Evidence-Based Practices for Children and Youths with Intellectual Disabilities

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PREFACE

Access to services grounded in evidence-based practices is a fundamental right for all children and young people. Yet, paradoxically, students with disabilities—particularly those with intellectual disabilities—are often among the most underserved in this regard. They are frequently subjected to interventions lacking empirical support, and their needs are too often marginalized in both research and practice. It was from this reality that our project emerged: to rigorously investigate and distinguish which practices for individuals with intellectual disabilities are supported by evidence and which are not.

Embarking on such a comprehensive and long-term research initiative would not have been possible without institutional and financial support. At this juncture, our project titled Evidence-Based Practices for Children and Youth with Intellectual Disabilities: Identification and Utilization was awarded funding through The Scientific and Technological Research Council of Türkiye (TÜBİTAK) National Support Program. This support allowed us to form a dedicated research team and access the necessary resources. While securing funding marked the beginning of our journey, the true work began thereafter. Since 2020, our team has worked diligently and with unwavering commitment to conduct this large-scale study.

This report is the result of the efforts not only of the core writing team but also of many contributors from diverse academic and institutional backgrounds. On behalf of the research team, I would like to express our heartfelt appreciation to Dr. Emrah Gülboy, Dr. Feyat Kaya, and Specialist Kübra Sayar for their contributions to the quality assessment and data extraction processes, as well as to Muhammed Ali Polat and Nuh Yılmaz for their valuable assistance during the data digitization phase. We are also grateful to TÜBİTAK for their financial support, and to Eskişehir Osmangazi University and Anadolu University for their institutional backing throughout this process.

As outlined in the methodology section of this report, we hope the findings from our long and meticulous research journey will inform the practices of professionals working with individuals with intellectual disabilities and inspire positive change in educational environments. Furthermore, we hope this work serves as a foundation for future scientific inquiry in this critical field.

Finally, in recognition of World Down Syndrome Day on March 21, I dedicate this study to all children and young people with intellectual disabilities—whose voices and needs inspired every step of this research.

On behalf of the IDEP team,
Prof. Dr. Şerife Yücesoy-Özkan
Principal Investigator

Introduction

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1.Introduction

Section 1

What is Intellectual Disability?

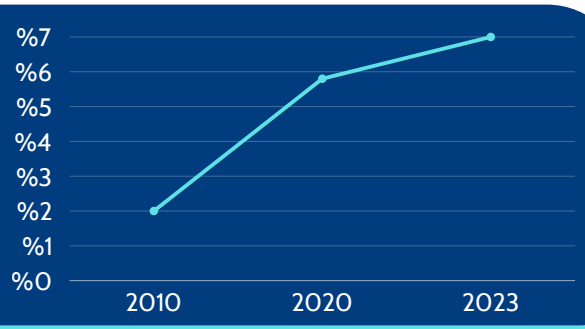
Intellectual disability (ID) is a condition characterized by significant limitations in intellectual functioning and adaptive behavior. Intellectual functioning includes general mental capabilities such as planning, learning, reasoning, abstract thinking, comprehension, and problem-solving (Schalock et al., 2021).

Intellectual disability is a type of disability that occurs before the age of 22 with significant limitations in both cognitive functions and adaptive behaviors including conceptual, social and practical skills. Limited cognitive functions are generally measured by IQ tests, and scores lower than 70-75 are indicates intellectual disability.

(American Assocation on Intellectual and Developmental Disabilities [AAIDD], 2022)

According to international **prevalence** studies, approximately 1% of the world population is estimated to be individuals with ID (Maulik et al., 2011). This rate exceeds 2% in developing or underdeveloped countries (Durkin, 2002). In Türkiye, according to the Population and Housing Census data, it is seen that individuals with at least one type of disability constitute 6.9% of the country's population (Ministry of Family and Social Services, 2023). The number of people registered in the National Disability Data System is around 2,511,950 and individuals with ID constitute **the second largest group** among disability types, with 17.07%.

While the prevalence of individuals with intellectual disabilities within the Turkish population was limited to 2% in the early 2010s, it increased to 5.8% in 2020 and approached 7% in 2023 (Ministry of Family and Social Services, 2023).



Intellectual disability is typically a lifelong condition (Carulla et al., 2011), and it affects individuals in various domains including academic achievement and adaptive behavior (Snell et al., 2009). Although certain common characteristics define this population, individuals with ID are a heterogeneous group, varying significantly based on age, etiology, severity of disability, and the educational opportunities they receive (Gargiulo & Bouck, 2021).

Education of Individuals with Intellectual Disabilities

Individuals with IDs often experience difficulties in both educational settings and daily life due to the limitations in their learning characteristics. Since their characteristics are highly variable, generalizations about these challenges and their solutions are often inappropriate (Zaman & Bauras, 2016). This situation requires the educational services provided to individuals with IDs to be more specific and structured (Kauffman & Hung, 2009). Providing educational opportunities to individuals with IDs and ensuring that they continue their lives independently are among the primary aims of special education (Browder & Spooner, 2011). This goal prioritizes how to provide educational services best (Singh, 2016).

The literature reveals that practices commonly used with individuals with disabilities **do not provide sufficient evidence or, at best, effective and ineffective practices are used together** (Dynia et al., 2020; Hess et al., 2008; Kauffman, 1996). Consequently, recent years have seen increased efforts to identify and promote evidence-based practices (EBPs) among educators and practitioners (Odom et al., 2013; Simonsen et al., 2008).

Although it is an essential right for all children and youth to receive instruction with evidence-based practices students with disabilities are the group most exposed to interventions that have no evidence-base (Jones, 2009). Implementing interventions with no evidence-base can lead to negative consequences both for students, teachers working with them, and families (Zane et al., 2008).

Students with IDs may experience a loss of motivation and learning anxiety due to repeated failures, as well as disruptions in academic development (Pascual-Leone & Johnson, 2004). Similarly, a positive and significant relationship is observed between the motivation of special education teachers and their use of effective and inclusive teaching strategies (Passanisi et al., 2022).

Families who finance their children's educational needs and, in most cases, provide complementary services such as transportation to education and support services may also spend their resources on ineffective practices. In short, turning to practices for which there is insufficient evidence of effectiveness causes labor, time, and money losses. Students with typical development can compensate for lost time with the necessary support; however, students with disabilities often cannot do this (Morningstar et al., 2016). Therefore, the impact of evidence obtained from research on educational decision-making is of greater importance in the education of individuals with disabilities (Mitchell, 2013).

Evidence-based practice (EBP) is an intervention implemented to improve student outcomes in a targeted developmental area, and its effects are demonstrated by a certain number of high-quality randomized control trials or quasi-experimental studies (Cook & Cook, 2013; Stoiber & DeSmet, 2010). EBPs can be defined differently by professional disciplines and research groups (APA, 2006; Slocum et al., 2014; Smith, 2013).

An evidence-based practice, identified as such, is the EBP for specific behaviors and skills, aligned with the characteristics of the participant group (population) and context, where evidence-based practices have been determined.

(Sam et al., 2019; Steinbrenner et al., 2020)

For example, direct instruction is an EBP for individuals with autism spectrum disorder between the ages of 0-14 for academic and pre-academic skills, between the ages of 6-14 for cognitive skills, between the ages of 0-22 for communication skills, and between the ages of 6-14 for school readiness skills (Steinbrenner et al., 2020). It is not yet possible to say that direct instruction is an EBP for individuals with autism spectrum disorder in all skill areas and all age groups or also for individuals with IDs. However, there may also be more than one EBP for the behaviors and skills determined for a participant group. For instance, both exercise and technology-based instruction are EBP in developing cognitive skills of individuals with autism spectrum disorder between the ages of 15-22 (Steinbrenner et al., 2020).

Evidence-based practices are determined through a comprehensive evaluation and synthesis of studies in the literature. For this purpose, the systematic review and meta-analysis procedures are followed as a research method (Sturmey, 2014). ***A systematic review*** is the systematic collection and analysis of studies that meet predetermined and clearly defined criteria through a transparent process to answer a specific research question (Harrer et al., 2022). ***Meta-analysis,*** on the other hand, is a statistical approach that aims to summarize the results of many quantitative studies with the same research focus (investigating the same problem) as a whole (Mills & Gay, 2019). Meta-analysis, developed by Gene Glass (1976), includes finding, defining, classifying, coding, measuring, and analyzing the findings within the systematic research process (Glass, 1976; Glass et al., 1981).

Rationale

Recently, national and international policies and service provision studies have accepted the determination of EBPs and their use in educational settings as current requirements. The Eleventh Development Plan (2019-2023), which sets out Türkiye's long-term development vision, also targets innovations in education and children considering global developments and trends. These innovations include goals such as ensuring that all individuals have access to inclusive and quality education (Article 547), establishing a quality assurance system in education (Article 550.3), and improving the quality of services provided to children and educational staff (Articles 606; 610; Turkish Presidency of Strategy and Budget, 2019).

Following the development plan, the Türkiye's Education Vision-2023 developed by the Ministry of National Education (MoNE) also includes the following goals related to special education: **Adopting internationally accepted practices, taking accountability as a basis, and increasing the quality of instruction** (MoNE, 2019). Accountability in education demonstrates the achievement of academic and social goals determined for students through objective assessment tools (No Child Left Behind [NCLB], 2002; Taubman, 2009). In this way, it is determined to what extent students benefit from instruction. One of the most critical steps to be taken to be accountable in education is using EBPs to increase the quality of instruction (Stoiber et al., 2016). In addition to national initiatives, international reports, laws, and professional principles on education also adopt the use of EBPs as a necessity and impose similar responsibilities on service providers (Behavior Analyst Certification Board, 2020; World Health Organization, 2011; NCLB, 2002).

In any field, studies that are well-designed and conducted at a high quality contribute significantly to the literature at an individual level; however, the results of a single study are not sufficiently convincing to make decisions about the intervention being considered for use.

(Fitzgerald et al., 2011; Rosenthal & DiMatteo, 2001)

Numerous studies have been conducted with individuals with IDs and have investigated the effectiveness of interventions. These studies constitute much more than what educators, as teachers or researchers, can read and analyze when necessary. As the number of studies on a particular subject increase, it becomes equally difficult for readers to access all the studies and examine the findings.

It is vital to systematically bring these studies together to have a broad perspective on the studies conducted (Cooper, 2010). Systematic review and meta-analysis answer research questions that are too broad to be asked by unique studies. It provides holistic, comprehensive, and detailed information on the subject it investigates through data obtained with objective criteria (Cleophas & Zwinderman, 2017).

Although comprehensive studies have determined EBPs for individuals with autism spectrum disorder (Steinbrenner et al., 2020) and learning disabilities (Lal and Kishore, 2020), attempts to determine EBPs for individuals with IDs are **limited** (Stoiber et al., 2016). Moreover, the structure of the studies conducted on individuals with IDs differs significantly from each other, which prevents the results from being brought together. Therefore, it is crucial to combine the studies that reveal effective practices for individuals with IDs and determine which practices have an evidence base and which do not.

The purpose of this report is to evaluate articles investigating the effectiveness of educational and behavioral interventions aimed at improving the performance of children and youth with IDs aged 0-22 years, and to conduct meta-analysis to determine EBPs for children and youth with IDs.

For this purpose, answers are sought to the following questions:

1. What are the characteristics of studies examining the effects of educational and behavioral practices aimed at improving the outcomes of children and youth with IDs between 0-22 regarding participants, methods, and interventions?
2. What is the effect size of educational and behavioral practices in improving the outcomes of children and youth with IDs between 0-22?
3. Do the effect sizes of educational and behavioral practices used in improving the outcomes of children and youth with IDs between 0-22 differ according to various variables (e.g., participants' age, disabilities' level, skill/behavior, etc.)?
4. Which practices used in improving the outcomes of children and youth with IDs between 0-22 are EBPs?
5. Which practices used in improving the outcomes of children and youth with IDs between 0-22 are not EBPs?

Methods

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2. Methods

Section 2

This study used the systematic review and meta-analysis steps developed by the Cochrane Collaboration. The flowchart of the research process is shown in Figure 2.1.

Figure 2.1 Research process

The 10 main steps of the current study are the following: (a) organizing the research team, (b) identifying research questions, (c) developing the systematic review protocols, (d) electronic search, (e) screening, (f) quality appraisal, (g) data extraction, (h) effect size calculation, (i) determination of EBPs, and (j) listing EBPs.

Step 1
Organizing The IDEP Team

Before conducting this systematic review, the number and qualifications of researchers to be involved in each step were planned. The research team was formed based on the competencies and expertise required for the research. A total of 13 researchers participated in this study: five held PhD degrees, five were doctoral students, one was a master's student, and two were undergraduate students.

Step 2
Identifying Research Questions

This study aimed to determine which behavioral and educational practices are EBPs for children and youth with IDs. Based on this aim, the research questions were defined. One question was focused on determine the descriptive characteristics of the EBPs; two addressed the effect sizes of the practices; and two investigated which practices qualify as EBPs and which do not.

Step 3
Developing the Systematic Review Protocols

Research protocols were developed for each step of the study. Before developing the protocols, relevant literature was reviewed, and the What Works Clearinghouse (WWC) protocols were selected as a basis. Although the established protocols were used, the research team made certain adaptations specific to this study and conducted pilot implementations accordingly. Following pilot implementations, the protocols were revised. Table 2.1 presents the protocols, and the sources used in their development.

Table 2.1 Sources used in preparing protocols

Research Step	Protocol
Electronic Research	WWC Protocol for Reviewing Interventions for Children and Students with Intellectual Disability-Version 3.1
Screening	WWC Protocol for Reviewing Interventions for Children and Students with Intellectual Disability-Version 3.1
Design Standards	WWC Review Protocol Manual Version-4.0
Quality Indicators	WWC Review Protocol Manual Version-4.0 Gersten et al., 2005 Kratochwill et al., 2013

Step 4
Electronic Research

Databases of Anadolu University Library were used to identify the studies to be included in the systematic review and meta-analysis. No restrictions were applied in order to conduct a comprehensive electronic search, and all databases were searched simultaneously. Among these, there are over 70 databases, including Web of Science, Academic Search Ultimate, EBSCOhost, ERIC, Social Sciences Citation Index (SSCI), and Arts & Humanities Citation Index (AHCI), which are commonly used indexes for social and humanities sciences.

The search was filtered by using two primary limiters: (a) studies published in peer-reviewed journals, and (b) studies conducted within the past 100 years, specifically between 1921 and 2020. Only studies published in peer-reviewed journals were included, and gray literature was excluded. The criteria, categories, and search terms used in the electronic search are presented in Table 2.2.

In the first phase of the search, 60,357 studies were accessed. Then, the publication type was selected as "academic journal," document types such as books, reports, and conference papers were excluded, resulting in 60,074 remaining studies. After removing duplicates, **49,147** studies were included for review.

Table 2.2 Criteria, categories and search terms used in electronic search

Research Criteria	Filters
Publications	Peer-reviewed journal
Years	Between 1921 and 2020
Search Categories	**Search Terms**
Study Design AND	1-case design OR ABAB design OR Alternating treatment OR Baseline OR Causal OR Changing criterion OR Comparison group OR Control group OR Effectiveness OR Evaluation OR Experiment OR Impact OR Intrasubject replication OR Matched groups OR Meta-analysis OR Meta analysis OR Multi-element OR Multiple baseline OR Multiple probe OR One-subject design OR Posttest OR Post-test OR Pretest OR Pre-test OR QED OR Quasi-experimental design OR Random* OR Randomized controlled trial OR RCT OR RDD OR Regression discontinuity OR Reversal design OR Simultaneous treatment OR Single case OR Single subject OR Treatment OR Withdrawal design
Intervention AND	Approach* OR Curricul* OR Instruct* OR Intervention* OR Program* OR Strateg* OR Teach* OR Technique* OR Therap* OR Train*
Population AND	Adolescen* OR Child* OR Student* OR Teen* OR Young adult* OR Youth*
Disability	Angelman Syndrome OR Cognitive* disab* OR Developmental* delay* OR Developmental* disab* OR Developmental* disorder* OR Down* Syndrome OR Fetal Alcohol Syndrome OR Fragile X Syndrome OR Intellectual* disab* OR Intellectual* handicap* OR Mental* handicap* OR Mental* retard* OR Neurodevelopment* disab* OR Prader-Willi Syndrome OR Rett Syndrome OR Severe* disab* OR Williams Syndrome

Step 5
Screening

The included studies were screened according to the criteria determined based on the aims of the systematic review. The screening process aimed to apply the inclusion and exclusion criteria to the titles and abstracts in order to determine whether the studies were relevant to the review's objectives and met the inclusion criteria (Cherry & Dickson, 2017). PICO —an abbreviation for Population, Intervention, Comparison, and Outcomes— developed by the Cochrane Collaboration, was used to determine the studies included in this review and to establish the conceptual framework. The inclusion and exclusion criteria within this framework were clearly defined.

Inclusion and Exclusion Criteria

Population

Two criteria were established for the population: age and diagnosis. These criteria were defined based on the American Association on Intellectual and Developmental Disabilities (AAIDD) definition of ID. ID is a condition characterized by significant limitations in intellectual functioning (IQ score between 70-75) and adaptive behavior, with onset occurring before the age of 22.

In this study, research involving participants aged 0-22 (included) who were diagnosed with intellectual disability, intellectual impairment, mental retardation, syndromes causing intellectual disability, hydrocephalus, microcephaly, traumatic brain injury, or multiple disabilities that include these conditions was included in the systematic review.

Interventions

The inclusion criteria for interventions required that the study involve a behavioral, developmental, or educational intervention. Studies using treatment packages that incorporated these types of interventions were also included in the systematic review. In contrast, studies involving medical treatments, surgical procedures, dietary approaches, or engineering-based interventions were excluded.

Outcomes

The outcome criteria were align with the intervention criteria, focusing on participants' behavioral, developmental, or academic outcomes. Outcomes related to growth and development (e.g., height, weight, and head circumference), physical characteristics (e.g., weight loss, weight gain or increased physical performance), sensory functions (e.g., improving vision and hearing), and health-related outcomes (e.g., recovery from illness, and physical and mental well-being) were excluded.

