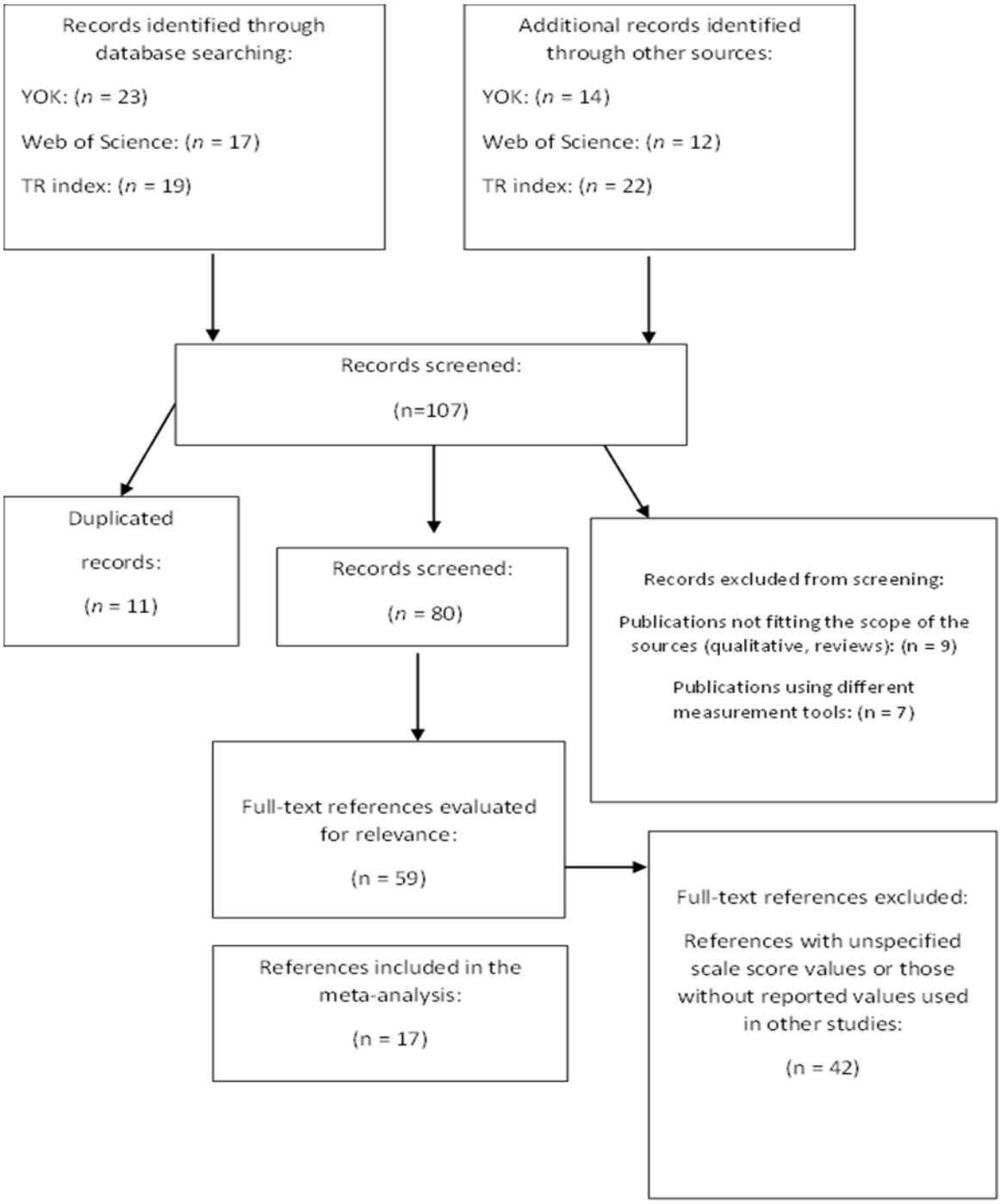

Figure 1. PRISMA Study Selection Flowchart

Statistical Approach

In psychology and education, total effect size is central to calculating effect size across studies. A multiple result from a study is required to discuss dependency issues, as multiple results from a single paper may include the same individuals, leading to dependence between results. Additionally, follow-up studies or data measured at specific time points can lead to dependency issues between effect sizes. Multivariate three-level meta-analysis is another option used when examining multiple outcomes. In the two-stage method, individual participant data are aggregated at the study level, and then a standard meta-analysis is

performed. Consequently, if within-study heterogeneity is not of interest to researchers, it is sufficient to examine the effect size (Tanner-Smith & Tipton, 2014).

