Contents lists available at Science-Gate

International Journal of Advanced and Applied Sciences

Journal homepage: https://www.science-gate.com/IJAAS.html

Examining early intervention models for children with disabilities: A systematic literature review

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ARTICLE INFO

Article history:
Received 22 February 2026
Received in revised form
15 July 2026
Accepted 23 July 2026

Keywords:
Early intervention
Children with disabilities
Family engagement
Inclusive support
Systematic review

ABSTRACT

This study aims to synthesize recent evidence on early intervention (EI) models for children with disabilities, focusing on developmental outcomes, accessibility, and family engagement, as these issues remain important for improving inclusive support systems. Using a systematic literature review design guided by PRISMA, records from Scopus and ERIC published between 2022 and 2024 were screened, and 22 studies were selected for thematic synthesis. The review identified three interrelated themes: family-centered practices, professional practices and innovations, and contextual and cultural dimensions of EI. The findings show that EI is more effective when caregiver participation is active, professional support is adaptable, and service delivery is responsive to local conditions. The review is limited by its restricted timeframe, inclusion of only English-language studies, coverage of two databases, exclusion of gray literature, and heterogeneity among the studies, which prevented a meta-analysis. The review contributes to the literature by integrating recent evidence across the relational, professional, and contextual dimensions of EI, which are often examined in isolation, thereby providing a more coherent and practice-relevant understanding of how intervention effectiveness is shaped across diverse settings.

1. Introduction

Early intervention (EI) occupies a critical place in services for children with disabilities because early childhood represents a period of heightened developmental plasticity, during which timely support can shape cognitive, motor, communicative, and social development in meaningful ways (Guralnick, 2019). For children at risk of developmental delay, the question is no longer whether early support matters, but rather what kinds of intervention models are most responsive, accessible, and sustainable across diverse service contexts. This issue is important not only for children, but also for the families, professionals, and systems responsible for translating intervention principles into everyday practice. In this sense, EI is both a developmental and a service-delivery concern, requiring attention to child outcomes alongside the quality of support structures surrounding the child.

Existing scholarship has consistently shown that effective EI extends beyond child-focused techniques alone. Evidence-based practice remains central to the field, yet its implementation is often uneven when transferred from controlled or ideal settings into routine service environments (Johnson et al., 2018). Within this landscape, family-centered approaches have gained particular importance because they position caregivers as active partners in intervention rather than passive recipients of professional advice. Such approaches are associated with stronger parent involvement, more responsive support, and better alignment between intervention goals and family realities. At the same time, studies have shown that the success of family-centered EI depends heavily on practitioner competence, professional support, and the quality of relationships built between families and service providers (Bagur et al., 2024). These observations suggest that EI effectiveness cannot be understood solely in terms of program design; it must also be examined through

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the professional and relational conditions that enable implementation.

Furthermore, the field has increasingly recognized that EI is shaped by contextual variation. Inclusive service delivery remains difficult in many settings because families encounter barriers related to access, coordination, training, and resource availability. These challenges appear across both high-income and under-resourced contexts, although they may take different forms depending on policy structures, service integration, and cultural expectations surrounding disability and family roles (Siller et al., 2021). Consequently, understanding EI models requires more than documenting whether a given intervention "works." It also requires attention to how intervention models are delivered, who can access them, and how contextual conditions influence their uptake and effectiveness. Without such a synthesis, the field risks advancing intervention knowledge in fragmented ways, with strong evidence for selected models but weaker understanding of how those models travel across contexts and populations.

Despite the growing body of work in this area, the literature remains dispersed across different intervention types, service settings, and disability-related concerns. Much of the existing research tends to focus on specific programs or localized implementation issues, rather than offering a comparative understanding of how family-centered practices, professional innovations, and contextual factors interact within contemporary EI. This fragmentation creates a clear need for a systematic literature review (SLR) that can consolidate recent evidence in a structured and transparent way. In the present review, the search was limited to studies published between 2022 and 2024. This timeframe was selected deliberately to capture the most recent evidence informing current EI practice, particularly in relation to developments in family-centered delivery, telepractice, service integration, and context-responsive implementation. The review was therefore designed as an updated synthesis of contemporary EI trends rather than a historical review of the field. Nevertheless, this decision may have excluded earlier foundational studies and should be considered when interpreting the scope of the review. Against this background, the present study addresses three research questions:

- How do family-centered practices impact parent involvement and the developmental outcomes of children with disabilities in early childhood intervention?
- How do professional practices influence the delivery, effectiveness, and accessibility of early childhood intervention programs?
- How do contextual and cultural factors influence the implementation and effectiveness of early intervention practices across different regions and populations?

By examining these questions through a systematic synthesis of recent studies, this review aims to clarify what current evidence suggests about the effectiveness, accessibility, and implementation conditions of EI models for children with disabilities. In doing so, it seeks to identify patterns across contemporary research, highlight unresolved issues, and generate implications for future research, policy, and practice.