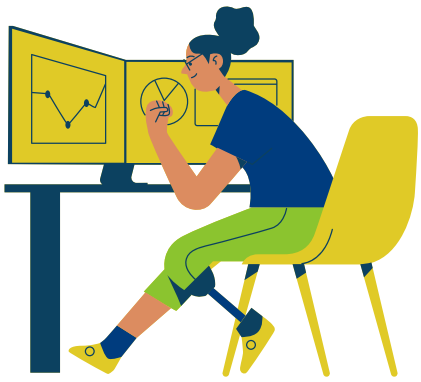
Study Design

The research design category included experimental designs that examined the effects of practices. Randomized controlled trials, quasi-experimental studies, single-case experimental studies, mixed method studies, and multi-method studies that employing these approaches were included in the systematic review. Other research designs, such as action research design, correlational research, causal-comparative research were excluded.

Table 2.3 Summary information on inclusion and exclusion criteria

Inclusion Criteria	Description
Population (P)	Children and youths aged between 0 and 22 Individuals diagnosed with intellectual disability, mental retardation or mental handicapped
Intervention (I)	Behavioral, developmental or educational interventions Educational practices in individuals' natural environments, such as home, school, and community
Comparison (C)	Randomized controlled trials and quasi-experimental designs (Group experimental designs) Single-case experimental designs
Outcomes (O)	Behavioral, developmental or educational outcomes

Eight researchers participated in the screening process and reviewed between 8,000 and 15,000 studies each. A total of 45,742 studies were excluded for not meeting the inclusion criteria. Following the screening, 2,470 single-case experimental design (SED) studies, 885 group experimental design studies (GED), and 50 mixed-methods design (MIX) studies were included in the systematic review for further evaluation. The rationale and corresponding numbers for the excluded studies are presented in Table 2.4.



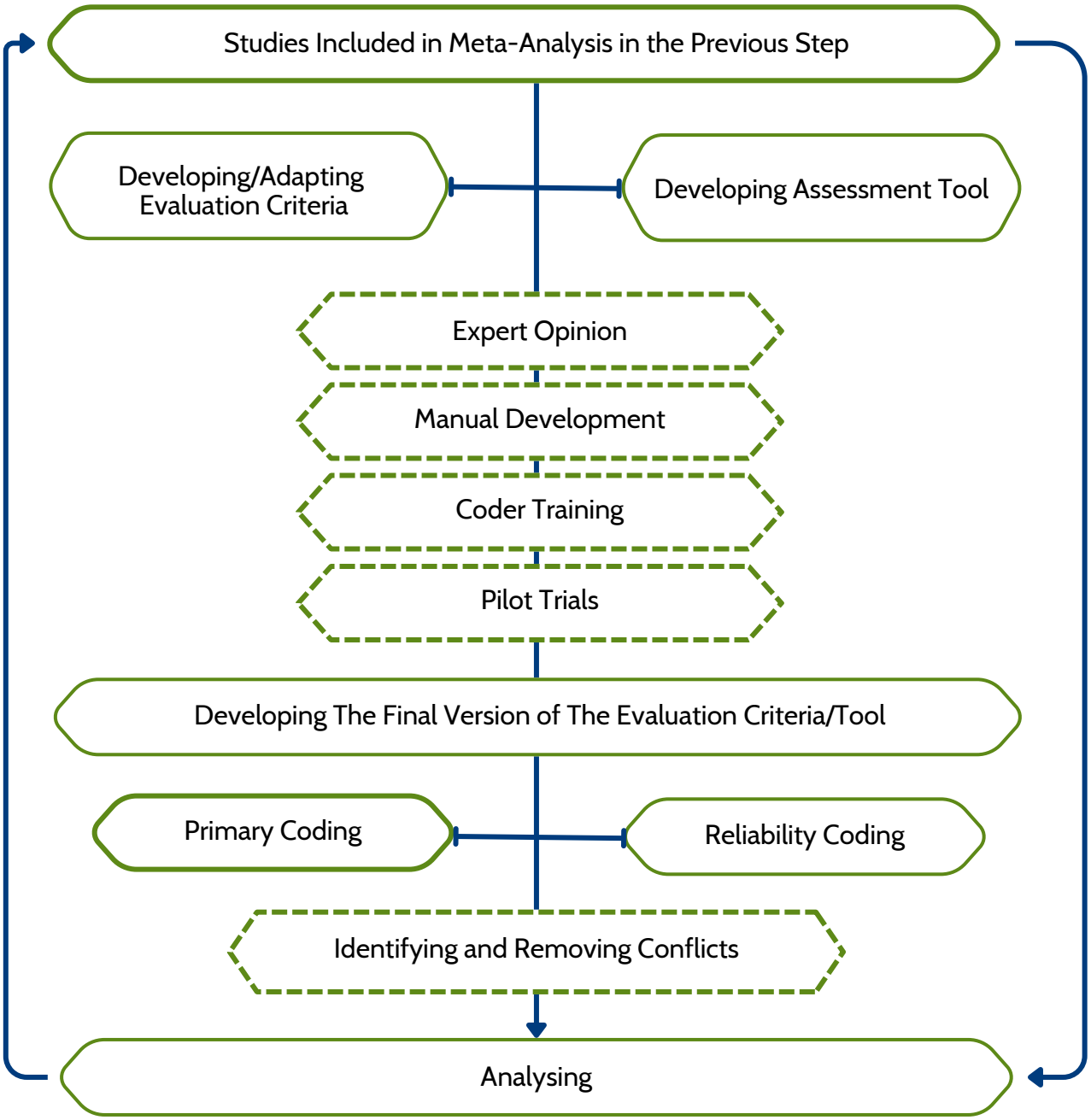
Tablo 2.4 Rationales for excluding the studies and their numbers

Excluded from Title		Excluded from Abstract		Excluded from Full-Text		Total
Disability	14,941	Disability	1,183	Disability	826	**16,950**
Study design	5,782	Study design	5,708	Study design	1,241	**12,731**
Population	5,181	Population	1,717	Population	756	**7,654**
Intervention	6,903	Intervention	697	Intervention	115	**7,715**
Total	**32,807**	**Total**	**9,305**	**Total**	**2,938**	**45,050**
Studies published in different languages and without extent English abstracts						**626**
Duplicate studies in LimeSurvey						**66**
Total Number of Studies Excluded						**45,742**
Single-case experimental studies included						**2,470**
Group experimental studies included						**885**
Mixed-method studies included						**50**
Total Number of Studies Included						**3,405**

Step 6
Quality Appraisal

A three-stage process was conducted as a part of the review: (a) applying design standards, (b) assessing quality, and (c) performing visual analysis for SEDs. Due to the differences in research methodology, the design standards for SEDs and GEDs differ in certain aspects. Therefore, design standards were defined separately for each method, and applied sequentially —first for SEDs and then for GEDs. The flowchart procedures in the quality appraisal process is summarized in Figure 2.2.

Figure 2.2 Flowchart of procedures in the quality appraisal process



Applying Design Standards

Design standards were applied to all SED and GED studies that met the inclusion criteria in screening. Covidence, a systematic review software, was used to facilitate the application of design standards. Covidence enables reviewers to annotate articles, supports multiple reviewers working with simultaneously and independently, and stores all records with the ability to archive them by category (https://www.covidence.org).

Studies transferred to Covidence were categorized into two groups based on their research design: SED and GED studies. Of the 50 studies initially classified as MIX, 43 were assigned to the GED group, and seven to the SED group.

Design Standards: Single-Case Experimental Design Studies

To apply design standards to studies utilizing SEDs, a set of evaluation questions was developed. All coders conducted pilot coding using these questions, which addressed research design, dependent and independent variables, baseline, intervention, and findings. Following the pilot coding, a meeting was held to finalize the evaluation questions and establish the coding protocol.

Prior to applying the design standards eight coders —four holding doctorates in special education and four doctoral candidates— were trained in the use of Covidence. After the training, eight coders simultaneously performed pilot coding. Based on their feedback and review of the software, the evaluation questions were finalized. During the application of design standards for SEDs, each coder evaluated between 500 and 1,600 studies.

According to the evaluation results, 204 out of 2,477 SED studies met the design standards, 258 met the design standards with reservation, and 12 met the design standards both with and without reservation (n = 474). In this step, 2,003 studies were excluded because they did not meeting the design standards. The reasons for the exclusion of SEDs are provided in Table 2.5.

Design Standards: Group Experimental Design Studies

Design standards were applied to all GED studies that met the inclusion criteria during the screening. For this purpose, a set of evaluation questions aligned with the design standards was first developed. According to the WWC standards, which were used as the basis, the criteria are grouped under two main categories: core elements and non-design components (U.S. DoE, IES, WWC, 2018). The studies included in this meta-analysis were evaluated using both categories.

Of the 928 GED studies reviewed, 186 studies met the design standards, and 57 met the design standards with reservation (n = 243). In this step, 685 studies were excluded because not meeting the design standards. The reasons for the exclusion of GEDs are presented in Table 2.6.

Table 2.5 Numbers for meeting and excluding design standards for SED studies

	Exclusion Reasons	Number
Total Study Meeting Design Standards ***n* = 474**	No interobserver agreement (IOA) in 20% of each phase	834
	No three demonstrations of experimental effect	273
	One or two data points	163
	Non-concurrent/delayed multiple baseline design	122
	No baseline phase	110
Meeting Design Standards ***n* = 204**	No graphs/tables in findings	89
	IOA not specified	83
	AB design	75
	Changing criterion design	50
	ABA design	48
	Brief functional analysis	30
Meeting Design Standards with Reservation ***n* = 258**	ABC design	37
	First three data points are not simultaneous (For multiple probe design)	16
	IOA 79% and below or Kappa .59 and below	14
	Non-concurrent/delayed multiple probe design	13
	Cumulative graph	13
	No data immediately prior to intervention (Multiple probe design)	12
Meeting Design Standards Both with and Without Reservation ***n* = 12**	BAB design	8
	No four repetitions of the alternation (For alternating treatments design)	7
	Baseline and intervention phases are not separated	4
	There is no independent variable manipulation	2
	Total Number of Studies Not Meeting Design Standards	**2,003**

Table 2.6 Numbers for meeting and excluding design standards for GED studies

	Exclusion Reasons	Number
Total Study Meeting Design Standards ***n* = 243**	There is no experimental/control group	505
	Baseline equivalence is not sufficient	58
	No random assignment	42
Meeting Design Standards ***n* = 186**	Reliability data not specified	41
	Outcome measurement is absent	25
	High attrition	6
Meeting Design Standards with Reservation ***n* = 57**	No validity	5
	SMART/ RDD design	2
	Reliability is low	1
	Total Number of Studies Not Meeting Design Standards	**685**

Quality Indicators: Single-Case Experimental Design Studies

A modified version of the quality indicators developed by Horner and colleagues (2005) was used to evaluate SED studies. To be classified as high quality within the scope of this meta-analysis, a study had to meet all 21 indicators. A study was considered acceptable if it failed to meet the participant selection indicator (Item 2) and/or the social validity indicators (Items 19-21), resulting in a score of 18/21, 19/21, or 20/21. Studies that failed to meet any indicators outside of Items 2 and 19-21 were classified as of low quality based on the quality indicators.

Of the 474 SED studies, 177 were rated as high quality and 70 as acceptable (n = 247). In this step, 227 studies were excluded due to low quality. The reasons for the exclusion of SEDs are presented in Table 2.7.

Quality Indicators: Group Experimental Design Studies

The quality indicators developed by Gersten and colleagues (2005) were used to evaluate GED studies. These indicators are grouped into two categories: essential and desirable quality indicators. In this meta-analysis, studies that meet all but one of the essential quality indicators and at least four of the desirable quality indicators were classified as high quality. Studies that meet all but one of the essential indicators and at least one of the desirable indicator were considered acceptable.

Of the 243 GED studies, 48 were rated high quality, and five as acceptable (n = 53). In this step, 190 studies were excluded due to low quality. The reasons for the exclusion of GEDs are presented in Table 2.8.

Table 2.7 Frequency of meeting quality indicators and exclusion rates for SED studies

Exclusion Reason	Rate
Were the participants described with sufficient detail to allow replication?	19.3%
Were the critical features of the setting are described with sufficient to allow replication?	53.0%
Were the dependent variables described with operational precision?	13.3%
Was the process of measurement described with replicable precision?	13.7%
Was the independent variable described with operational precision?	9.0%
Was the fidelity described?	69.8%
Were the baseline conditions described with operational precision?	20.6%
Was the research design control the common threats to internal validity?	19.3%
Was the experimental effect and external validity been established?	11.6%
Total Studies of Low Quality	**227**
Was the process of selecting participants described with replicable precision?	40.0%
Was the magnitude of the change in the dependent variable socially important?	1.7%
Was the implement of independent variable practical and cost effective?	6.8%
Was the independent variable applied in in typical physical and social contexts?	45.2%
Acceptable Studies	**70**
High Quality Studies	**177**
Total Number of Studies Meeting Quality Indicators	**247**

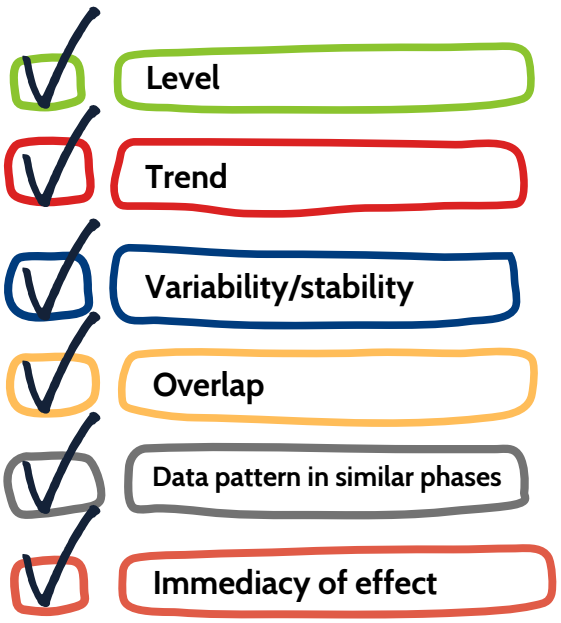
Table 2.8 Frequency of meeting quality indicators and exclusion rates for GED studies

Exclusion Reason	Rate
Essential Quality Indicators	
Was sufficient information given characterizing the interventionist provided?	54,7%
Was the intervention clearly described?	22,1%
Was the fidelity of implementation described and assessed?	94,7%
Was the nature of services provided in comparison conditions described?	61,0%
Were the data analysis techniques appropriately linked to key research questions/ hypotheses?	2,6%
Did the research report include also effect size calculations?	64,7%
Desirable Quality Indicators	
Were outcomes measured beyond an immediate posttest?	65,7%
Was criterion-related validity and construct validity of the measures provided?	78,9%
Was any documentation of the nature of instruction?	74,2%
Did the research report include actual audio or videotape excerpts?	89,4%
Were results presented in a clear, coherent fashion?	5,2%
Total Studies of Low Quality	**190**
Acceptable Studies	**5**
High Quality Studies	**48**
Total Number of Studies Meeting Quality Indicators	**53**

Visual Analysis

Visual analysis was conducted for the 247 SED studies that were rated as high quality or acceptable based on quality assessment. The analysis followed the criteria proposed by Kratochwill and colleagues (2013) and was further supported by additional literature soruces supported by sources (Kazdin, 1982).

In the visual analysis, graphs were evaluated on the following elements: (a) level, (b) trend, (c) variability/stability, (d) overlap, (e) immediacy of effect, and (f) data pattern in similar phases. Evaluation questions were developed to guide the for analysis using these aspects.



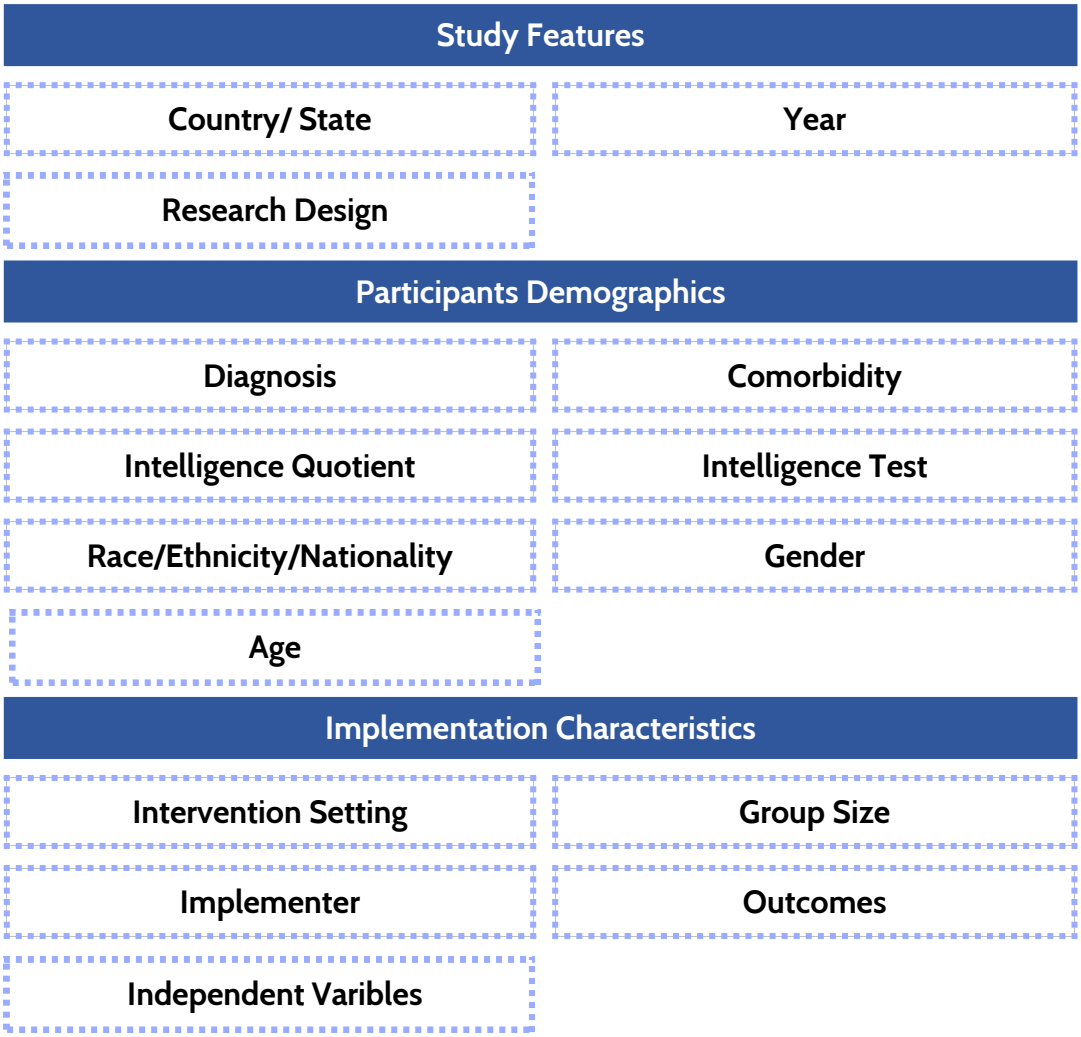
In this study, **strong evidence** was defined as an observed effect in at least three cases with no ineffective cases. **Moderate evidence** indicated an effect in at least three cases and no effect in one case. **No evidence** was defined as an effect observed in two or fewer cases. As a result of the visual analysis, 202 studies demonstrated strong evidence, 13 studies showed moderate evidence, and 32 studies showed no evidence. The results of the visual analysis are presented in Table 2.9.