Robust Variance Estimation (RVE, Hedges et al., 2010) and Multi-Level Meta-Analysis (MLMA; Van den Noortgate et al., 2014) methods take dependencies into account while using all available effect size estimates and practically incorporate robust variance estimation. An alternative model is to aggregate the effect size at the study level and adapt the process to a univariate meta-analysis. When both models are equal, aggregation is typically preferred due to its computational simplicity and easier tracking of the code. In this study, the restricted maximum-likelihood (REML) method was preferred as the model predictor and standardized mean difference data were used in the effect size measurement model.

Random-Effects Model

The Random-Effects Model assumes that true effects are normally distributed. Since the aim is to estimate the average of this distribution, two sources of variation must be considered. First, each study's estimated effect has its own error. Second, there are differences in the true effects between studies. The goal of assigning weights to studies is to minimize both sources of variance (Borenstein et al., 2005).

Due to significant heterogeneity across studies and its commonality in social sciences, the Random-Effects Model was preferred in this study. To assess how much effect sizes vary between studies in a meta-analysis (referred to as heterogeneity), researchers typically use a statistical test known as the Q statistic (Lipsey & Wilson, 2001). For heterogeneity calculation, this study used the restricted maximum likelihood estimator (Viechtbauer, 2010). Additionally, the Knapp-Hartung adjustments (Knapp & Hartung, 2003) method was used to calculate the confidence interval around the pooled effect size, as it reduces the likelihood of false positives, particularly in studies with small populations (Langan et al., 2019). In this study, the Jamovi 1.6.15 Major version was used for meta-analysis computations.

Publication Bias

Studies included in meta-analyses can lead to publication bias for various reasons. Publication bias refers to the higher likelihood that studies with positive effects are published more frequently than studies with negative results. The primary reason for this is the inclusion of published studies in the literature with effect sizes reported multiple times, which leads to an exaggeration of the summary effect size. To address this, the measures to be taken include ensuring that published and unpublished theses, articles, conference proceedings, government and technical reports, and similar works are included in the meta-analysis (Littell et al., 2008). Therefore, thorough investigation of the relevant literature plays an essential role in this process. Another preventive measure is to conduct the literature review with a common researcher. Having two researchers review the literature increases reliability.

There are various ways to address publication bias. Funnel plots, Egger's regression test, trim-and-fill method, Rosenthal's Fail-Safe N, and other methods are used to predict publication bias (Begg & Mazumdar, 1994; Duval & Tweedie, 2000; Egger et al., 1997; Light et al., 1994; Rosenthal, 1979). To provide a comprehensive meta-analysis, researchers must be aware of these biases and strive for a more inclusive search strategy.

Funnel plots are graphical tools used to investigate publication bias in meta-analyses. These plots show the relationship between the study size and its precision (standard error). Ideally,

the plot should resemble a symmetrical funnel, with more studies at the top (large standard errors associated with smaller studies) and fewer studies near the average effect size (small standard errors associated with larger studies) (Harrer et al., 2021; Sterne et al., 2005). Deviations from this shape may indicate publication bias. Researchers can visually inspect funnel plots to gain insight into potential biases that may affect the overall findings of a meta-analysis (Pigot, 2012).

Meta-Analysis

This section evaluates the data related to a meta-analysis focusing on training practices supporting the social skills of preschool children in Türkiye. In the study, the results of 17 separate studies were synthesized using the comprehensive Meta-Analysis software found in Jamovi version 1.6.15's MAJOR package. At the beginning of the study, an Excel sheet was created for coding the data, which included variables such as the name of the variable associated with training practices supporting the social skills of preschool children, author names, publication year, sample size, mean scores, standard deviation, publication type, and sample type. While not all of this data was used in the analysis phase, this detailed coding process was utilized to determine the quality of the studies and the data/results obtained in these studies.

As seen in Table 1, the meta-analysis includes seventeen research articles published between 2011 and 2023. The sample sizes range from 12 to 48 participants, corresponding to a total of 869 individuals. Table 1 presents the descriptive information of the studies included in the research, generally aiming to provide information to the reader.