2. Methodology

This section presents an overview of the preferred reporting items for systematic reviews and meta-analyses (PRISMA) standard, setting a foundation for structured reporting. Following this, details are presented on the development of the research questions, as well as the systematic processes used for identification, screening, and determining the eligibility of sources. Further explanation includes criteria for assessing quality and approaches used for data collection and analysis.

2.1. Research design

This systematic review followed the PRISMA guidelines to enhance transparency in the identification, screening, eligibility assessment, and reporting of studies. The review focused on empirical studies examining early intervention models for preschool-aged children with disabilities. The search was restricted to publications from 2022 to 2024 in order to capture the most recent evidence on current service delivery trends, including family-centered practice, technology-supported intervention, service integration, and context-responsive implementation. This decision was made to provide an updated synthesis of contemporary practice developments rather than a historical overview of the field. However, because the publication window was intentionally narrow, earlier foundational studies may not have been captured, and this should be considered a limitation when interpreting the scope of the review.

2.2. Systematic searching strategy

2.2.1. Identification

The systematic review process undertaken in this study involved a series of structured steps to ensure the comprehensive identification of relevant literature. Initially, keywords were carefully selected, followed by the identification of related terms through dictionaries, thesauri, encyclopedias, and prior research studies. Search strings were then developed for the Scopus and ERIC databases by incorporating all identified terms (Table 1). In the initial stage, the database search identified 3,088 records across the Scopus and ERIC databases that were potentially relevant to the study topic.

Table 1: The search string used for the systematic review process

Database	Search string
Scopus	(("early intervention model" OR "early intervention program" OR "early intervention strategies" OR "early childhood intervention") AND ("children with disability" OR "children with special needs" OR "special student" OR "students with disabilities" OR "special education needs") AND ("preschool" OR "pre-kindergarten" OR "early childhood education")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "PSYC")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2024))
ERIC	("early intervention model" OR "early intervention program" OR "early intervention strategies" OR "early childhood intervention") AND ("children with disability" OR "children with special needs" OR "special student" OR "students with disabilities" OR "special education needs") AND ("preschool" OR "pre-kindergarten" OR "early childhood education") pubyearmin:2022 pubyearmax:2024

2.2.2. Screening

The screening stage was conducted using the predefined inclusion and exclusion criteria presented in Table 2. The 3,088 identified records were screened according to publication language, publication timeline, literature type, publication stage, and subject area. After applying these criteria, 253 records remained for further screening. Duplicate records were then identified and removed (n = 5), resulting in 248 full-text articles for eligibility assessment.

Table 2: The inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2022-2024	< 2022
Literature type	Journal (article)	Conference, book, review
Publication stage	Final	In press
Subject	Social sciences and psychology	Besides social sciences and psychology

2.2.3. Eligibility

In the eligibility phase, 248 full-text articles were assessed to determine their alignment with the inclusion criteria and the objectives of the review. At this stage, the full texts were examined in relation to the study focus, target population, and direct relevance to the review questions. A total of 226 articles were excluded due to lack of direct relevance to the review focus, absence of empirical data, inaccessible full-text versions, or insufficient alignment with the study objectives. As a result, 22 studies were retained for detailed analysis, as presented in Fig. 1.

2.3. Quality appraisal

The quality assessment process was implemented to ensure that the methodology and analysis of the selected studies adhered to rigorous standards. Each study underwent a thorough evaluation by the corresponding author, supported by two co-authors, with a detailed examination of the methodology, analytical approach, study relevance, literature review, theoretical framework, and identified limitations. Articles were assessed based on six criteria, with evaluations marked as Y (yes), P (partially), or N (no). Studies meeting at least four criteria were included in the review. Assessment decisions were reached collectively, with any disagreements resolved through discussions among the raters and authors. This process resulted in the inclusion of 22 articles that met the established quality benchmarks, comprising 18 studies that fulfilled all six criteria, two that met five criteria, and two that satisfied four criteria. The detailed results of the quality assessment are presented in Table 3.