Table 2.9 Results of visual analysis

Exclusion Reason	Rate
Inconsistency of baseline data	51,7%
No level change or immediacy effect between baseline and intervention phase	56,8%
No therapeutic change during the intervention phase	49,9%
Overlap between baseline and intervention phase	75,8%
Inconsistency of data in similar phases	43,1%
Total Number of Studies with No Evidence	**32**
Evidence Status	**Number**
Strong Evidence	202
Moderate Evidence	13
Total Number of Studies with Evidence	**215**

Step 7
Data Extraction

In the quality indicators, data from 268 studies (215 SED, 53 GED) that were rated as high quality or acceptable were analyzed descriptively. Descriptive analysis refers to the examination of directly quoted data based on pre-determined themes (Yıldırım & Şimşek, 2006). To determine the categories for descriptive data extraction, the relevant literature was reviewed, resulting in the development of 15 purpose-specific topics. These topics are; (a) country/state, (b) year, (c) research design, investigating study features (d) diagnosis, (e) comorbidity, (f) IQ, (g) intelligence test, (h) race/ethnicity, (ı) gender, (i) age, investigating participant demographics (j) setting, (k) group size, (l) implementer, (m) outcomes, and (n) independent variable investigating implementation characteristics.



To organize the independent variables included in the studies within the scope of EBPs and to classify them appropriately according to the literature, a content analysis of the independent variables was conducted. Content analysis is a systematic and methodical technique used to describe collected data and examine the relationships between concepts (Krippendorff, 2018).

The content analysis was carried out using the template developed by Hoffmann et al. (2014). First, the short names of the independent variables obtained during the descriptive data extraction step were listed, and the same or similar independent variables were grouped together. Each study was then examined individually to identify how the independent variable was defined, what the core components of the intervention were, which tools were used as part of the intervention, how the intervention was implemented, and what adaptations (if any) were made. As a result, all the information provided regarding the examined independent variable was compiled, and the structure of the interventions was examined in detail. Following the content analysis, the studies were reclassified by grouping similar independent variables together.

Step 8
Effect Size Calculation

Effect sizes were calculated separately for SED studies that provided evidence based on visual analysis and for GED studies that were rated as high quality or acceptable according to the quality indicators. For this purpose, data from common independent variables across the studies were compiled, and calculations were performed.

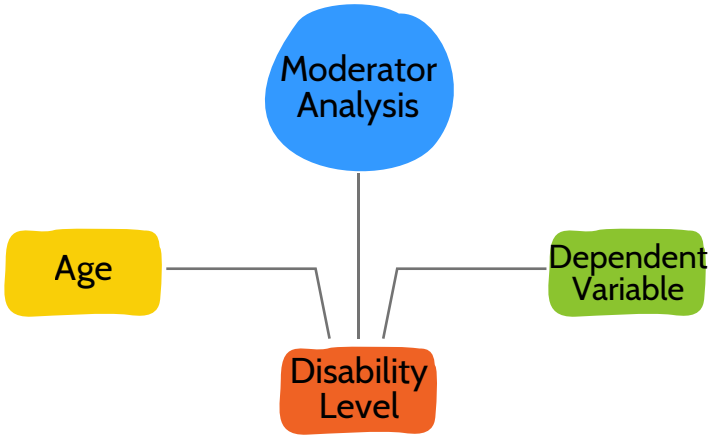
In SED studies, research findings are mostly presented graphically, and raw data are typically not reported. Therefore, the data points from the graphs in the studies were converted into numerical values through a data digitization process. The baseline and intervention phase data from the graphs of participants included in this meta-analysis were digitized.

Within the scope of this meta-analysis,
a total of 18,601 data points from 1,086 graphs
were digitized to facilitate the calculation of effect sizes.

To determine the magnitude of the functional relationship in SED studies, baseline trend-controlled Tau-*U* was used (Parker et al., 2011). When interpreting the mean effect sizes, values between .0-.20 were considered small effects, .21-.59 as moderate effects, .60-.79 as large effects, and .80 and above as very large effects (Vannest & Ninci, 2015).

For GED studies, summary data —including the number of participants, pre-test and post-test mean scores, and standard deviation values (n, mean, SD) for the experimental and control groups— were used to calculate effect sizes. Data analysis for GED studies was conducted using the Comprehensive Meta-Analysis (CMA) software. Data related to the interventions were sequentially entered into the software, and the appropriate meta-analytic model (fixed-effects or random-effects) was selected. Subsequently, mean effect sizes were calculated, heterogeneity across studies was assessed, forest plots were examined, and publication bias analysis was conducted. When interpreting the mean effect sizes, values between .00-.20 were considered weak effects, .21-.50 as modest effects, .51-.99 as moderate effects, and 1.00 and above as strong effects (Cohen, 1988).

In addition to calculating effect sizes for the interventions, the extent to which these effects were influenced by specific variables was also evaluated. to this end, a moderator analysis was conducted. In this meta-analysis, it was examined whether age group, level of disability, and dependent variables served as significant moderators. The moderator analysis was performed using the Jamovi 2.3 software.

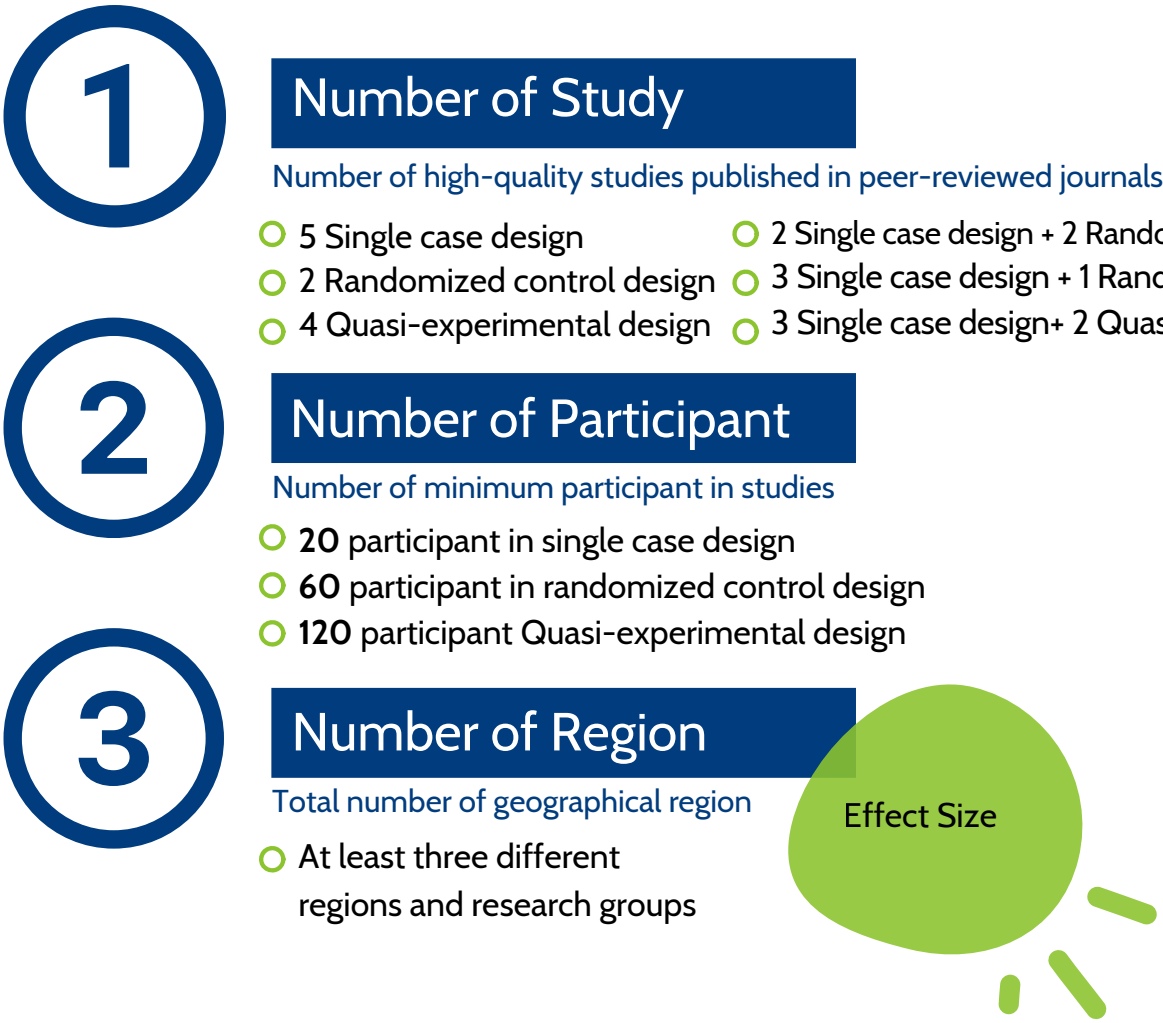


Step 9
Determination of Evidence-Based Practices

Following the content analysis, it was determined whether the grouped independent variables provided sufficient evidence. In identifying EBPs, the criteria of the Council for Exceptional Children (CEC) —a U.S. based organization focused on identifying and disseminating EBPs— were used as a foundation. In addition, various protocol decisions were made. Interventions supported by an adequate number of studies were classified as EBPs or emerging practices.

For an intervention to be considered an EBP, it had to meet the following criteria: (a) number of studies, (b) number of participants, (c) geographic distibution, and (d) effect size. The EBP criteria adopted within the scope of this meta-analysis are presented in Figure 2.3.

Figure 2.3 Evidence-based practice criteria



Coders

A varying number of coders participated in each step of the meta-analysis. The doctoral-level coders were individuals with experience in meta-analyses, single-case experimental studies, quasi-experimental studies, and/or group experimental studies at both national and international levels. Coders who were currently pursuing their doctoral education had passed the Phd qualification exam in the Special Education (Intellectual Disabilities) program and had completed graduate-level coursework in research methods and statistics. The number of coders and their educational levels involved in each step of the meta-analysis are presented in Table 2.10.

Table 2.10 Number of coders and their education levels involved in meta-analysis steps

Research Steps	Doctoral Degree					Postgraduate Students					Master Student	Undergraduate Students	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Electronic search	X	X				X	X						
Screening	X	X	X	X		X	X	X	X				
Design standards for SEDs	X	X	X	X		X	X	X	X	X			
Design standards for GEDs	X	X			X	X	X	X	X	X	X		
Quality indicators for SEDs	X	X	X	X		X	X	X	X	X			
Quality indicators for GEDs	X	X			X	X	X				X		
Visual analysis	X		X	X		X							
Descriptive data extraction	X	X	X	X		X	X	X	X	X	X		
Data digitizing	X					X						X	X
Calculating effect size					X	X					X		
Determining EBPs	X					X							

Reliability

Throughout the meta-analysis process, various assessment tools were developed and utilized. The careful preparation of these tools and the training of coders are critical factors influencing the validity and reliability of the data (Lipsey & Wilson, 2000). Accordingly, all assessment tools were rigorously developed through multiple stages, including expert opinion, pilot implementations, and final refinements. In parallel with tool development, interactive training sessions were conducted by experts for each evaluation step, and pilot trials were implemented to prepare coders prior to the main data collection phase.

To support coders in making consistent decisions over extended evaluation periods and to enhance inter-coder reliability, detailed guides were developed for each evaluation step. These guides included comprehensive instructions as well as examples illustrating inclusion and exclusion criteria.

In addition to the meticulous planning and implementation of the meta-analysis process, all stages of the research were conducted by **at least two researchers.** Reliability data were collected and analyzed for 100% of the data at each step (Aromataris et al., 2015). To determine inter-coder reliability, both percentage agreement and Cohen's Kappa coefficient were calculated. Percentage agreement refers to the proportion of decisions on which two coders concurred, while Cohen's Kappa is a statistical measure that accounts for agreement occurring by chance when coding categorical data (Fleiss, 1971).

In this meta-analysis, Cohen's Kappa was preferred, as it specifically assessed the level of agreement between coder pairs when selecting studies for inclusion or exclusion. Both reliability measures were calculated using the irr 0.84.1 package in R 4.2.1 (Gamer & Lemon, 2019; R Core Team, 2022). The reliability results obtained at each step of the study are presented in Table 2.11.

Tablo 2.11 Reliability data

Research Steps	Reliability Rates	Cohen's kappa
Electronic search	100%	-
Screening	96,4%	.718
Design standards for SEDs	91,6%	.764
Design standards for GEDs	89,3%	.720
Quality indicators for SEDs	98,0%	-
Quality indicators for GEDs	88,1%	-
Visual analysis	96,2%	-
Descriptive Data Extraction	93,2%	-
Data digitizing	98,9%	-
Calculating effect size	95,5%	-

Results

idep
Intellectual Disability
Evidence & Practices

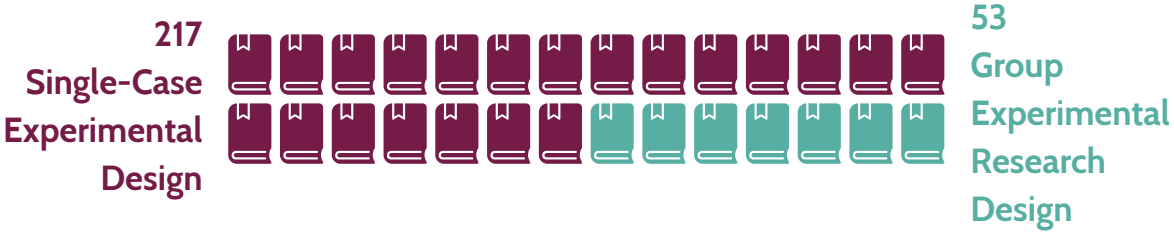
3. Results

Section 3

This section presents the findings from SED and GED studies that met the inclusion criteria and successfully passed all evaluation stages to be included in the meta-analysis. First, descriptive analysis results are provided regarding study characteristics such as publication year, country, methodology, participant demographics, implementation setting, and dependent variables. Next, the overall effect sizes of the interventions and the results of moderator analysis are reported. In the final part, findings which practices qualify as EBPs and which do not are explained. The PRISMA Flow Diagram for the research is shown in Figure 3.2.

Analysis of Descriptive Data

Descriptive analysis was conducted on a total of 270 studies that passed all evaluation stages and were included in the meta-analysis. Of these, 217 employed SEDs, and 53 utilized GEDs. Two of the SED studies (Souza & Rehfeldt, 2013; Wolery et al., 1991) were treated as separate studies, as each reported two distinct experiments.