Table 1.Descriptive Information for the Studies Included in the Research

Author	Study Design	Comparison Groups	Measurement Tools	Publication Type
Karaman_NN_2016	The study group consisted of 44 children (22 in the experimental group: 8 girls, 14 boys; and 22 in the control group: 10 girls, 12 boys), along with their parents. The age range was between 48-66 months.	Experimental group (n=22), Control group (n=22)	Social Skills Assessment Scale (SSAS) Preschool Social Skills Assessment Scale (PSSAS)	Master's Thesis
Göktaş_İ_2015	The study group consisted of four subgroups: Experimental Group 1 (group implementing Family Involvement Activities), Experimental Group 2 (group implementing the Social Skills Training Program), Experimental Group 3 (group implementing Family Involved Social Skills Training Program), and the Control Group (group with no program).	Experimental group (n=32), Control group (n=32)	Personal Information Form, Child-Parent Relationship Scale, Social Skills Assessment Scale	Master's Thesis
Uysal_A_2014	The data was collected using the Purdue Preschool Children's Self-Concept Scale (PPCSC) and Social Skills Assessment Scale (SSAS). Additionally, the Family Information Form developed by the researcher was used to gather demographic information of the children and parents.	Experimental group (n=44), Control group (n=44)	Purdue Preschool Children's Self-Concept Scale (PPCSC) and Social Skills Assessment Scale (SSAS)	Master's Thesis
Uzun_H_2016	The study aimed to examine the impact of the Father Education Program, applied to fathers with preschool children, on father-child relationships and preschool children's social skills. The study included preschool children with normal development and their fathers.	Pre-test Post-test Experimental group (n=40), Control group (n=40)	Child-Parent Relationship Scale Social Skills Assessment Scale	Doctoral Thesis
Liman_B_2017	The research follows an experimental design with a pre-test/post-test control group model.	Pre-test Post-test Experimental group (n=21), Control group (n=19)	Child-Parent Relationship Scale Social Skills Assessment Scale	Doctoral Thesis
Başdaş_F_2017	In this ten-week study, lessons in the experimental group involved activities from a drama-based digital storytelling program, while in the control group, activities from a preschool program were used.	Experimental group (n=24), Control group (n=24)	Social Skills Assessment Scale	Master's Thesis

Aslan_ B_2018	The study group included 37 preschool students, with 18 in the experimental group and 19 in the control group. The study lasted for 10 weeks.	Experimental group (n=18), Control group (n=19)	Preschool Nutrition Teaching Test (PNTT) Social Skills Assessment Scale (4-6 Years)	Master's Thesis
Bozdağ_S_2022	The study examined the effect of the "Story-Based Education Program," prepared for 4-5-year-old children, on their social and emotional skill development. The research design was a pre-test/post-test control group experimental design.	Experimental group (n=20), Control group (n=20)	Social Skills Assessment Scale	Master's Thesis
Duman_Ş_2023	This study used a pre-test/post-test control group quasi-experimental design. The study group consisted of 17 children in the experimental group and 18 children in the control group, with a total of 35 children.	Experimental group (n=17), Control group (n=18)	Early Literacy Skills Assessment Tool Social Skills Assessment Scale	Master's Thesis
Şahbaz_S_2019	The effect of a peace education program in preschool on the social skill development of preschool children was examined using pre-test and post-test.	Experimental group (n=20), Control group (n=20)	Social Skills Assessment Scale	Master's Thesis
Yeşilay_Daşıran_T_2023	The study used a "Pre-test-Post-test Control and Experimental Group" quasi-experimental research model.	Pre-test/post-test control group experimental design was used. Experimental group (n=20), Control group (n=20)	Self-Regulation Skills Scale Social Skills Assessment Scale	Doctoral Thesis
Oziskender_G_2011	The study group consisted of 40 preschool students randomly selected from a group of 6-year-olds, divided into experimental and control groups. The study examined the effects of preschool music education using the Orff approach on students' social skills.	Pre-test/post-test control group experimental design was used. Experimental group (n=20), Control group (n=20)	Social Skills Assessment Scale	Master's Thesis
IBIS_2017	The research was conducted with 24 children aged 5-6 attending kindergarten.	Experimental group (n=12), Control group (n=12)	Social Skills Assessment Scale	Master's Thesis
Pekdogan_2016	This study used a pre-test/post-test-retention test control group experimental design. 60 children aged 5-6 attending kindergarten participated in the	Pre-test/post-test control group experimental design was	Social Skills Assessment Scale	Article

	study.	used. Experimental group (n=30), Control group (n=30)

Findings

In the study, the heterogeneity of the standardized mean difference coefficients was evaluated by calculating the I^2 index as a function of the Q statistic. The Q statistic was applied to test the assumption of homogeneity between the standardized mean differences. The I^2 index is a potential measure of heterogeneity (Higgins & Thompson, 2003). Approximately, I^2 values of 25%, 50%, and 75% may reflect low, moderate, and substantial heterogeneity, respectively. The average effect sizes obtained through Fisher's z-transformation, along with their upper and lower confidence intervals, were converted back to the original standardized mean difference coefficient metric to interpret the results. As a result, Fail-Safe N, Egger's Regression, and Kendall's Tau tests were used to evaluate potential publication bias. The Random-Effects Model was used to analyze standardized mean differences based on categorical variables.

Heterogeneity

Meta-analysis determines the level of diversity among the studies included in the analysis and allows for the investigation of the research topic through different parameters. In this context, this meta-analysis study addressed the presence of heterogenous distribution among the studies included in the analysis. The Q test and I^2 value were used to determine the heterogeneity of the research results. The Q test, which evaluates the likelihood of the observed differences between results being randomly distributed, indicates heterogeneity of the mean effect sizes when the I^2 value calculated based on the degrees of freedom exceeds it (Card, 2012). The I^2 value, which complements the Q test, expresses the amount of heterogeneity of the mean effect sizes (Cleophas & Zwinderman, 2017). An I^2 value higher than 75% is considered to reflect a high level of heterogeneity (Cooper et al., 2009). Table 2 presents the Heterogeneity Statistics results.