Study Characteristics

The distribution of studies by publication year indicates a notable increase in the number of eligible studies beginning from the 2010s. The years with the highest proportion of studies meeting the inclusion criteria for this meta-analysis were 2020 (9.6%) and 2013 (9.2%). (See Figure 3.1)

Figure 3.1 Distribution of studies by year

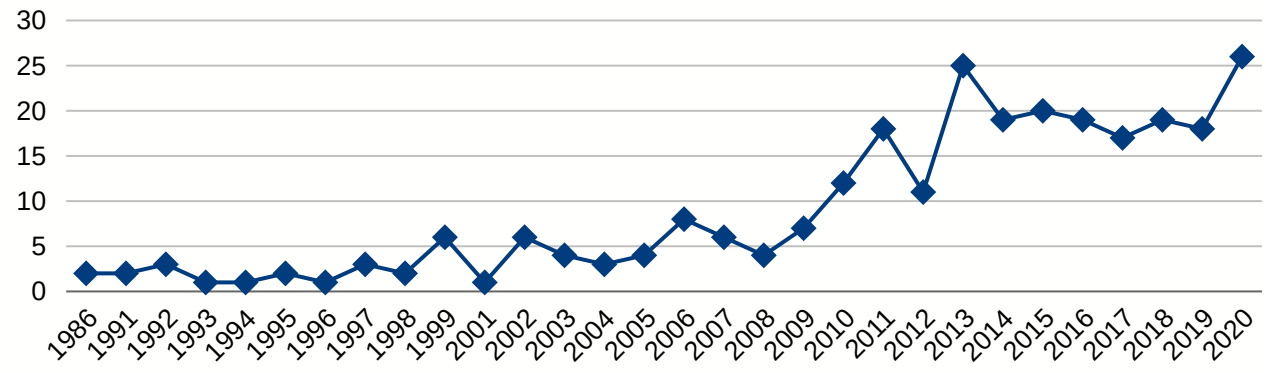


Figure 3.2 PRISMA Flowchart (1921-2020)

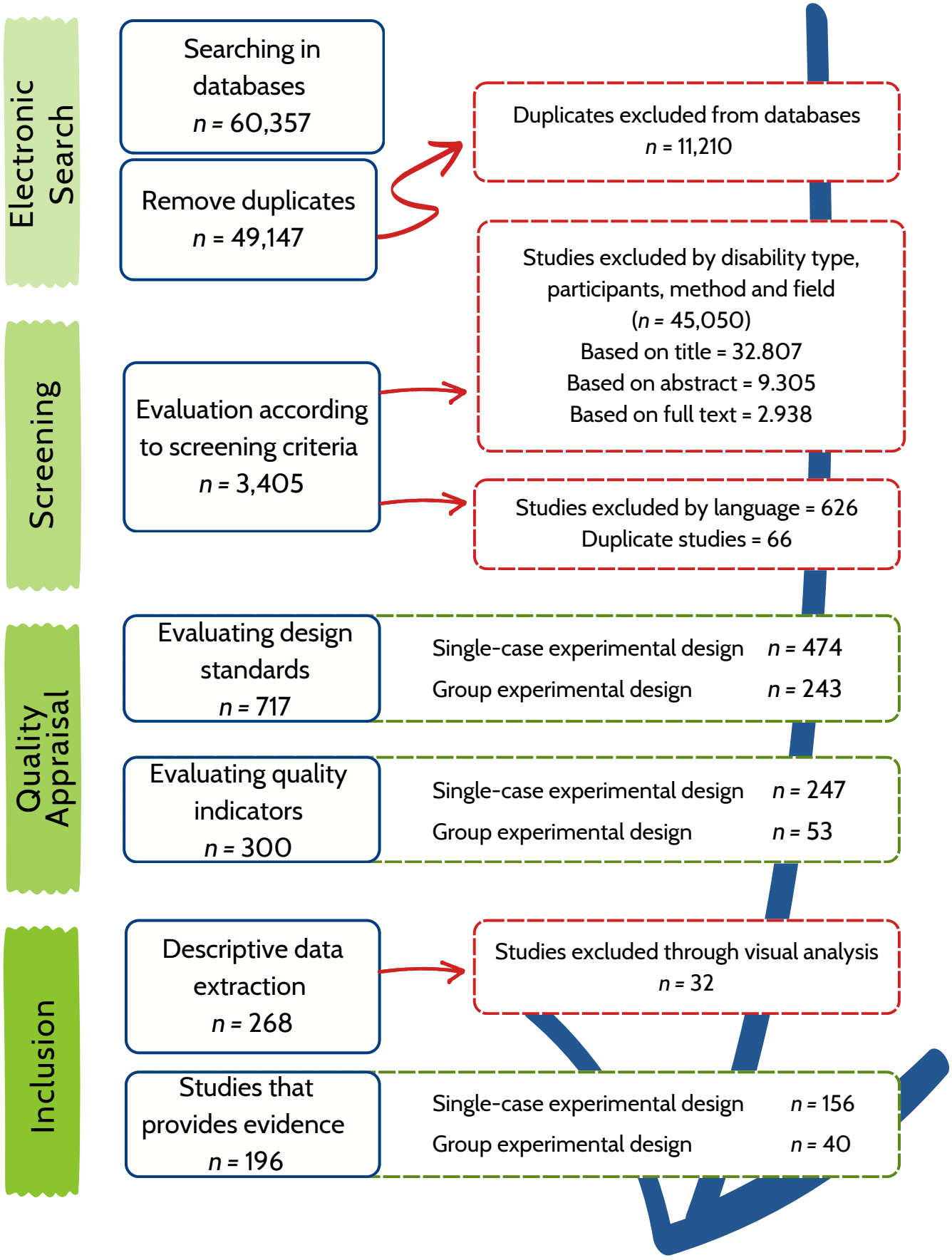
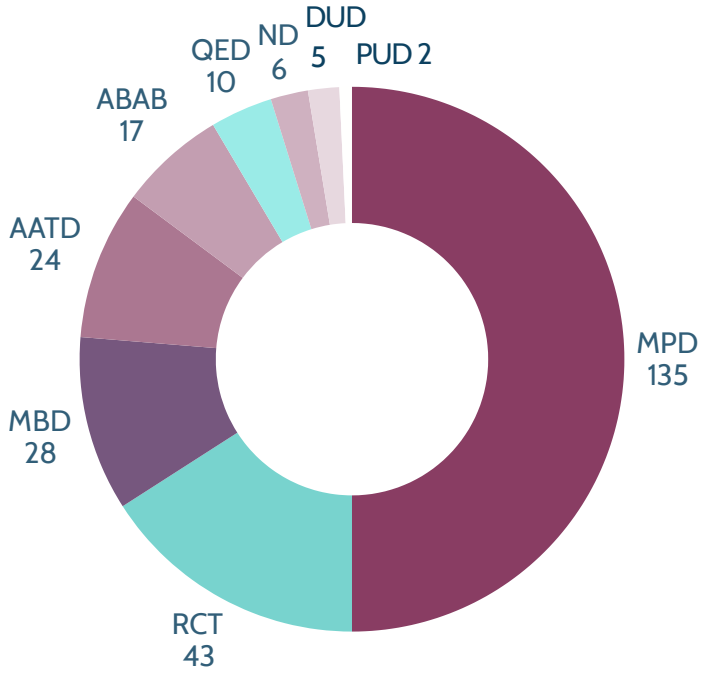


Figure 3.3 Distribution of studies by country

The vast majority of the studies were conducted using SEDs **(80.3%)**, whereas those employing GEDs accounted the minority **(19.7%)**.

Figure 3.4 Distribution of studies by research design



Single-Case Experimental Design

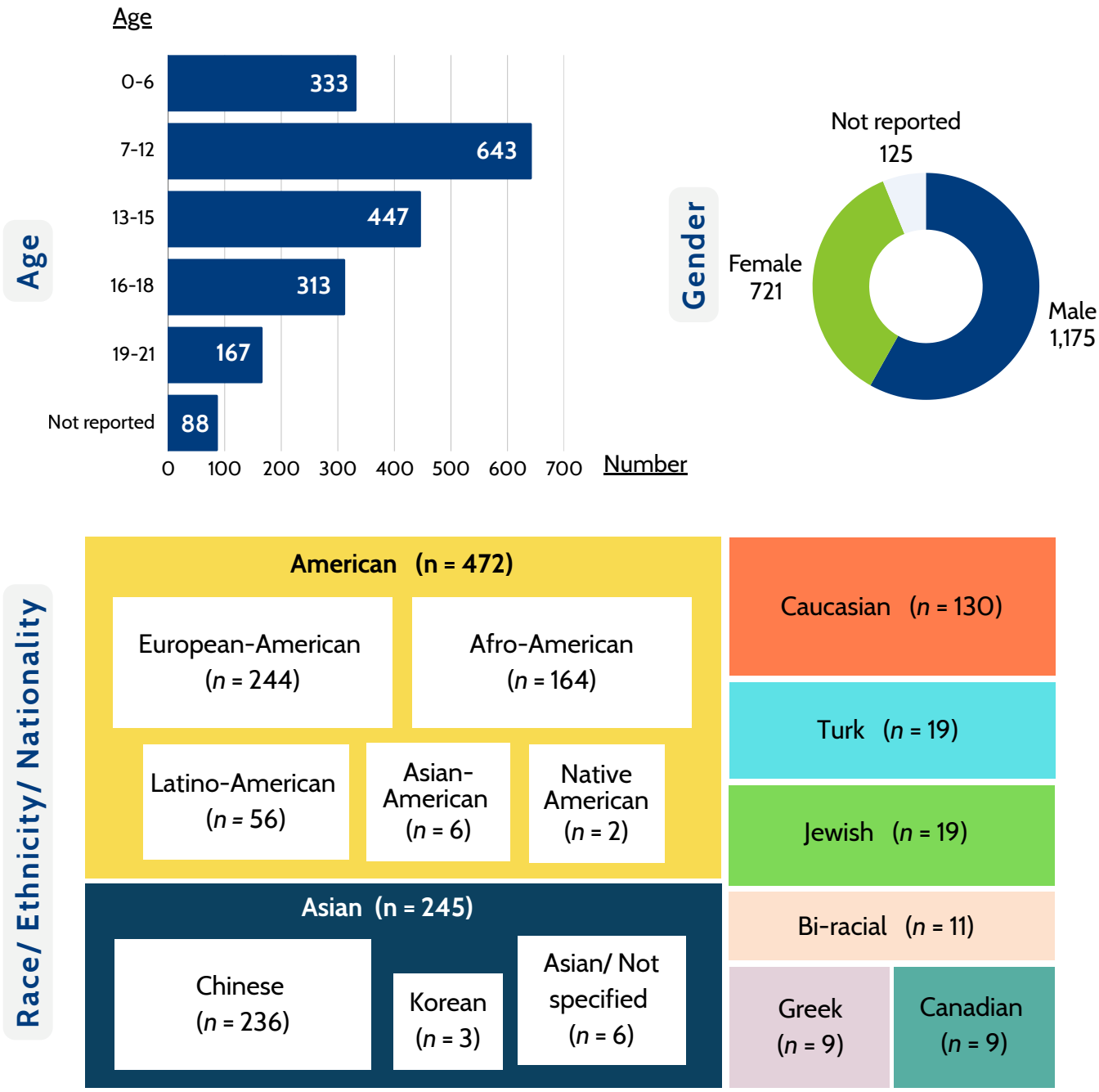
MPD- Multiple probe design
MBD- Multiple baseline design
AATD- Adapted alternating treatments design
ABAB- ABAB design
ND- Nested design
ATD- Alternating treatments design
PTD- Parallel treatments design

Group Experimental Design

RCT- Randomized controlled trials
QED- Quasi-experimental design

Participants Demographics

An examination of the participants' gender distribution reveals that the majority were male (58,1%). Gender information for 125 participants (6,1%) in five group experimental studies was not reported. In terms of age, the largest proportion of participants fell within the 7-12 age range (33,2%), followed by the 13-15 (23,1%), the 0-6 (17,2%), the 16-18 (16,1%), and the smallest group, the 19-22 years (8,3%). In GED studies, a total of 88 participants were excluded from the analysis due to the lack of exact age data; only general age ranges were provided. For participants whose age ranges were reported, the ages spanned from 60 months (5 years) to 216 months (18 years).



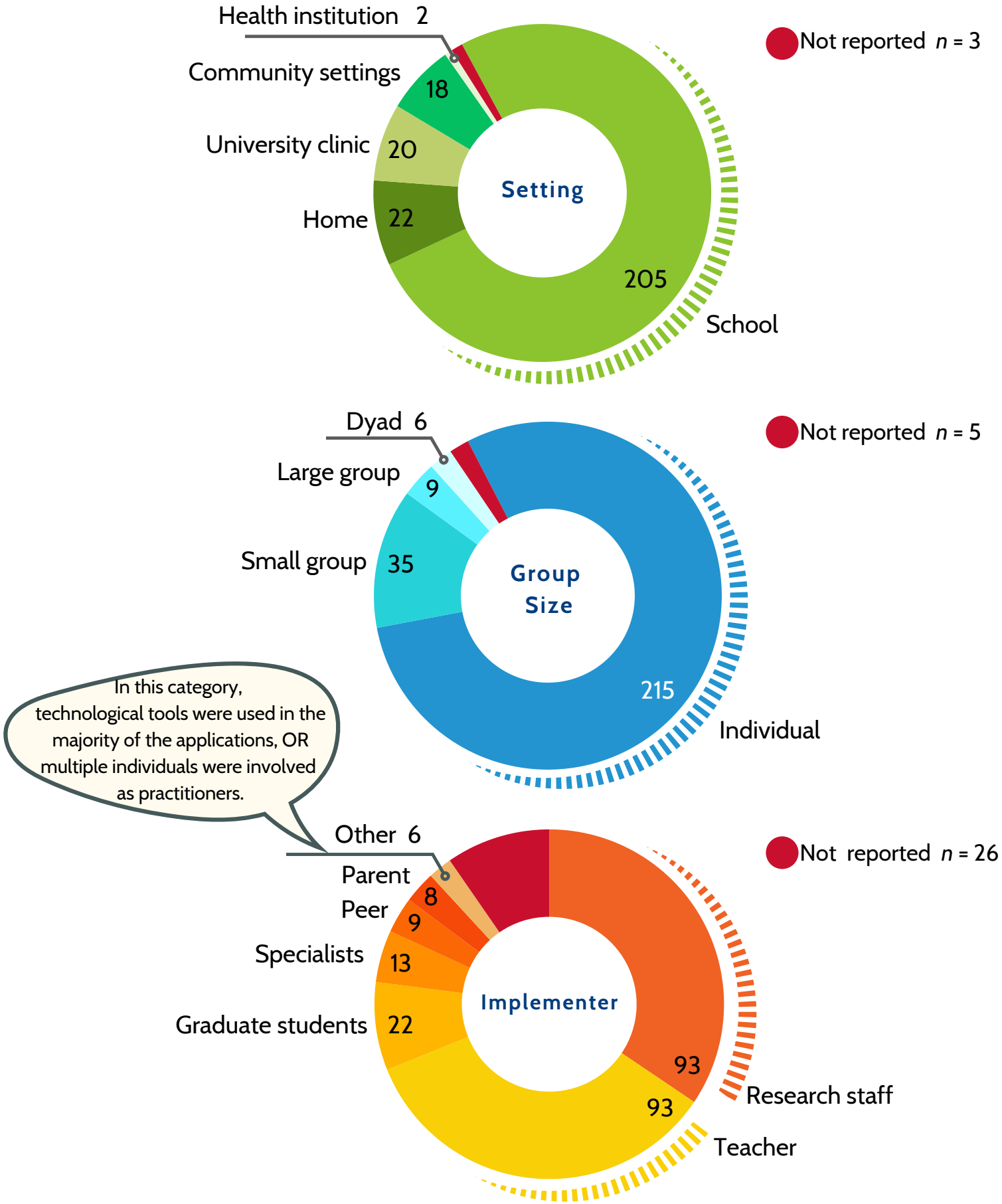
The majority of the participants (72,5%) were individuals with IDs. It was observed that some participants had comorbid conditions in addition to their primary diagnoses. The most common comorbidity accompanying ID was autism spectrum disorder (30%), followed by speech and language disorders (18,7%). The distribution of participants' diagnoses is presented in Table 3.1.

Table 3.1. Primary diagnoses and comorbidity of participants

Diagnosis	N	Comorbidity	N
Intellectual disability	1.374	Autism spectrum disorder	75
Down syndrom	303	Speech or language disorder	43
Developmental disability	103	Attention deficit hyperactivity disorder	28
Fetal alcohol syndrome	72	Other health conditions	27
Fragile X syndrome	14	Epilepsy	14
Multiple disability	13	Serebral palcy	13
Prader-Willi syndrome	3	Physical disabilities	10
Traumatic brain injury	3	Hearing loss	8
William syndrome	2	Visual impairment	7
Microcephaly	2	Obsessive compulsive disorder	2
Other syndrome	6	Selective mutism	1
		Pervasive developmental disorder	1
Total	**1.895**		**229**

In SED studies, only participants who met the inclusion criteria regarding disability type were included in the analysis. In GED studies, since individual-level assessment was not feasible, it was required that at least half of the participants in both the experimental and control groups met the inclusion criteria in terms of disability type. As a result, it was observed that 126 participants in GED studies had primary diagnoses that fell under disability types excluded from this meta-analysis. These individuals were coded separately as "excluded diagnoses." The diagnoses of these participants included autism spectrum disorder (n = 95), borderline intellectual functioning (n = 23), cerebral palsy (n = 3), other health conditions (n = 2), pervasive developmental disorder (n = 1), obsessive-compulsive disorder (n = 1), and attention deficit hyperactivity disorder (n = 1). **Nevertheless, the vast majority of the 2,021 participants analyzed in this study (93,7%) were individuals with disability types included in the scope of this meta-analysis.**

Figure 3.5 Distribution of intervention setting, group arrangement and implementers



Distribution of Studies by Outcomes

The dependent variables targeted in the studies—those intended to be acquired, increased, or reduced—were classified using content analysis. Through this classification, 12 distinct dependent variables were identified. The definitions and distribution of these variables, along with example studies from the analysis, are presented alphabetically in Table 3.2.