Table 2.Heterogeneity Statistics

I^2	df	Q	p
86.64%	16	114.715	<.001

Table 2 shows that the results of the Cochran Q test indicate significant differences among the standardized mean difference coefficients ($Q_{Total}(17) = 114.715$, $p < 0.001$). The table presents the Q and I^2 statistics, which vary within the 95% confidence interval for the mean effect size. These figures reflect the changing values of the standardized mean difference coefficients across different studies. Given the significant results of the Q statistic, the high I^2 value, and the wide prediction range, it is evident that the studies aimed at enhancing the social skills of preschool children through educational and similar interventions require a comprehensive analysis of the significant heterogeneity between them ($I^2 = 86.64$).

Publication Bias

Publication bias presents a significant challenge in meta-analyses and literature reviews. As a result, researchers must address publication bias before starting a meta-analysis. Several graphical and numerical methods are available to determine publication bias in meta-analytic studies. Among these, funnel plots are commonly used. In a funnel plot, to prevent publication bias, studies included in the meta-analysis should display a symmetric distribution at the top of the funnel. However, when symmetry is not apparent, researchers may sometimes apply a subjective method to evaluate the funnel plot (Duval & Tweedie, 2000). This subjectivity is a commonly criticized feature of funnel plots. Therefore, in assessing the publication bias of meta-analysis results, using Fail-safe N values alongside funnel plots enhances the reliability and validity of the findings. Figure 2 presents the funnel plot of the standardized mean difference coefficients of the Social Skills Assessment Scale (SSAS).

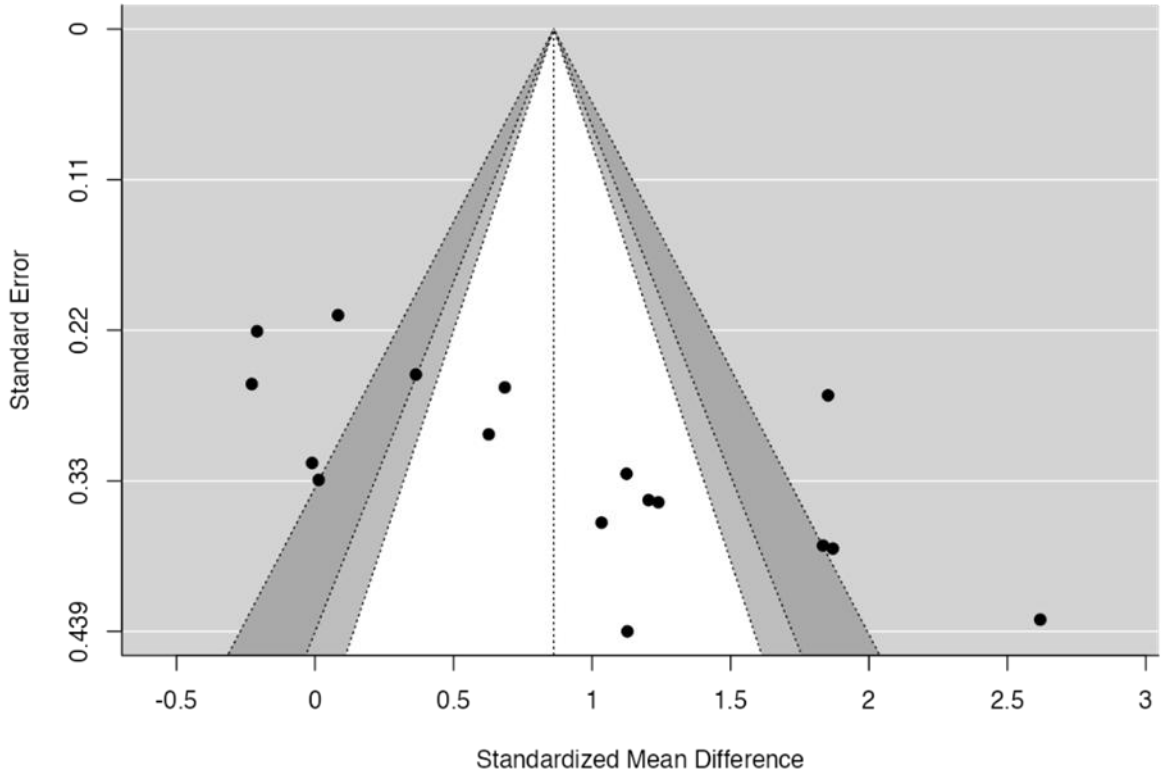

Figure 2. Funnel Plot of the Standardized Mean Difference Coefficients of the SSAS

Table 3 presents the results of the publication bias evaluation.

Table 3. Publication Bias Evaluation

Test Name	value	p
Fail-Safe N	685.000	<.001
Begg and Mazumdar Rank Correlation	0.544	0.002
Egger's Regression	3.587	0.003
Trim and Fill Number of Studies	0.000	.

When Figure 2 and Table 4 are analyzed, the results show that the Egger regression test is statistically significant (Egger Value = 3.587, p = 0.003 < 0.05). This suggests that the studies included in the meta-analysis provide evidence of publication bias. Begg and Mazumdar's rank correlation test assesses publication bias by analyzing the relationship between effect sizes and their standard errors. In Figure 2, the results show an asymmetric structure in the funnel plot (Kendall's Tau = 0.544, p = 0.002), indicating publication bias in study selection. The "trim and fill" test, created by Duval and Tweedie, assesses the gap between observed and true effects by estimating studies excluded from the meta-analysis due to publication bias. The trim and fill analysis shows that there is a significant difference between the observed and true effects of this research. In addition, we analyzed Fail-Safe-N, which represents one of the quantitative outputs of the meta-analysis. The Fail-Safe-N metric estimates the number of unpublished studies needed to change the overall conclusion of the meta-analysis. The high Fail-Safe-N value obtained (FSN = 685.000, p < 0.001) suggests that the findings of the meta-analysis are robust to publication bias and that the conclusions drawn as a result are reliable. Table 4 presents the generalized effect size outputs for SSAS.

Table 4. Generalized Effect Size Outputs for SSAS

REM (Random-Effects Model) (k = 17)

Model	ES	Standard Error of Measurement	Z	p	CI Lower	CI Upper
REM	0.862	0.202	4.28	<.001	0.430	1.280

Note. Tau² Estimator: Restricted Maximum-Likelihood; ES: Effect Size; REM: Random-Effects Model

Effect size is inherent to meta-analysis. In meta-analysis, effect size allows us to understand not just a fraction, but the entirety of the picture. When reviewing Table 4, the standardized mean difference value was used for effect size calculations in this study. According to the analysis results, the effect size value based on the Random Effects Model (REM) was found to be 0.862. Considering the threshold values cited by Cohen (1988), the effect size is considered high (Cohen et al., 2002).

A total of k=17 studies were included in the analysis. The observed standardized mean differences ranged from -0.2285 to 2.6183, with most of the estimates being positive (%86). Based on the Random Effects Model, the estimated mean standardized effect size was 0.86 (%95 CI: 0.4347 to 1.2891) (see Figure 3). Therefore, the average result is significantly different from zero [t (16) = 4.2772, p = 0.0006]. According to the Q-test, the true results appear heterogeneous [Q (16) = 114.7151, p < 0.0001, tau² = 0.5809, I^2 = %86.6354].

The Random Effects Model in Table 5 shows the value 0.862. The analysis indicates that the confidence interval ranges from 0.43 to 1.28, and the significance level is p <0.001. Lipsey and Wilson (2001) stated that the overall effect size of this study is both positive and significant. With an effect size of 0.862, it is understood that children in the experimental group demonstrated a significant increase in their Social Skills levels due to the educational and similar interventions, compared to the control group. In Figure 3, the forest plot for the SSAS standardized mean difference coefficients is presented.