Table 3.2 Definitions and distribution of dependent variables in the studies

Outcome	Definition	Number of Study
Academic Skills	These refer to abilities, strategies, and habits that support individuals' success in an academic setting (Shapiro & Keller, 2006). They typically encompass skills related to core academic subjects such as literacy, mathematics, science, social studies, and native language proficiency (e.g., Bouck & Long, 2020; Root et al., 2020).	80
Appropriate School Behaviors	These refer to behaviors that facilitate individuals' participation in educational settings and prepare them for effecting learning experiences (Kerns & Clemens, 2007). Such behaviors typically include participating in activities, staying on task, raising one's hand to speak, responding to instructions, waiting patiently, following rules, and completing assigned tasks (e.g., Clarke et al., 2016; Luke et al., 2014).	22
Challenging Behaviors	These refer to behaviors that cause harm to the individual or others, impede learning for oneself or peers, negatively impact social interactions, deviate from cultural norms, and persist over time (Erbaş, 2017; Lane et al., 2011; Yücesoy-Özkan, 2013). Examples of such behaviors include crying, yelling, hitting, refusing follow instructions, resisting requests, and engaging in off-task activities (e.g., Kim et al., 2014; Schuiringa et al., 2017).	21
Cognitive Behaviors	These refer to the fundamental skills that the brain uses to think, understand, learn, remember, reason, and direct attention (Meltzoff, 2010). Such skills include naming, classifying, recalling, comprehending, evaluating, and others (e.g., Fossett & Mirenda, 2006; Katz et al., 2020).	44
Independent Living Skills	These refer to the skills individuals use across various environments—such as home, school, workplace, and community settings—to manage their daily lives independently (Luft, 2012). These skills include personal care (e.g., dressing, grooming, hygiene), meal preparation, clothing care (e.g., laundry, sorting, identifying), money management (e.g., banking, budgeting), personal organization (e.g., managing materials and time), and home maintenance. However, they are not limited to these and may encompass a wide range additional skill areas (e.g., Shepley et al., 2018; Tekin-İftar, 2008).	59

Table 3.2 Definitions and distribution of dependent variables in the studies

Outcome	Definition	Number of Study
Language and Communication Skills	These are skills used to convey and/or receive various types of information, enabling individuals to understand others and be understood in return (Newman & Holzen, 2023). Such skills may include effectively communicating ideas, actively listening, giving and receiving constructive feedback, or speaking in public; however, they are not limited to these (e.g., Gannon et al., 2018; Schaefer et al., 2018).	27
Leisure Skills	These refer to the skills individuals use to engage themselves during free time, enjoy recreational activities, and take a break from the demands of daily life —typically without requiring assistance from others (Zijlstra & Vlaskamp, 2005). Such skills include activities such as coloring, reading, listening to music, playing sports, playing games, engaging with toys, watching movies or television programs, and participating in hobbies (e.g., Eratay, 2020; Fetko et al., 2013).	10
Motor Skills	These refer to abilities that involve precise movement of the body's muscles to perform a specific task, requiring coordination between the nervous system, muscles, and brain (Gabbard, 2013; Yücesoy-Özkan, 2016). Motor skills include gross motor skills such as walking, running, and cycling, as well as fine motor skills such as sewing, buttoning, stringing beads, hammering nails, and drawing (e.g., Apache, 2005; Park et al., 2020).	19
Safety Skills	These refer to behaviors that promote personal health and safety, help individuals avoid dangerous situations or people, and support the elimination of hazardous conditions (Jang et al., 2016). Such skills include being cautious and vigilant, avoiding harmful associations such as gangs or bullying, staying away from strangers and reading warning signs to prevent safety-threatening incidents. They also encompass responses to actual threats, such as taking medication, applying bandages, and seeking help in emergencies (e.g., Özen, 2008; Yücesoy-Özkan et al., 2013).	11
Self-Determination Skills	These refer to a set of interrelated skills that individuals use across their lifespan to make choices consistent with their personal beliefs, values, interests, needs, and abilities, thereby enabling them to take control of their lives (Wehmeyer & Shogren, 2016; Yücesoy-Özkan, 2009). These skills include self-awareness and self-perception, self-advocacy, recognition of one's own competencies, self-management, decision-making, problem-solving, time management, and leadership (e.g., Babb et al., 2020; Cross et al., 1999).	14

Table 3.2 Definitions and distribution of dependent variables in the studies

Outcome	Definition	Number of Study
Social Skills	These refer to the skills that facilitate interaction and communication with others through both verbal and non-verbal means, help establish and maintain social rules and relationships, and are used in daily life to engage with others (Watkins et al., 2016). They include behaviors that regulate social interactions, such as greeting, giving and receiving compliments, expressing gratitude, apologizing, listening, and asking for permission, as well as verbal and non-verbal communication skills, including speaking, using gestures, facial expressions, and body language (e.g., Biggs et al., 2018; O'Handley et al., 2016).	12
Vocational Skills	These refet to the practical abilities that help individuals become proficient in a specific trade or profession. Such skills prepare individuals for careers in skill-based occupations, including working as carpenters, masons, electricians, tradespeople, or artisans (e.g., Cavkaytar, 2012; Johnson et al., 2019).	10

Effect Size

This section presents the overall effect sizes of the interventions, as addressed in the second research question. The selection of interventions for effect size calculation was based on whether they met the additional EBP criteria. In other words, effect sizes were calculated for all interventions that satisfied the minimum requirements regarding participant group, number of studies, and geographic distribution, as determined through preliminary analysis following the content analysis.

Effect sizes were calculated separately for SED and GED studies. For SED studies, overall effect sizes were calculated for all interventions except sports and exercise. For GED studies, overall effect sizes were calculated for six interventions derived from two or more studies. The overall effect size data for the practices are presented in Table 3.3.

Table 3.3 Overall effect size data of practices

Practices	Tau-*U*	Variance	95% CI	Effect Size (Single-case)	Hedges' g	Variance	95% CI	Effect Size (Group experimental)
Cognitive Strategy Instruction	1.00	0.17	[0.66-1.00]	Very large	1.155	0.09	[0.577-1.733]	Strong effect
Computer Assisted Instruction	.81	0.05	[0.71-0.91]	Very large	-	-	-	-
Computer-Based Intervention	.80	0.04	[0.71-0.90]	Very large	0.135	0.04	[0.044-0.226]	Modest effect
Least-to-Most Prompting	.93	0.04	[0.84-1.00]	Very large	-	-	-	-
Manipulatives	.97	0.07	[0.83-1.00]	Very large	-	-	-	-
Milieu Teaching	.86	0.13	[0.59-1.00]	Very large	0.587	0.04	[0.195-0.978]	Moderate effect
Parent Training	1.00	0.14	[0.72-1.00]	Very large	-0.403	0.10	[-1.016-0.209]	Weak effect
Peer Tutoring	.88	0.05	[0.77-0.99]	Very large	-	-	-	-
Reading Strategies	.88	0.06	[0.74-1.00]	Very large	0.494	0.00	[0.351-0.637]	Moderate effect
Self-Management	.94	0.04	[0.86-1.00]	Very large	-	-	-	-
Simultaneous Prompting	.90	0.04	[0.81-1.00]	Very large	-	-	-	-
Sport and Exercise	-	-	-	-	0.057	0.02	[-0.195-0.308]	Weak effect
Technology-Aided Instruction	.89	0.03	[0.81-0.96]	Very large	-	-	-	-
Time Delay	.79	0.00	[0.73-0.85]	Large	-	-	-	-
Video-Based Package	.90	0.03	[0.82-0.98]	Very large	-	-	-	-
Video Modeling	.79	0.04	[0.73-0.85]	Large	-	-	-	-
Video Prompting	.97	0.04	[0.88-1.00]	Very large	-	-	-	-

Evidence-Based Practices

As a result of the evaluation, 15 practices were identified as EBPs for the education of individuals with IDs. These practices were further analyzed to determine the age groups and dependent variables for which they demonstrated evidence of effectiveness, and a corresponding matrix was developed. The number of studies and participants associated with the identified EBPs are presented in Table 3.4, and the matrix is provided in Table 3.5.

Table 3.4 Number of studies and participants for EBPs

Evidence-Based Practice	Number of Single-Case Exp. Studies	Number of Single-Case Exp. Participants	Number of Group Exp. Studies	Number of Group Exp. Participants	Number of Quasi Exp. Studies	Number of Quasi Exp. Participants	Overall Participant Number
Cognitive Strategy Instruction	2	7	7	109	0	0	**116**
Computer Assisted Instruction	10	25	0	0	0	0	**25**
Computer-Based Intervention	8	20	4	117	0	0	**137**
Least-to-Most Prompting	9	29	0	0	0	0	**29**
Milieu Teaching	3	5	3	88	1	33	**126**
Parent Training	2	4	2	27	0	0	**31**
Peer Tutoring	7	25	0	0	0	0	**25**
Reading Strategies	6	14	9	209	2	54	**277**
Self-Management	11	34	0	0	1	5	**39**
Simultaneous Prompting	11	31	0	0	0	0	**31**
Technology-Aided Instruction	14	29	0	0	0	0	**29**
Time Delay	20	53	0	0	0	0	**53**
Video-Based Package	17	38	0	0	0	0	**38**
Video Modeling	14	41	1	190	0	0	**231**
Video Prompting	11	30	0	0	0	0	**30**

Table 3.5 Evidence-based practices matrix

Evidence-Based Practices	Academic Skills					Appropriate School Behaviors					Challenging Behaviors					Cognitive Behaviors					Language and Communication Skills					Independent Living Skills				
	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years
Cognitive Strategy Instruction																														
Computer-Assisted Instruction																														
Computer-Based Instruction																														
Least-to-Most Prompting																														
Milieu Teaching																														
Parent Training																														
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Technology-Aided Instruction																														
Time Delay																														
Video-Based Package																														
Video Modeling																														
Video Prompting																														

*Permission for the formal use of the matrix was obtained from Steinbrenner et al. (2020) and Hume et al. (2021).

Table 3.5 Evidence-based practices matrix

Evidence-Based Practices	Leisure Skills					Motor Skills					Safety Skills					Self-Determination Skills					Social Skills					Vocational Skills				
	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years	0-6 years	7-12 years	13-15 years	16-18 years	19-22 years
Cognitive Strategy Instruction																														
Computer-Assisted Instruction																														
Computer-Based Instruction																														
Least-to-Most Prompting																														
Milieu Teaching																														
Parent Training																														
Peer Tutoring																														
Reading Strategies																														
Self-Management																														
Simultaneous Prompting																														
Technology-Aided Instruction																														
Time Delay																														
Video-Based Package																														
Video Modeling																														
Video Prompting																														

*Permission for the formal use of the matrix was obtained from Steinbrenner et al. (2020) and Hume et al. (2021).

Cognitive Strategy Instruction

Grounded in cognitive learning theory, cognitive strategy instruction is an approach that enables students to structure and regulate their own learning. These practices involve explicitly teaching students how and when to apply cognitive strategies necessary for performing a given skill. As a result, students actively engage in their own learning processes (Harris & Pressley, 1991). Instructional components such as goal-oriented planning, drafting, implementation, and revision are carried out with the active involvement of students.

EBP Criteria

- 2 single-case, 7 group experimental studies
- 116 participants
- Netherlands, Türkiye, Canada, 1 state in the USA
- 5 different research groups

Skill Domains

	Ages
✓ Academic Skills	7-12, 13-15, 16-18, 19-22
✗ Independent Living Skills	
✗ Cognitive Skills	
✓ Language and Communication Skills	13-15
✗ Vocational Skills	
✗ Security Skills	
✗ Self-determination Skills	
✗ Leisure Time Skills	
✗ Motor Skills	
✗ Social Skills	
✗ Problem Behaviors	
✗ Appropriate School Behaviors	

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Computer-Assisted Instruction

This refers to instructional practices that incorporate computer programs to deliver targeted exercises as part of instruction (Barrow et al., 2009). Depending on the structure of the intervention, the teacher's role in these practices may reduced; however, the computer does not fully replace the teacher. Instead, the teacher assumes the role of diversifying and enhancing the instructional process (Blok et al., 2002). Computer programs can be integrated into teacher-led instruction in various ways. For example, by determining learning objectives, supporting instructional activities, providing feedback, or conducting assessments (Barrow et al., 2009; Van Daal & Reitsma, 2000).

EBP Criteria

- 10 single-case experimental studies
- 55 participants
- Türkiye
  4 states in the USA
- 7 different research groups

Skill Domains

	Ages
✓ Academic Skills	7-12, 13-15, 16-18, 19-22
✓ Independent Living Skills	13-15, 16-18
✓ Cognitive Skills	0-6, 7-12
✓ Language and Communication Skills	16-18, 19-22
✗ Vocational Skills	
✗ Security Skills	
✓ Self-determination Skills	16-18
✗ Leisure Time Skills	
✗ Motor Skills	
✗ Social Skills	
✗ Problem Behaviors	
✗ Appropriate School Behaviors	

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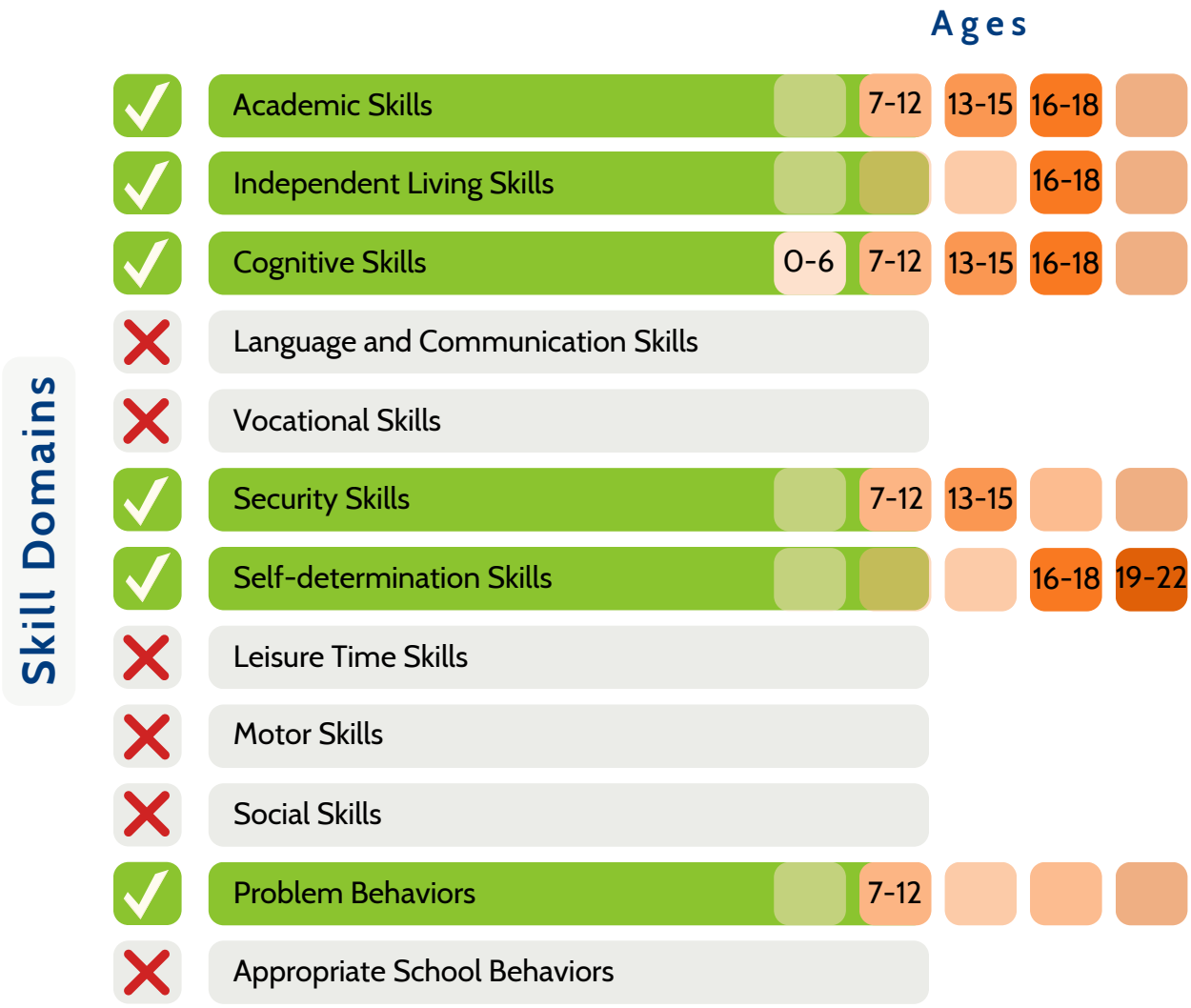
Computer-Based Intervention

These are systematic and structured instructional practices in which the teaching process is carried out through pre-designed computer software to achieve educational goals (Bedwell & Salas, 2010). In these interventions, all stages of instruction—such as prompting, reinforcement, and data recording—are executed by the computer. Adults may play a limited role, such as assisting with the hardware use, or may have no role in the instructional process at all. The most commonly used applications in this category are computer-mediated games.

EBP Criteria

- 8 single-case, 4 group experimental studies
- 137 participants
- Australia, China, Netherlands, Italy, Türkiye, 3 states in the USA
- 10 different research groups



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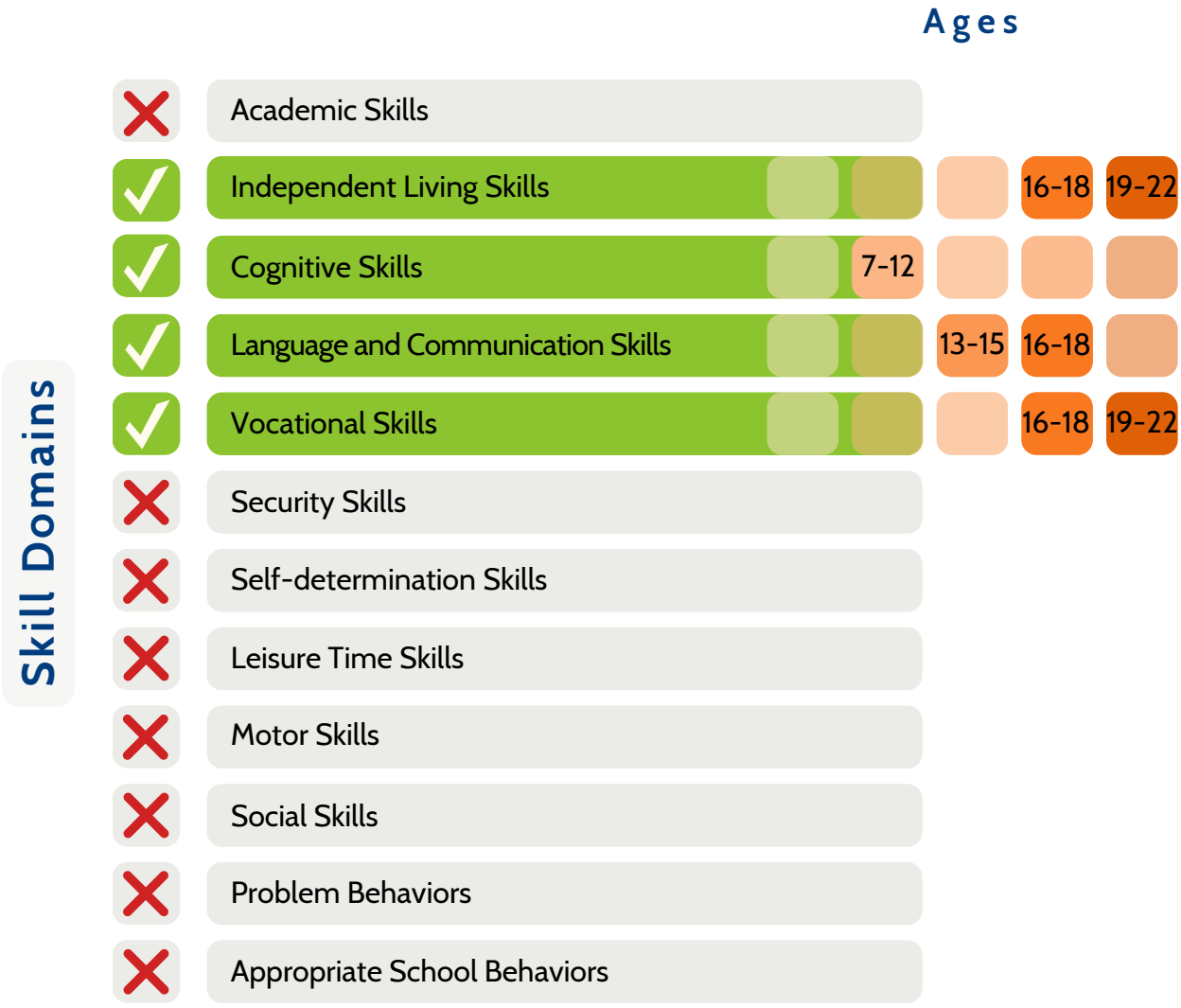
Note: In the study by Van der Molen et al. (2010), there were two experimental groups and one control group, so it was treated as two separate studies, and the effect sizes of the experimental groups were evaluated separately.

Least-to-most Prompting/System of Least Prompting

This is an instructional method in which teaching begins with the least restrictive prompt necessary to elicit the target behavior and the type and intensity of prompts are increased as needed (Tekin-İftar & Kırcaali-İftar, 2013). In least-to-most prompting, instruction starts with prompts that exert minimal physical influence on the individual. If the student does not perform the target behavior, prompts with gradually increasing levels of assistance are introduced. The types and sequence of prompts to be used are predetermined prior to instruction (Alberto & Troutman, 2013).

EBP Criteria

- 9 single-case experimental studies
- 39 participants
- Türkiye
  4 states in the USA
- 6 different research groups



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Milieu Teaching

This is a naturalistic language teaching approach that utilizes various strategies within daily activities to support language development (Peters-Scheffer et al., 2016). Milieu teaching aims to enhance children's interaction in enriched environments through strategies such as environmental arrangement, following the child's lead, and establishing social routines (Warren et al., 2006). There are three forms of this approach: prelinguistic Milieu teaching, Milieu teaching, and enhanced Milieu teaching.

EBP Criteria

- 3 single-case, 4 group experimental studies
- 126 participants
- 4 states in the USA
- 7 different research groups

Skill Domains

	Skill Domains	Ages
✗	Academic Skills	
✗	Independent Living Skills	
✗	Cognitive Skills	
✓	Language and Communication Skills	0-6
✗	Vocational Skills	
✗	Security Skills	
✗	Self-determination Skills	
✗	Serbest Zaman Becerileri	
✓	Leisure Time Skills	0-6
✗	Social Skills	
✗	Problem Behaviors	
✗	Appropriate School Behaviors	

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Parent Training

Parent training refers to the process in which experts provide education to the parents of individuals with IDs, after which parents assume the role of implementers and actively participate in planning, implementing, and evaluating interventions using various teaching methods, techniques, and strategies (Lundahl et al., 2006). To this end, the knowledge and skill levels of family members designed as practitioners are first enhanced, followed by the implementation of practices. Parent training involves evaluating both the effects of the training provided to parents —through strategies such as role-playing and modeling— and the outcomes observed in the children.

EBP Criteria

- 2 single-case, 2 group experimental studies
- 31 participants
- Australia, Türkiye, 2 states in the USA
- 4 different research groups

Skill Domains

	Ages
✗ Academic Skills	
✓ Independent Living Skills	13-15, 16-18, 19-22
✗ Cognitive Skills	
✗ Language and Communication Skills	
✗ Vocational Skills	
✗ Security Skills	
✗ Self-determination Skills	
✗ Leisure Time Skills	
✗ Motor Skills	
✗ Social Skills	
✗ Problem Behaviors	
✓ Appropriate School Behaviors	0-6

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Peer Tutoring

These are instructional practices in which peers or siblings of similar age and educational level engage in a structured teaching-learning process to directly teach students acquire new skills (Falchikov, 2001). In peer tutoring, one peer may take on the role of the teacher while the other peer(s) act as learners, or peers may alternate between the roles of teacher and learner within the same session (Eiserman, 1988).

EBP Criteria

- 7 single-case experimental studies
- 25 participants
- Türkiye
  4 states in the USA
- 4 different research groups

Skill Domains

	Skill Domains	Ages
✓	Academic Skills	7-12, 16-18
✓	Independent Living Skills	7-12, 13-15, 16-18
✓	Cognitive Skills	7-12
✗	Language and Communication Skills	
✗	Vocational Skills	
✗	Security Skills	
✗	Self-determination Skills	
✗	Leisure Time Skills	
✓	Motor Skills	13-15, 16-18
✗	Social Skills	
✗	Problem Behaviors	
✗	Appropriate School Behaviors	

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Reading Strategies

These are instructional strategies designed to develop individuals' early literacy and alphabet knowledge, as well as their reading fluency and comprehension skills (Boyle, 2008; National Reading Panel, 2000). Reading strategies support literacy development through various techniques such as facilitating recall, making predictions, increasing motivation, repeated reading, reader's theater, echo reading, shared reading, read aloud, and word repetition (Thuy, 2021).

EBP Criteria

- 6 single-case, 11 group experimental studies
- 277 participants
- Canada, Israel, Sweden, United Kingdom, 7 states in the USA
- 12 different research groups

Skill Domains

		Ages				
✓	Academic Skills	0-6	7-12	13-15	16-18	19-22
✗	Independent Living Skills					
✓	Cognitive Skills	0-6	7-12	13-15	16-18	
✓	Language and Communication Skills	0-6	7-12			
✗	Vocational Skills					
✗	Security Skills					
✗	Self-determination Skills					
✗	Leisure Time Skills					
✗	Motor Skills					
✗	Social Skills					
✗	Problem Behaviors					
✓	Appropriate School Behaviors	0-6	7-12			

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Self-Management

This refers to systematic use of various strategies by individuals to change or maintain their own behaviors, thereby gaining control over their actions. The primary goal of self-management is for individuals to regulate their behaviors independently, without requiring guidance from an adult or peer (Alberto & Troutman, 2013). This practice includes strategies such as self-prompting (or providing self-cues), self-monitoring (or self-recording), self-evaluation, self-instruction (or self-teaching), and self-reinforcement (Yücesoy-Özkan & Sönmez, 2011).

EBP Criteria

- 11 single-case, 1 group experimental study
- 39 participants
- Türkiye 7 states in the USA
- 10 different research groups

Skill Domains

		Ages
✓	Academic Skills	13-15, 16-18, 19-22
✓	Independent Living Skills	7-12, 13-15, 16-18, 19-22
✗	Cognitive Skills	
✗	Language and Communication Skills	
✗	Vocational Skills	
✗	Security Skills	
✓	Self-determination Skills	7-12, 13-15, 16-18, 19-22
✗	Leisure Time Skills	
✗	Motor Skills	
✗	Social Skills	
✗	Problem Behaviors	
✓	Appropriate School Behaviors	0-6, 7-12, 13-15

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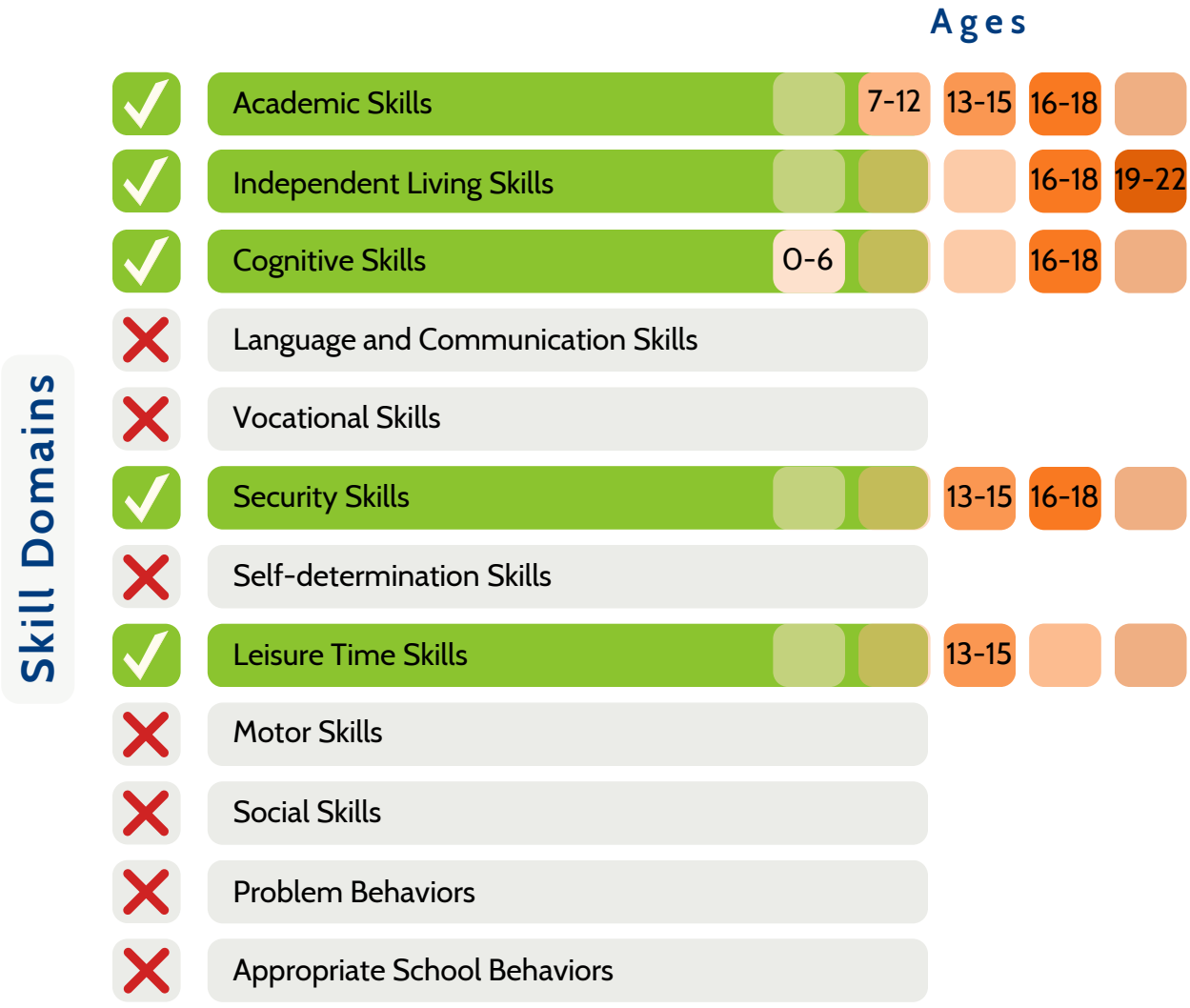
Simultaneous Prompting

This is an instructional method in which the controlling prompt is provided immediately after presentation the target stimulus related to the target behavior. The goal is for the student to consider the prompt presented immediately after the target stimulus and perform the expected response (Tekin-İftar & Kırcaali-İftar, 2013). In this practice, the individual uses the provided prompt to respond correctly to the target behavior. Since the controlling prompt is delivered immediately after the target stimulus in every instructional session, students are not given the opportunity to respond independently. Therefore, probe sessions are conducted immediately before instruction to assess the student's current performance on the target behavior (Alberto & Troutman, 2013)

EBP Criteria

- 11 single-case experimental studies
- 31 participants
- Türkiye
  3 states in the USA
- 4 different research groups



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Technology-Aided Instruction

These are practices in which technological devices, applications, and/or virtual networks are systematically utilized to achieve or maintain educational goals (Odom et al., 2015). Unlike low-tech solutions, technology-aided instruction involves the use of digital tools or applications that significantly influence and support the majority of the teaching process. Examples include augmented reality applications, wearable technologies, smartboard usage, mobile devices, and educational mobile applications.

EBP Criteria

- 14 single-case experimental studies
- 29 participants
- Australia, Türkiye, 4 states in the USA
- 6 different research groups

Skill Domains

	Ages
✓ Academic Skills	7-12, 19-22
✓ Independent Living Skills	0-6, 7-12, 13-15, 16-18, 19-22
✓ Cognitive Skills	19-22
✓ Language and Communication Skills	19-22
✓ Vocational Skills	16-18, 19-22
✗ Security Skills	
✓ Self-determination Skills	7-12, 19-22
✗ Leisure Time Skills	
✗ Motor Skills	
✗ Social Skills	
✗ Problem Behaviors	
✗ Appropriate School Behaviors	

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Note: In the study by McMahon et al. (2015), a control group adaptive alternating treatments design was used, it was treated as two separate studies, and the effect sizes of the intervention groups were evaluated separately.

Time Delay

This is an instructional method in which a target stimulus related to the desired behavior is presented, a specific period (fixed or progressive) is waited for the individual to respond, and if no correct response is given, a controlling prompt is provided (Tekin-İftar & Kırcaali-İftar, 2013). In time delay, trials with 0-second, fixed, or progressive delay intervals are used. In 0-second delay trials, the prompt is provided immediately after the target stimulus. In fixed delay trials, the prompt is given after a fixed period (e.g., 4 seconds). In progressive delay trials, the prompt is provided after gradually increasing intervals (e.g., 2,4, or 6 seconds). The type of prompt used remains consistent throughout the process.

Note: Both constant time delay and progressive time delay practices are included within the scope of time delay instruction.

EBP Criteria

- 20 single-case experimental studies
- 53 participants
- 5 states in the USA
- 7 different research groups

Skill Domains

	Ages
✓ Akademik Beceriler	7-12, 13-15, 16-18, 19-22
✓ Independent Living Skills	7-12, 13-15, 16-18, 19-22
✓ Cognitive Skills	0-6, 7-12
✓ Language and Communication Skills	13-15, 16-18
✓ Vocational Skills	16-18
✓ Security Skills	7-12, 13-15, 16-18, 19-22
✗ Self-determination Skills	
✓ Leisure Time Skills	0-6, 16-18, 19-22
✗ Motor Skills	
✗ Social Skills	
✗ Problem Behaviors	
✗ Appropriate School Behaviors	

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Note: In the study by Wolery et al. (1990), two experiments were reported, so they have been considered as two separate studies.

Video-Based Package

This is an instructional practice that uses video technologies such as video modeling or video prompting, along with various types of prompts (e.g., physical prompts, verbal prompts), reinforcement, and/or error correction, either simultaneously or sequentially. In video-based package interventions, different combinations can be applied depending on the target behavior and the characteristics of the students. Examples include practices where video modeling is combined with time delay, video modeling is paired with video prompting, or video modeling is used alongside error correction.

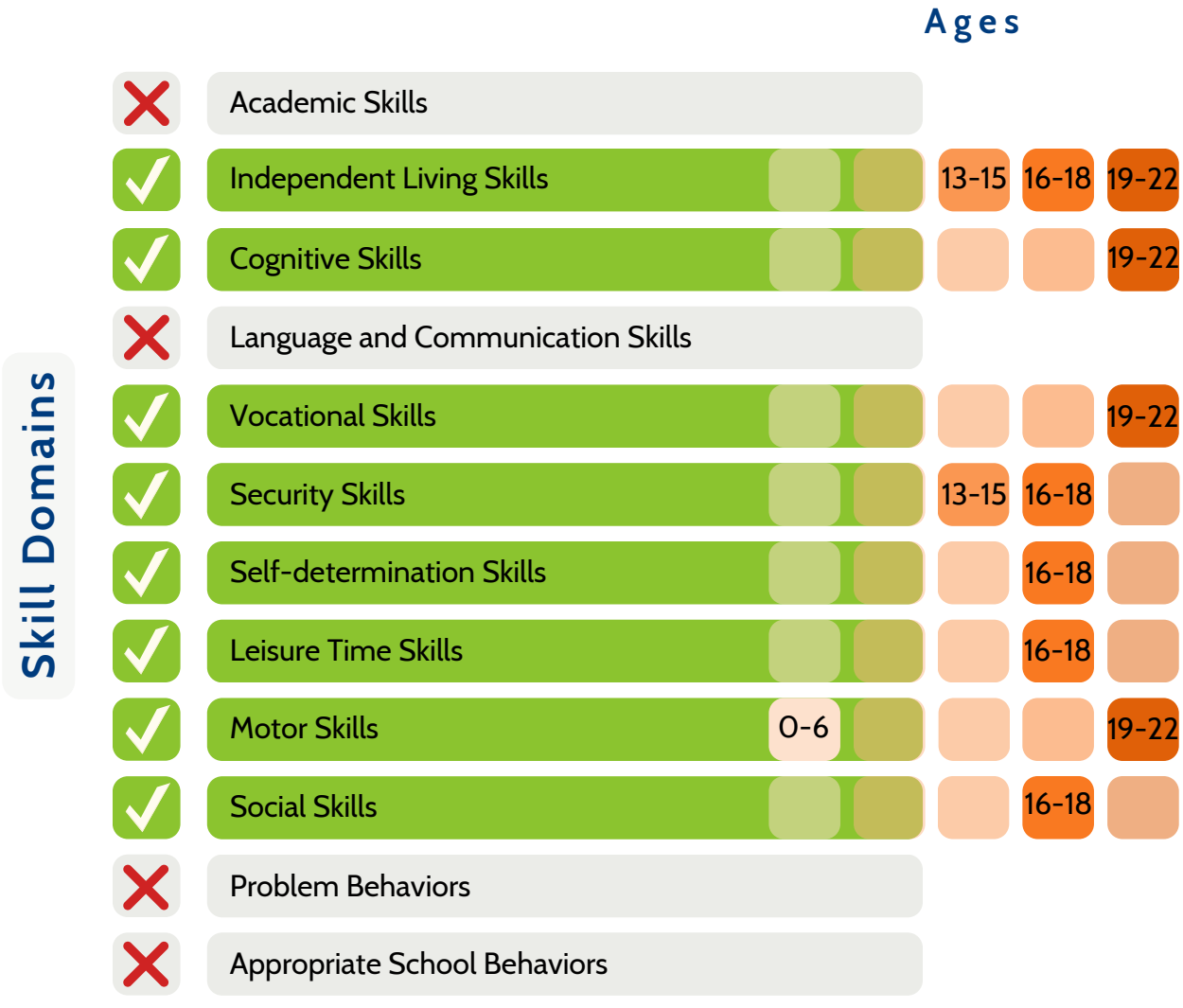
17 single-case experimental studies

38 participants

EBP Criteria

Greece
10 states in the USA

12 different research group



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Note: In the study by Wynkoop et al. (2018), a three-group adaptive alternating treatments design was used, so it was treated as two separate studies, and the effect sizes of the intervention groups were evaluated separately

Video Modeling

This is an instructional method where pre-recorded videos related to the target behavior are shown to the learner in one go, and the learner is then asked to perform the observed target behavior. In this practice, which uses video recordings, the learner is shown the entire video of the target behavior from start to finish, after which they are given the opportunity to perform the behavior (Corbett, 2003; Yücesoy-Özkan, 2013). The videos used in video modeling may feature an adult, a peer, or the learner themselves. Additionally, different perspectives can be used in the videos.