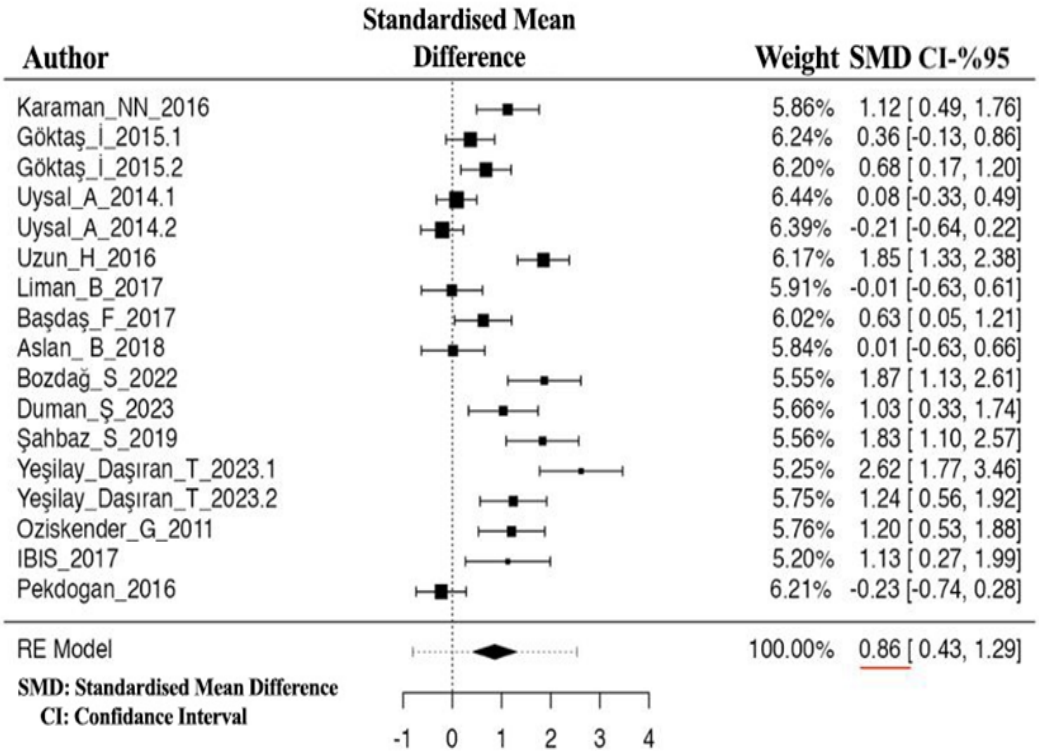

Figure 3. Forest plot for the SSAS standardized mean difference coefficients

Forest plot for the SSAS standardized mean difference coefficients shows the results of the meta-analysis examining the effects of educational and similar interventions on preschool children's social skills. The overall meta-analysis consisted of 17 effect sizes assessing preschool children's social skills. The effect sizes (ES=0.862 (95% CI [0.43 – 1.28], p<0.001) were aggregated using the Random Effects Model for the main effect size. The calculated effect size represents a significant and strong positive impact (Cohen, 1988). In simpler terms, the meta-analysis indicates that the studies included in the review show that intervention groups achieved better results compared to the control group in terms of enhancing preschool children's social skills. The 95% confidence interval (CI) for the standardized mean differences ranges from 0.43 to 1.28. This means that the true effect size could fall anywhere within this range with 95% confidence.

Moderator Analysis / Meta-regression

Publication Type

Subgroup analysis for publication type is presented in Table 5, and Q-Test results based on variance analysis are presented in Table 6.

Table 5. Subgroup Analysis / Meta-regression for Publication Type

Publication Type	k	ES	95 %CI	Tau^2	Tau	Q	I^2
Master's Thesis	13	0.690	0.308;1.072	0.3962	0.629	63.13	82
Doctoral Thesis	4	1.410	0.330;2.486	1.0919	1.045	30.75	90

k: number of publications, ES: Effect Size

Table 6. Q-Test Based on Variance Analysis

	Q	df	*p*-value
Between groups	93.89	1	0.128
Within groups	63.13	13	<0.001

When examining Tables 5 and 6, the results indicate that the type of publication is not a statistically significant moderator (Q=93.89, df=1, p=0.128). Regarding publication types, doctoral theses show a larger effect size (ES=1.41) compared to master's theses (ES=0.690), but the confidence intervals overlap. The subgroup analysis based on publication type reveals differences in social skill effects between doctoral and master's theses.

Among doctoral theses, the aggregated effect size is ES=1.41, indicating a positive effect on social skill scores. However, the confidence interval (CI=0.330 to 2.486) suggests significant variability in the social skill score results within this subgroup. Heterogeneity analysis showed substantial variation (I^2 = 90%), which indicates differences in the effects on social skill scores across studies in this subgroup.

On the other hand, master's theses exhibited a smaller effect size (ES=0.690) with a narrower confidence interval (0.308 to 1.072). Heterogeneity analysis again showed substantial variation (I^2=82%), indicating differences in the effects on social skill scores across studies in this subgroup.

Although one article was included in the sampling of the study, it was not included in the analysis of the publication type as a moderator. This is because meta-analysis and meta-regression require two or more studies to be included (Akgöz et al., 2004). Therefore, the article, representing only a single sample, was not included in the publication type analysis as it would not constitute a scientifically valid analysis.

Publication Year (Before and After 2016)

Table 7 presents the subgroup analysis for the publication period, and Table 8 presents the Q-Test results based on variance analysis.

Table 7. Subgroup Analysis / Meta-regression for Publication Period

Publication Year	k	ES	95 %CI	Tau^2	Tau	Q	I^2
Before 2016	10	0.534	0.108;0.961	0.3968	0.630	58.95	84
After 2016	7	1.370	0.758;1.983	0.5883	0.734	29.65	79

k: number of publications, ES: Effect Size

Table 8. Q-Test Based on Variance Analysis

	Q	df	*p*-value
Between groups	88.61	1	0.024
Within groups		16	<0.014

Table 7 and Table 8 show that the subgroup analysis of publication year revealed differences in effect sizes between different years (before 2016 and after 2016) (Q = 88.61, df = 1, p = 0.024). The results indicate that the publication year is a significant moderator and shows significant heterogeneity. This means that there are differences between before and after 2016. Specifically, post-2016 studies showed the strongest positive effect (ES = 1.37) with high residual heterogeneity (I^2 = 79%). This suggests that studies conducted after 2016 may be particularly effective. Pre-2016 studies showed a moderate positive effect (ES = 0.534) with high residual heterogeneity (I^2 = 84%). As a result, the publication year type significantly explained the heterogeneity, and as shown in Table 8, there are differences between the publication years.