EBP Criteria

- 14 single-case, 1 group experimental studies
- 231 participants
- Austraila, Kuwait, Türkiye, 4 states in the USA
- 7 different research groups

Skill Domains / **Ages**

		Ages
✓	Academic Skills	13-15, 16-18
✓	Independent Living Skills	7-12, 13-15, 16-18, 19-22
✗	Cognitive Skills	
✗	Language and Communication Skills	
✗	Vocational Skills	
✓	Security Skills	13-15, 19-22
✗	Self-determination Skills	
✓	Leisure Time Skills	13-15
✓	Motor Skills	7-12, 13-15, 19-22
✓	Social Skills	19-22
✗	Problem Behaviors	
✗	Appropriate School Behaviors	

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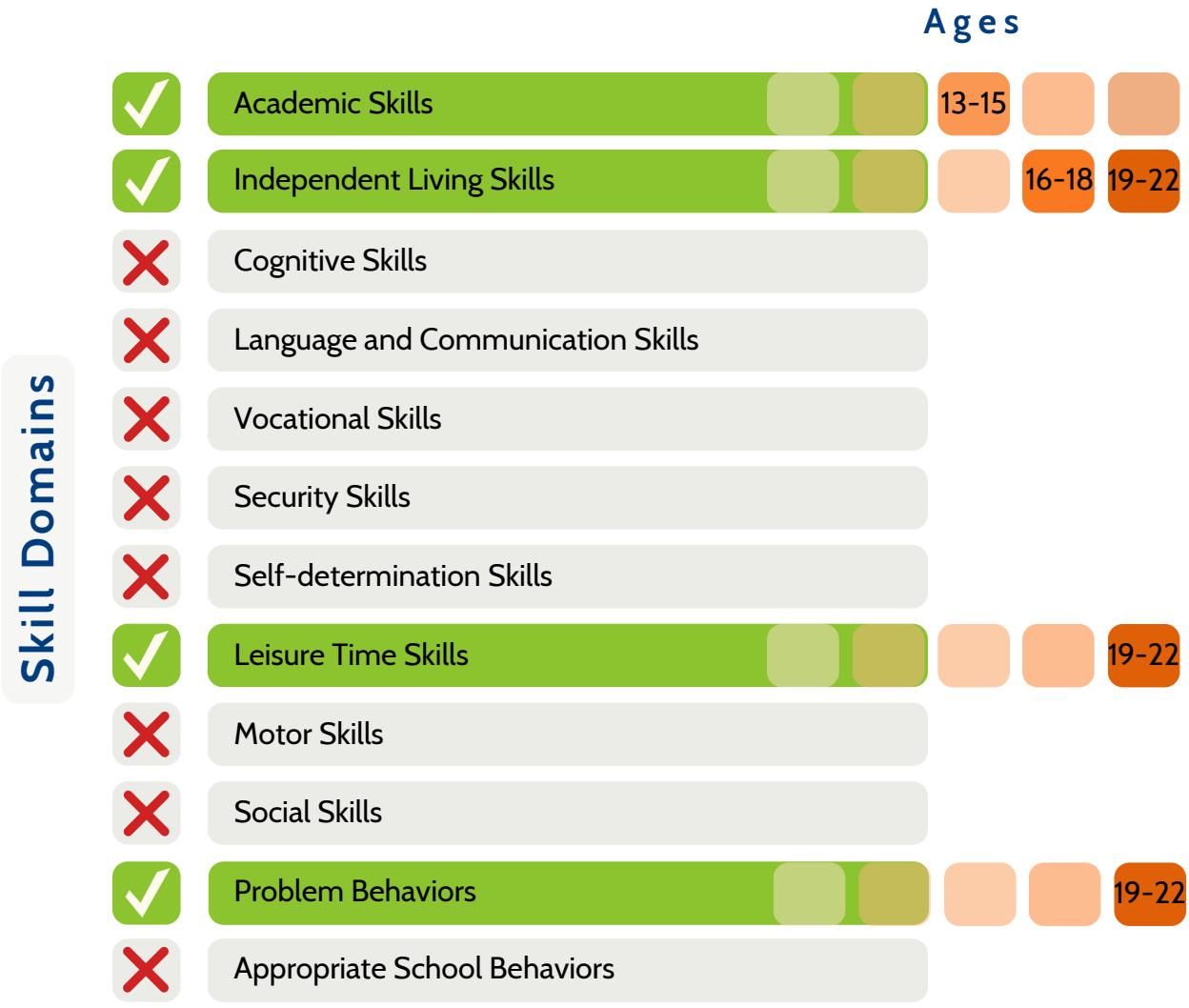
Note: In the study by Mechling et al. (2015), a control group adaptive alternating treatments design was used; in the study by Mechling et al. (2014), a multiple probe design and an adaptive alternating treatments design were used together; and in the study by Yücesoy-Özkan (2013), the effectiveness of different video models was replicated using an adaptive alternating treatments design. Therefore, these were treated as separate studies, and the effect sizes of the intervention groups in each study were evaluated separately.

Video Prompting

This is an instructional method where pre-recorded videos related to the target behavior are shown one step at a time, and the student is asked to perform the observed step before moving on to the next step (Cihak et al., 2006). In this practice, which uses video recordings, the steps of the target behavior are broken down and shown to the student, who is then given the opportunity to perform each step (Kaya & Yücesoy-Özkan, 2022). After the student watches and performs a step, they are prompted to watch and perform the next step.

EBP Criteria

- 11 single-case experimental studies
- 30 participants
- 5 states in the USA
- 4 different research groups



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Note: In the study by Spencer et al. (2015), a three-group adaptive alternating treatments design was used, and in the study by Mechling et al. (2009), a multiple probe design and an adaptive alternating treatments design were used together. Therefore, these were treated as separate studies, and the effect sizes of the intervention groups in each study were evaluated separately.

Emerging Practices

As a result of the evaluation, 20 practices were identified as emerging practices for the education of individuals with IDs. The number of studies and participants for these emerging practices are presented in Table 3.6, and their definitions are provided in Table 3.7.

Table 3.6 Number of studies and participants of emerging practices

Emerging Practices	Number of SED Studies	Number of SED Part.	Number of GED Studies	Number of GED Part.	Number of QED Studies	Number of QED Part.	Overall Participant Number
Antecedent-Based Interventions	4	7	0	0	0	0	**7**
Animal-Assisted Therapy	0	0	1	30	0	0	**30**
Assistive Technology	12	17	0	0	0	0	**17**
Behavioral Skills Training	0	0	1	10	0	0	**10**
Cognitive Behavioral Instruction/Strategies	0	0	1	46	0	0	**46**
Direct Instruction/Model-Lead-Test/Explicit Instruction	6	13	0	0	0	0	**13**
Early Intensive Behavioral Intervention - EIBI	0	0	1	20	1	11	**31**
Embedded Teaching	5	13	1	14	0	0	**27**
Function-Based Treatment	4	7	0	0	0	0	**7**
Gofar Game, Faceland Game	0	0	1	19	0	0	**19**
Math Program	0	0	2	38	0	0	**38**
Manipulatives	11	23	0	0	0	0	**23**
Narratives	4	8	0	0	0	0	**8**
Occupation Therapy	0	0	1	43	1	22	**65**
Peer Mediated Intervention	2	3	1	35	0	0	**38**
Prompting	5	11	0	0	0	0	**11**
Response Card Strategy	4	13	0	0	0	0	**13**
Relationship-Based Developmental Intervention	1	1	1	5	0	0	**6**
Schema-Based Instruction	6	19	0	0	0	0	**19**
Structured Teaching-TEACHH	2	2	0	0	1	12	**14**

Table 3.7 Descriptions of emerging practices

Emerging Practices	Description
Antecedent-Based Interventions	These are instructional practices that involve modifying environmental stimuli prior to occurrence of a behavior, either to teach new skills or to reduce problem behaviors (Miltenberger, 2015). Early examples of thse interventions include antecedent exercises, enriched environments, and protective equipment. More advanced practices include non-contingent reinforcement, high-probability request sequences, and functional communication training (Demir, 2017). In this meta-analysis antecedent-based interventions identified include high-probability request sequences (behavioral momentum), establishing operations, and antecedent physical activity.
Animal-Assisted Theraphy	These are instructional practices in which an animal with suitable characteristics is integrated as an essential component of the teaching process to help facilitate the acquisition of target skills (Kruger & Serpell, 2010). Animal-assisted therapy is implemented by, or under the supervision of, a qualified specialist and includes individualized goals tailored to each student.
Assistive Technology	These are practices in which technological devices and/or services are systematically used to teach or develop target skills (Edyburn, 2000; Wielandt et al., 2006). Assistive technology tools refer to devices that may be used either temporarily or permanently to support daily living activities (Ravneberg & Söderström, 2017). In this meta-analysis, assistive technology practices include augmentative and alternative communication (AAC) systems and the use of assistive devices.
Behavioral Skills Training	This is a multi-component practice used in skill instruction that incorporates behavioral strategies (Leaf et al., 2015). These components include instruction, modeling, rehearsal, and feedback. Within this framework, the target skill is first taught using traditional instruction. Then, the behavior is demonstrated by the teacher, followed by the student's performance of the skill. Finally, immediate feedback is provided after the behavior is performed (Miltenberger, 2015).
Cognitive Behavioral Instruction/Strategies	These are practices that integrate both cognitive processes and behavioral approaches such as the use of stimuli, reinforcement, and extinction to promote the development of new behaviors (Graham & Reynolds, 2013). These strategies aim to hep individuals recognize their own emotions and thoughts, and to cope with or adapt to new situations (Özdel, 2015). Cognitive behavioral instruction/strategies can be employed both to reduce problem behaviors and to teach a variety of functional skills.

Table 3.7 Descriptions of emerging practices

Emerging Practice	Description
Direct Instruction/Model-Lead-Test/Explicit Instruction	This is a teacher-directed practice that incorporates behavioral learning principles and follows systematic steps to teach target skills. Direct instruction is grounded in the philosophy that students may not learn effectively unless instruction is delivered in a structured and purposeful manner (Adams & Carnine, 2003). Therefore, direct instruction includes clearly defined implementation steps. These steps typically involve assessment, instructional planning, preparation, creating the need for skill, demonstration (modeling), guided practice, feedback and error correction, independent practice, and maintenance (Joyce et al., 2015).
Early Intensive Behavioral Intervention-EIBI	These are individualized, intensive, and comprehensive practices that apply the principles of applied behavior analysis (ABA) for teaching new skills. In these interventions, parents play an active role as practitioners at various levels in collaboration with experts (Green et al., 2002). Typically initiated during the preschool years, EIBI programs are designed to make use of not only structured instructional hours but also every waking moment of the child's day to achieve educational goals. The intervention generally begins in the home environment and is gradually extended to include the school setting (Hayward et al., 2009).
Embedded Teaching	These are practices in which teaching is systematically integrated into ongoing activities, transitions, or daily routines to support the acquisition of target skills. Delivered during or between routine activities, embedded teaching aims to increase both instructional opportunities and student participation by creating natural learning opportunities (Snyder et al., 2015). This approach follows the child's lead and aligns instruction according to the individual's interests and preferences.
Function-Based Treatment	These are practices designed to reduce or eliminate problem behaviors by identifying the stimuli that trigger the behavior and the functions these behaviors serve (Wood et al., 2007). These interventions modify the conditions under which the problem behavior occurs, based on the information gathered about the problem behavior, and focus on why the problem behavior occurs to minimize the reinforcement function obtained as a result of the problem behavior. Additionally, it provides individualized instruction to increase desired behaviors. In this way, The ultimate goal is to replace problem behaviors with desired behaviors that fulfill the same function (Davis et al., 2012).
Gofar Game, Faceland Game	These are instructional practices that integrate cognitive strategy instruction with technology-aided instruction. The game package, which includes a computer game, requires users to complete tasks in the game by using a strategy consisting of the steps: focus and plan, act, and reflect. By engaging with these steps, the games aim to support the development of attention regulation and problem-solving skills through strategic planning (Kable et al., 2016).

Table 3.7 Descriptions of emerging practices

Emerging Practice	Description
Math Program	Math program refers to a comprehensive practice that incorporates family training, therapeutic support, and a structured mathematics curriculum (Kable et al., 2007). Within this framework, the math instruction component is designed as a multi-faceted, structured and comprehensive program that addresses neurodevelopmental deficits which may hinder the acquisition of math skills. It offers an interactive learning experience, and including strategies aimed at enhancing memory and cognitive functioning related to mathematical problem solving (Tzanakaki et al., 2014).
Manipulatives	Manipulatives are practices that involve the use of physical objects which learners can interact with their hands to support concept acquisition (Bouck et al., 2017). These tools help transform abstract concepts into tangible experiences, thereby facilitating understanding and promoting active engagement. Common examples of manipulatives include various types of abacuses, blocks, concrete-to-abstract teaching tools, number lines, and Touchmath materials. While physical objects are the most frequently used, technological alternatives known as virtual manipulatives can also serve the same purpose (Bouck et al., 2018).
Narratives	These are practices that employ various type of stories to teach target skills or reduce problem behaviors. By presenting scenarios through narratives, these practices help make situations related to the target skill more predictable, thereby better preparing students for relevant situations (Sansosti et al., 2004). Within the scope of this meta-analysis, the practices categorized under narratives include social stories, power cards, and story-based instruction.
Occupation Therapy	These are practices implemented by specialists aimed at developing, maintaining, and teaching new skills, particularly those related to vocational functioning (Blaskowitz et al., 2021). These practices may incorporate various approaches such as technology training, motivational strategies, and parent training. Occupational therapy focuses on enhancing a broad range of skills, including fine motor skills, daily living skills, vocational skills, leisure and social interaction skills, and participation in community settings (Ineson, 2015; Nilsson et al., 2011).
Peer Mediated Intervention	These are instructional practices designed to provide repeated opportunities for interaction among peers, reduce reliance on adult support, and foster peer-based learning (Biggs et al., 2018). In these practices, the peer assumes a clearly defined role that forms an integral part of the intervention (Falchikov, 2001). This approach differs from peer tutoring, in which the entire instructional process is led is led by the peer. Examples of peer mediated interventions include peer networks, peer support, peer assessment, and peer feedback.

Table 3.7 Descriptions of emerging practices

Emerging Practice	Description
Prompting	Prompts are specific stimuli to ensure that a student produces the correct response during instruction (Collins et al., 2017). Prompts that consistently lead to correct responses are known as controlling prompts, whereas those that merely increase the likelihood of a correct response without guaranteeing it are referred to as non-controlling prompts (Cooper et al., 2019). Common types of prompts include physical, model, verbal, gestural, and visual prompts, each serving to support the learner at varying levels of assistance depending on instructional needs.
Response Card Strategy	These are practices in which all students in a classroom simultaneously respond to teacher's request or question using whiteboards or pre-prepared visual or written cards (Bondy & Tincani, 2018; Heward et al., 1996; Lambert et al., 2006). Easily implemented in classroom settings, the response card strategy is designed to promote active student engagement in academic tasks while allowing the teacher receives to obtain immediate feedback from the students (Schnorr et al., 2016).
Relationship-Based Developmental Intervention	These are family-centered practices designed to enhance the parent-child relationship, often focusing on goals such as secure attachment, social-emotional skills, and problem behaviors (Kim & Kim, 2022). Since these interventions primarily support interaction between parent and child, parents often take on the role of practitioners (Lieberman et al., 2005). Approaches such as relationship-based teaching, emotion coaching, and responsive support are structured as parent-led strategies aimed at improving the behaviors of young children (Cunningham et al., 2009; Eisenberg et al., 2005).
Schema-Based Instruction	These are practices used in teaching mathematics and problem-solving skills, enabling students to regulate their own behaviors while utilizing strategies that involve various solution methods and schemas (Jitendra et al., 2009). Schemas are domain- or context-specific knowledge structures that organize information and assist students in classifying problem types to identify the most appropriate solution path (Fuchs et al., 2004). By aligning schemas with specific problem types, these practices aim to help students better understand the underlying relationships and goals within a given problem.
Structured Teaching-TEACCH	These are practices that include various principles aimed at understanding the nature of a student's disability and supporting the individualized implementation of instruction, both for the student and across instructional environments (Schopler et al., 1995). These principles involve recognizing each student's characteristics, potential, interests, strengths, and weaknesses; providing visual or written supports; designing instructional practices that address a wide range of skill areas; and preventing or effectively responding to problem behaviors (Mesibov et al., 2004).

Non-Evidence-Based Practices

Based on the evaluation conducted in line with the established criteria, nine individual interventions and nine intervention packages were identified as non-evidence-based practices in the education of individuals with IDs. Detailed descriptions of these practices are presented in Table 3.8.

Table 3.8 Descriptions of non-evidence-based practices

Non-evidence-based Practice	Description
Activity Schedules	These are visual support systems designed to guide individuals through sequences of planned activities. Activity schedules are constructed using visual or written materials that represent the tasks to be completed. The primary aim is to promote students independence by allowing team to carry out activity-related steps without adult guidance (Krantz & McClannahan, 2014).
Antecedent Prompt and Testing	This practice involves presenting the target stimulus together with a controlling prompt during skill instruction. Once the target stimulus and prompt are provided, the student is given an opportunity to respond. As instruction progresses, the prompt is gradually faded, and probe trials are implemented to evaluate the student's independent performance (Tekin-İftar & Kırcaali-İftar, 2013).
Consequence-Based Behavior Reduction Intervention	These are practices designed reduce or eliminate problem behaviors by employing strategies based on reinforcement, extinction, or punishment. Among these approaches, reinforcement-based interventions are considered the most moderate (Kaiser & Rasminsky, 2017; Yücesoy-Özkan, 2013). In this meta-analysis, the consequence-based practices identified include differential reinforcement and time-out.
Graduated Guidance	This practice involves dynamically adjusting the level of instructional prompts based on real-time decisions made during teaching. As the student successfully performs steps related to the target skill, adult assistance is gradually reduced. The primary aim is to foster student independence throughout the instructional process (Collins, 2012).
Inquiry-Based Instruction	Grounded in the significance of inquiry and exploration in individual development, inquiry-based instruction encompasses practices in which students actively participate in identifying problems through observation, conducting research, collecting and analyzing data, evaluating results, and sharing knowledge. This approach is particularly effective in teaching scientific concepts (Minner et al., 2010). With the growing integration of technological tools in education, there is an increasing emphasis on enhancing students' ability to utilize these tools to cultivate scientific thinking (Önder & Önder, 2018).

Table 3.8 Descriptions of non-evidence-based practices

Non-evidence-based Practice	Description
Packaged Interventions	These are multi-component interventions that incorporate multiple instructional approaches simultaneously in the teaching target skills. In packaged interventions, the effectiveness is not assessed based on the impact of a single strategy, but rather on the effectiveness of multiple methods used within the instructional arrangements. Examples include combining time delay with graphic organizers, or implementing PECS alongside video modeling (Cihak et al., 2013; Wood et al., 2020).
Positive Behavior Support	This is a comprehensive practice designed to teach new behaviors, encourage desired behaviors, and reduce problem behaviors by modifying the individual's environment (Erbaş, 2005). Positive behavior support is built upon four core components: (a) the application of applied behavior analysis principles, (b) the integration of multiple intervention strategies, (c) sensitivity to the individual's cultural context, and (d) the sustainable implementation of support within institutional systems (Dunlap et al., 2009).
Social Skill Program	These are multi-component practices aimed enhancing social skills and teaching new ones. Social skill programs utilize a range of strategies that are aligned with their underlying curricular frameworks. Within the scope of this meta-analysis, the strategies included under social skill programs comprise video modeling, behavioral skills training, time delay, reciprocal teaching, as well as prompting and reinforcement-based practices (e.g., O'Handley et al., 2016).
Sport and Exercise	This practice involves the use of sports or physical exercises as a means to teach various skills. Ten group experimental studies focusing on sport and exercise included a total of 177 participants with IDs. These studies were conducted by eight independent research teams across Australia, France, the Netherlands, Hong Kong, Taiwan, Greece, and the state of Arizona in the United States. Although sport and exercise met the preliminary criteria for required to be considered an EBP, it was classified as having a weak effect based on effect size calculations. As a result, it was not recognized as an EBP for the education of individuals with IDs.
Stimulus Adaptations/ Stimulus Matching	These practices involve modifying the form or intensity of the target stimulus to elicit the target behavior from individuals. Stimulus adaptations are typically categorized into two types: stimulus fading and stimulus shaping. Stimulus fading entails altering the physical properties of the target stimulus, whereas stimulus shaping refers to the gradual transformation of the stimulus's form (Cooper et al., 2007).

Discussion

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4. Discussion

Section 4

This study aimed to evaluate articles investigating the effectiveness of interventions used to improve the performance of children and youth aged 0–22 with IDs and to determine EBPs for this population through systematic reviews and meta-analyses. A comprehensive search yielded 49,147 studies, from which 268 were retained after applying design standards, quality assessments, and visual analysis.

The systematic review revealed that the majority of studies were conducted in the United States, with participants predominantly being males with mild IDs. Effect size calculations showed that 15 practices were either highly effective or effective, two practices were moderately effective, one practice had a weak effect, and two were deemed ineffective. Moderator analysis indicated no statistically significant differences in most practices based on dependent variables, age, or level of disability. However, statistically significant positive effects were found for parent training (when appropriate school behavior was the outcome) and computer-based instruction (with the 12–15 age group as the moderator). The findings indicate that 15 practices qualify as EBPs, 20 are considered emerging practices, and 16 lack sufficient evidence to be classified as EBPs for improving the educational performance of children and youth with IDs.

The following section interprets the study's findings and situates them within the context of the existing literature. Additionally, the strengths and limitations of the study are discussed, along with practical recommendations and direction for future research based on the findings.

Systematic Review

Research efforts concerning IDs have historical roots dating back to ancient times; however, they began to adopt a more systematic framework in the 19th century (Altermark, 2017; Kanner, 1964). Despite this long-standing interest, the number of published studies in the 1980s and 1990s remained relatively limited. This scarcity may be attributed to the lower prevalence of experimental research during those decades, as well as to changes in the criteria used to assess methodological quality. Many earlier study fall short of today's research standards, which have become more rigorous over time. For instance, contemporary research reporting emphasizes the detailed reporting of elements such as participant inclusion criteria, practitioner qualifications, and intervention settings —standards that were often absent from earlier publications. This reflects a boarder evolution in the expectations surrounding methodological transparency and rigor within the field.

When examining the countries in which the studies included in the systematic review and meta-analysis were conducted, it becomes evident that the United States ranks fist, followed by Turkiye. This finding underscores the notably high quality of research conducted in Turkiye involving individuals with IDs. As a result, Turkiye can be considered one of the key contributors to the identification of EBPs for children and youth with IDs.

The majority of the interventions examined in the studies were conducted with school-age children in school settings, implemented individually by teachers or researchers. Recent studies in the literature indicate that these instructional arrangements continue to exhibit similar characteristics (Crowe et al., 2022; Sulu et al., 2023). It is also observed that teachers assume instructional roles comparable to those of researchers. This involvement is significant, as it ensures the inclusion of teachers in the search of the effective educational practices for students with IDs. However, the most effective setting for teaching functional skills such as shopping or appropriately using shared spaces is the natural environment in which these skills occur (Westling et al., 2021). Teaching in community-based settings is vital for enhancing quality of life, promoting full social participation, and fostering independence among individuals with IDs (Shier et al., 2009; Verdonschot et al., 2008). Despite this, only 18 studies (6.6%) utilized community environments such as markets, restaurants, or internship sites as intervention settings. Instruction in these settings allows for wider range of skill acquisition, as it encompassed spontaneous and context-specific behaviors that are often absent in school-based teaching (Gilson et al., 2017).

The target variables in these studies predominantly focused on academic skills and independent living skills. These two domains—including competencies such as literacy, basic mathematical calculations, effective use of the native language, personal care, and meal preparation—represent areas in which individuals with IDs frequently require support (Snell et al., 2009). Academic skills are fundamental for success within formal educational settings, whereas independent living skills are critical for fostering autonomy and enabling individuals to function without continuous assistance. However, it is noteworthy that safety skills, vocational skills, and leisure skills—each of which plays a vital role throughout the lifespan and significantly contributes to personal independence— remain among the least studied areas.

Overall Effect Size

Current standards for identifying EBPs underscore the necessity of calculating effect sizes independently of study authors to measure the impact of interventions (WWC, 2022). In this study, effect sizes were calculated to determine EBPs for children and youth with IDs. The findings indicated that 15 practices demonstrated varying degrees of effectiveness—ranging from weak to strong—in enhancing educational outcomes for individuals with IDs. Among these, one practice (sports and exercise) demonstrated a weak effect, whereas another (parent training) presented complex data that warrants further examination.

Among the 217 SED studies, only one study (Wolery et al., 1990) yielded a low effect size. This result can be attributed to the visual analysis conducted prior to effect size calculations. During the visual analysis phase, each participant's graph were individually examined, and studies lacking evidence of effectiveness were excluded from the meta-analysis. As a result, visual analysis and effect size findings were consistent in all but one case. This outcome aligns with previous research comparing visual analysis and effect size calculations (Yücesoy-Özkan et al., 2019). The study with a low effect size, exhibited an increasing trend during the baseline phase, which influenced the results. The Tau-*U* method, used for effect size calculation, controls for baseline trends and consequently categorized this study as havin low effect size, despite its initial visual evidence. This finding is consistent with literature emphasizing the importance of statistical measures, particularly when baseline data are inconsistent (Kazdin, 1982).

The effect size for sports and exercise, an intervention used for individuals with IDs, was found to be close to zero, indicating that this intervention is ineffective in improving educational outcomes. Although the upper bound of the confidence interval suggested the possibility of a small positive effect, its contribution to the overall analysis was minimal due to low statistical weight. Accordingly, the effect size analysis concluded that sports and exercise do not produce meaningful gains in educational outcomes for individuals with IDs. This finding is consistent with the existing literature, which highlights that while sports and exercise can lead to improvements in physical indicators such as agility, strength, and overall fitness these outcomes do not appear to translate into educational benefits (Jeng et al., 2016; Kapsal et al., 2019; Kavale & Forness, 2000).

The only intervention that yielded inconsistent results in effect size calculations was parent training. Separate analysis were conducted for SED and GED studies; however, the effect size estimates for parent training differed significantly between these methodologies. Specifically, the weighted effect size for SED studies indicated a high level of effectiveness, whereas the overall effect size derived from GED studies suggested no effect. Notably, effect sizes were calculated based on a very small number of studies for both research methods. This limitation, particularly for group experimental designs, may have influenced the results. Literature suggests that larger sample sizes tend to increase the likelihood of detecting positive effects (Kanat, 2023). However, in this meta-analysis only three GED studies on parent training were included, which likely contributed to the inconclusive findings. The group experimental studies primarily focused on promoting appropriate school behaviors and reducing problem behaviors through training provided by parents.

While parent training did not demonstrate effectiveness in reducing problem behaviors, moderator analysis based on dependent variables revealed a statistically significant positive effect on appropriate school behaviors. As a result, parent training was identified as an EBP for the education of individuals with IDs. However, it is important to note that the problem behaviors addressed in group experimental studies were not among the outcomes for which parent training was determined to be effective.

Moderator Analysis

In this study, dependent variables, age, and level of disability were examined as moderator variables. Although the groups included in the meta-analysis were heterogeneous, identifying which moderator significantly effected the effect size required analyzing multiple moderators. For SED studies, none of the moderator variables demonstrated a statistically significant impact. This outcome is likely due to the absence of random assignment in SED studies, as participant are typically selected based on similar characteristics aligned with the research objectives. Moreover, the dependent variables targeted for improvement were often consistent across participants. Consequently, moderator variables calculated separately for each intervention did not have a significantly influence on the effect sizes of the SED studies.

In GED studies, none of the moderator variables had a significant effect on the overall effect size, except for two variables. In parent training, studies targeting the improvement of appropriate school behaviors were found to be significantly more effective than those addressing other dependent variables. In computer-based instruction, age variable emerged as a significant moderator, with interventions involving participants aged 12–15 showing greater effectiveness compare to other age groups. This findings suggested that parents may be more successful in teaching new skills rather than in reducing or eliminating problem behaviors, which often require professional expertise. This interpretation is supported by literature indicating that managing problem behaviors can be particularly demanding for non-experts, such as parents (Doubet & Ostrosky, 2014). Therefore, while parents may be effective as instructors for skill acquisition, they may be less effective in problem behavior management. Regarding computer-based instruction, the enhanced effectiveness among 12–15-year-olds may be attributed to the motivational impact of technology, as this age group tends to be highly engaged with digital tools. Supporting this, previous research shows that individuals aged 12–17 are the most active demographic online (Lenhart et al., 2010). However, the impact of other potential moderator variables—such as participant gender, assessment tools, intervention settings, practitioner characteristics, and intervention duration—on the overall effect size remains an area for further investigation.

Evidence-Based Practices

In this meta-analysis, 15 practices were identified as EBPs, and 20 practices were classified as emerging practices for improving the educational outcomes of individuals with IDs. These classifications are subject to revision as new research emerges. Although the findings of this meta-analysis align with certain studies in existing literature, they diverge from others. For example, practices such as augmented reality, smartboard use, and mobile applications grouped under technology-aided instruction were identified as EBPs for individuals with IDs. This is consistent with previous studies that employed different effect size calculation methods and reported similar outcomes (Kim & Kimm, 2017).

Least-to-most prompting, a teaching method that involves systematically increasing the level of prompts, was also identified as an EBP based on 9 single-case experimental studies including 29 participants. This conclusion differs from prior evaluations. For instance, What Works Clearinghouse (WWC, 2018) determined that least-to-most prompting did not meet the criteria for an EBP due to the absence of GED studies and the limited number of participants (n = 19) in existing SED studies. In contrast, the current meta-analysis identified only SED studies but incorporated recent research that satisfied the minimum participant requirement, thereby supporting the classification of least-to-most prompting as an EBP for children and youth with IDs.

The findings also highlight notable differences in the EBPs identified for individuals with different types of disabilities. For example, activity schedules, social stories, and augmentative and alternative communication systems are recognized as EBPs for individuals with autism spectrum disorder (Ganz et al., 2012; Genc-Tosun et al., 2023); however, these same did not meet the criteria for EBPs for individuals with IDs. This can be explained by the greater emphasis on communication and interaction skills in teaching practices for individuals with autism spectrum disorder.

An analysis of the outcomes most frequently addressed by EBPs reveals that independent living skills are the most commonly targeted, followed by academic skills. In contrast, some outcomes such as problem behaviors and social skills are significantly underrepresented. Specifically, only two practices have been identified as EBPs in each of these areas. This observation is consistent with findings reported in previous studies (Clay et al., 2018; Shogren et al., 2004). These results underscore a pressing need for further research that specifically targets the reduction of problem behaviors and the enhancement of social skills among individuals with IDs.

Among the emerging practices, embedded teaching, manipulatives, and assistive technology are particularly noteworthy for being on the verge of meeting the criteria for EBPs. Among these, embedded teaching has been evaluated in five SED studies and one GED study, encompassing a total of 27 participants. While it satisfies the requirements regarding the number of studies and geographic distribution, it falls short of the minimum participant threshold—30 individuals with IDs—required for classification as an EBP. Thus, at least one additional high-quality experimental study involving a minimum of three participants with IDs from any geographic region is needed for embedded teaching to qualify as an EBP.

Manipulatives have been reached in 11 SED studies involving a total of 23 participants with IDs. Although this practice meets the criteria in terms of the number of studies and participants, it has not been classified as an EBP due to limited diversity among research groups. Specifically, 10 of the 11 studies were conducted by the same or a closely affiliated research teams. As a result, for manipulatives to qualify as an EPS, a high-quality effectiveness study must be conducted by researchers outside of the states of Michigan and Kentucky in the U.S. and by research groups not involved int the existing body of studies.

Assistive technology, has been evaluated in 12 SED studies involving a total of 17 participants with ID. While assistive technology meets the criteria for the number of studies and geographic diversity, it falls short of the minimum participant threshold required for classification as an EBP which is 20 individuals. Therefore, it appears that there is a need for a high-quality experimental study involving at least three participants with IDs in any geographic region.

Recommendations

The findings of this report serve as a practical guide for practitioners and researchers working with individuals with IDs. Based on the research process and the results obtained, several recommendations have been developed for practitioners and researchers in the field. These recommendations are listed in the following section.

Recommedations for Practice

1. Practitioners are encouraged to utilize EBPs identified in this study when providing educational interventions for individuals with IDs. When selecting these practices, it is recommended that EBPs be chosen based on the targeted outcomes and the characteristics of the students.
2. Practitioners can enrich educational interventions for individuals with IDs by combining multiple EBPs listed in this study.
3. Awareness campaigns can be conducted in collaboration with the Ministry of National Education to promote and disseminate EBPs for individuals with IDs.
4. To ensure the high-fidelity implementation of identified EBPs, training programs can be planned for all stakeholders involved in the individual's education, particularly teachers and parents.
5. Experts involved in teacher training programs can develop activities to enhance the knowledge and skills of pre-service teachers regarding EBPs.

Recommendations for Future Research

1. There is a limited number of group experimental studies aimed at identifying effective practices for teaching individuals with IDs. Researchers should be encouraged to conduct more group experimental studies.
2. A significant portion of studies were excluded from quality assessment due to the lack of data on treatment fidelity. Results from systematic reviews and meta-analyses conducted without quality assessment could be compared, as they may provide practical insights into implementation.
3. Conducting comprehensive systematic reviews and meta-analyses is a time-consuming process. Therefore, it is recommended that such studies be repeated at regular intervals to stay aligned with current trends.
4. This study did not analyze the duration of independent variables. However, it is believed that identifying efficient practices among EBPs is crucial for improving the quality of education provided. Future studies should include analyses of the duration or number of trials for the examined practices.
5. Effect size calculations in this study did not include follow-up data; only measurements taken immediately after the post-test were considered. Evaluations have shown that subsequent measurements, especially in group experimental designs, yield more effective results. Future studies should incorporate follow-up data in effect size calculations to highlight potential differences.
6. The effectiveness of an intervention can be influenced by many factors beyond the participants' age, level of disability, or dependent variables. Future studies could conduct moderator analyses on variables such as the intervention setting and the implementer.
7. Systematic reviews and meta-analyses evaluate studies through multiple steps with different criteria. Developing software that allows these steps to be conducted on a single platform, enabling multiple coders to work simultaneously yet independently, and facilitating storage and analysis, could lead to more rigorous research.
8. Comprehensive studies identifying EBPs for individuals with other types of disabilities, in addition to intellectual disabilities, could be conducted. A database could be created to consolidate findings from various studies, and this database could be made accessible to users to support the dissemination of EBPs.

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