Discussion

In this section, the findings of the meta-analysis on the effectiveness of social skills development programs implemented during the preschool period in the context of Türkiye are comprehensively evaluated in line with the existing scientific literature.

The obtained data reveal that the educational interventions in question have statistically significant and positive effects on the social skills development of preschool-aged children. However, the analysis results are not limited to focusing solely on the overall effect size; the level of heterogeneity observed in the studies, findings regarding publication bias, and the effects of various moderator variables are also carefully addressed and interpreted. In this context, the findings are discussed in terms of both methodological reliability and their place in the literature, providing a holistic assessment for practitioners and researchers.

The overall effect size (ES=0.862) obtained from the meta-analysis is considered to be a high effect level according to Cohen's (1988) classification. This finding indicates that social skills can be effectively developed through education during the preschool period. In the literature, the acquisition of social skills at an early age is frequently emphasized as having long-term positive outcomes in areas such as academic achievement, emotional development, and social adaptation (Bierman et al., 2008; Stefan & Miclea, 2012). Specifically, Bierman et al. (2008) demonstrated that social-emotional support applied at an early age through the Head Start REDI program positively influenced both academic success and behavioral adaptation during the transition to elementary school. Similarly, Stefan and Miclea (2012) showed that social-emotional prevention programs applied to preschool children at high risk led to significant improvements in children's classroom behavior and emotional competencies. In light of these findings, the high effect size reached in this study not only indicates short-term learning

outcomes but also suggests long-term benefits in terms of children's social adaptation and emotional health.

The high effect size (ES=0.862) obtained in this meta-analysis demonstrates that social skills development programs implemented during preschool in Türkiye have a strong and significant impact on children's social competencies. Aksoy and Erbay's (2021) classroom-based program demonstrated significant contributions to preschool children's preparedness for learning and social skills development, while Kayabalı and Özbey (2024) emphasized that social skills training not only improves social interactions but also enhances children's psychological resilience. These findings suggest that social-emotional learning is related to multidimensional outcomes. Our findings are also consistent with the research conducted by Özbey and Aktemur-Gürler (2019). In this study, the relationship between children's social skills and problem behaviors was examined, and it was found that individuals with higher social skills displayed fewer problem behaviors. Similarly, Atmaca et al. (2020) noted that social skill levels significantly varied based on some demographic variables, which aligns with the heterogeneity results identified in our study. Samar and Demiriz (2024) demonstrated a positive relationship between social skills and self-regulation, while Boz et al. (2018) highlighted the importance of family-supported social skills practices and pointed out the impact of environmental factors that support social skill development. The lack of such environmental support, however, may negatively affect the sustainability of the outcomes. Kapıkıran et al. (2006) reported that social skill levels vary according to variables such as age and gender, drawing attention to the need for individualization in educational practices. On the other hand, findings pointing to the impact of curriculum updates and the enrichment of program content suggest that studies conducted after 2016 have reached higher effect sizes (Kayabalı & Özbey, 2024; Aydın & Özbey, 2022).

The heterogeneity value (I^2=86.64) identified in the meta-analysis indicates that there is a high level of variance among the analyzed studies. This suggests that the overall effect size cannot be generalized homogeneously across all studies, and the results should be evaluated within the context of differences. The high level of heterogeneity can be related to the diversity of the intervention programs used in the studies, the duration of the interventions, the expertise level of the trainers, differences in measurement tools, and heterogeneity in sample characteristics (Borenstein et al., 2021). In this context, it is thought that there are significant differences in the implementation methods and contexts of the programs, and these differences may cause a widening in the confidence intervals of the effect size. As emphasized by Higgins et al. (2003), high I^2 values indicate the necessity of in-depth evaluations through subgroup analyses or moderator variables rather than a single generalized result in meta-analyses. In the context of Türkiye, the differentiation of social skills development programs according to local needs can be considered a direct reflection of this heterogeneity. Therefore, it is critical for educational policies to be developed in a way that is sensitive to regional conditions and practitioner characteristics, in order to reduce heterogeneity and make the programs more effective.

As a result of the analyses conducted, the Egger regression test (p=.003) and the Begg and Mazumdar rank correlation test (p = .002) were found to be statistically significant. However, an asymmetric distribution was observed in the funnel plot, which, as frequently noted in the literature, indicates the presence of publication bias (Rothstein et al., 2005). Publication bias may limit the generalizability of the meta-analysis findings, as positive and statistically significant results tend to be published at a higher rate. In this context, the possibility that the results obtained represent only a certain trend in the published literature should not be

overlooked. On the other hand, the Fail-Safe N value (FSN=685) calculated using Rosenthal's (1979) approach is quite high. This means that 685 unpublished studies would need to be included in the meta-analysis for the effect size to lose its statistical significance. Therefore, despite the publication bias, it can be said that the overall reliability of the analysis findings is high.

In the meta-regression analysis conducted within the meta-analysis, no statistically significant difference was found between the effect sizes obtained by publication type (p=.128). This finding suggests that the effect sizes for social skill development between master's theses and doctoral dissertations generally remained at similar levels. However, the higher effect size (ES = 1.41) found in doctoral dissertations compared to master's theses suggests that doctoral-level studies may have more detailed analysis processes, stronger statistical techniques, or more qualified sample structures. Furthermore, doctoral research often includes more comprehensive intervention programs, which could be one of the potential explanatory factors for this difference. On the other hand, as a result of the meta-regression operations, the publication year variable was identified as a significant moderator (p=.024). Especially in studies conducted after 2016, higher effect sizes were obtained (ES=1.370). This increase indicates that social skills training programs have become more structured in terms of content, implementation methods, and evaluation techniques. The updated preschool education program in Türkiye, which more distinctly emphasized social-emotional development in 2013 (MoNE, 2024), can be considered a structural factor supporting this improvement. The strengthening of the programs' content, the development of teacher guidance materials, and the adoption of systematic approaches to family involvement explain the higher effect sizes in studies from this period. In other words, the significant difference observed under the moderation of publication year demonstrates that updates in educational policies and program development processes are reflected in the field of social skills training. This finding is important in terms of highlighting the impact of content innovations on pedagogical outcomes.

Limitations of the Study

First, the analysis only included published theses. Grey literature, such as conference papers, project reports, unpublished studies, and institutional documents, were excluded from the meta-analysis. This omission limits the scope of the knowledge base and increases the risk of publication bias. Indeed, both the Egger test and the Begg and Mazumdar correlation test confirmed this risk with statistical significance. Moreover, conducting the analysis solely based on Turkish sources introduces a potential language bias limitation. Secondly, the relatively small number of studies included in the meta-analysis (k = 17) suggests that, despite the strong overall effect size (ES = 0.862), caution should be exercised when generalizing the findings. The notably high heterogeneity (I^2 = 86.64) indicates that there are significant differences across sample structures, practitioner profiles, program contents, and evaluation methods, which should be carefully analyzed. Third, the majority of the studies analyzed employed the same measurement tool, the Social Skills Assessment Scale (SSAS). This reduces the diversity of the measurement tools in the dataset and may limit the results to a particular evaluative perspective.

Conclusion

In conclusion, this meta-analysis provides valuable insights into the implementation of social skills development programs for preschool children in Türkiye. Consistent with the existing literature, the effectiveness of these educational interventions is not surprising. The

findings regarding preschool children's social skills are promising. The meta-analysis shows that the applied educational programs have had a significant effect size. However, it should be noted that the study was based on a small sample size. The type of publication does not appear to be an effective moderator in terms of the impact on social skills development in preschool children. This may be due to the homogeneity of the measurement tool (Social Skills Assessment Scale – SSAS) used in the studies. However, the publication year stands out as an effective moderator. Studies conducted before and after 2016 show that particularly post-2016 educational programs have demonstrated a substantially significant effect size in enhancing preschool children's social skills. This can be attributed to the enrichment of the educational programs and the updating of the curriculum.

This meta-analysis offers a comprehensive and quantitative synthesis of the effectiveness of social skills support programs implemented in Türkiye's preschool education system, contributing significantly to the existing literature. However, the findings highlight the need to consider certain methodological limitations.

In light of this, the following recommendations for future research can be developed:

This study is limited to a meta-analysis. Incorporating studies that are not limited to quantitative data but are also supported by qualitative findings or conducted using mixed methods will contribute to a deeper understanding of social skills development. This meta-analysis has addressed social skills in general. Conducting meta-analyses focused on subdimensions of social skills such as empathy, collaboration, self-expression, problem-solving, and emotional awareness will provide micro-level information on which skills can be more effectively developed through specific programs. Conducting longitudinal meta-analyses that track not only the short-term outcomes but also the long-term effects of the programs will provide valuable information regarding the sustainability of these interventions.

In conclusion, the findings of this study suggest that social skills education programs in Türkiye are generally effective. However, the need for more comprehensive, multidimensional, and contextually sensitive research is clearly highlighted.

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