Table 3: Quality assessment results

No.	Reference	RD	QA1	QA2	QA3	QA4	QA5	QA6	Criteria fulfilled
1	Bagur et al. (2024)	QL	Y	Y	Y	Y	Y	Y	6
2	Abarca et al. (2024)	QL	Y	Y	Y	Y	Y	Y	6
3	Rakap et al. (2024)	QN	Y	Y	Y	N	Y	Y	5
4	Tarasun et al. (2024)	MX	Y	Y	Y	Y	Y	Y	6
5	García-Ventura et al. (2023)	QN	Y	N	Y	Y	Y	N	4
6	Frugone-Jaramillo and Gràcia (2023)	QL	Y	Y	Y	Y	Y	Y	6
7	Callanan et al. (2023)	QL	Y	Y	Y	Y	Y	Y	6
8	Vilaseca et al. (2023)	MX	Y	Y	Y	Y	Y	Y	6
9	Howe et al. (2023)	QL	Y	Y	Y	Y	Y	Y	6
10	Martínez-Rico et al. (2023)	QN	Y	Y	Y	Y	Y	Y	6
11	Neilsen-Hewett et al. (2023)	QL	Y	Y	N	Y	Y	N	4
12	Su et al. (2023)	QN	Y	Y	Y	Y	Y	Y	6
13	Ashengo and Dolisso (2023)	QL	Y	Y	Y	Y	Y	Y	6
14	Yazıcıoğlu and Akdal (2023)	QN	Y	Y	Y	Y	Y	Y	6
15	Bhopti et al. (2022)	MX	Y	Y	Y	Y	Y	Y	6
16	Mas et al. (2022)	QN	Y	Y	Y	Y	N	Y	5
17	Robles-Bello and Sánchez-Teruel (2022)	QN	Y	Y	Y	Y	Y	Y	6
18	Tupou et al. (2022)	MX	Y	Y	Y	Y	Y	Y	6
19	Shire et al. (2022)	MX	Y	Y	Y	Y	Y	Y	6
20	Al-Attiyah et al. (2022)	QN	Y	Y	Y	Y	Y	Y	6
21	Al Rubaie (2022)	QN	Y	Y	Y	Y	Y	Y	6
22	Sarouphim and Kassem (2022)	MX	Y	Y	Y	Y	Y	Y	6

RD: Research design; QA: Quality assessment; QN: Quantitative; QL: Qualitative; MX: Mix methods

2.4. Data abstraction and analysis

This study employed an integrative analysis approach to explore diverse research designs, particularly emphasizing quantitative methods to uncover primary themes and subthemes. The process commenced with a comprehensive review of 22 publications to extract data relevant to the research objectives, as illustrated in Fig. 1. Recent critical studies on early intervention models' impact on preschool-aged children with disabilities were examined, focusing on their methodologies and key findings. Themes were systematically developed through collaborative efforts among the coauthors, ensuring they were firmly rooted in the evidence. A detailed log was maintained to document insights, observations, and challenges, enabling a clear and accurate interpretation of the data. Initial findings were compared to identify and resolve inconsistencies, with discussions held to achieve consensus on differing interpretations. Collaborative refinements ensured consistency and coherence in the final themes. To validate the study's findings, two experts in educational psychology and special education reviewed the themes for clarity, relevance, and adequacy. Their feedback informed further refinements, enhancing the quality of the themes and reinforcing the study's academic rigor for reliable and accessible outcomes.

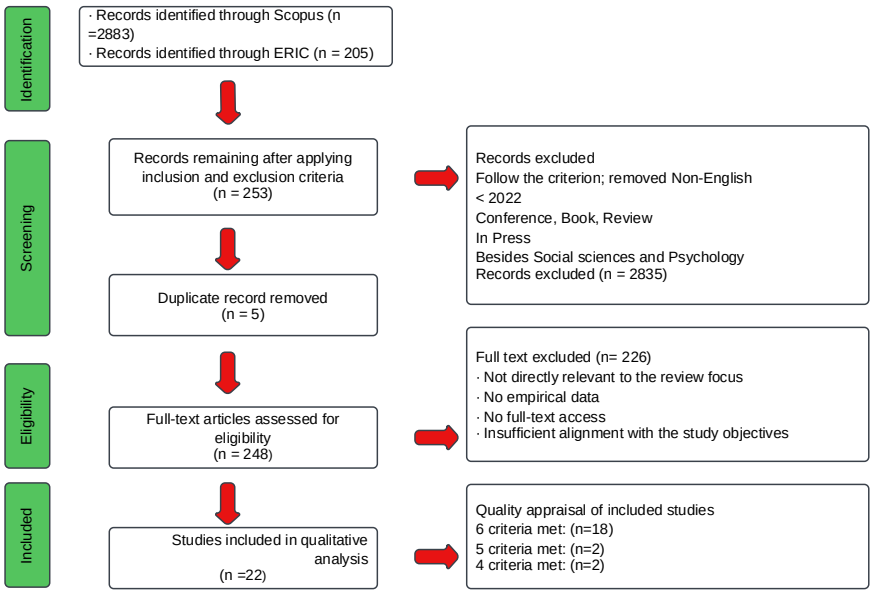

Fig. 1: Flow diagram of the search process

3. Results

3.1. General background of the selected studies

The distribution of articles by year, as shown in Fig. 2, indicates that 2023 had the highest number of publications, totaling 10 articles, marking a significant peak in research output (Ashengo and Dolisso, 2023; Callanan et al., 2023; Frugone-Jaramillo and Gràcia, 2023; García-Ventura et al., 2023; Howe et al., 2023; Martínez-Rico et al., 2023; Neilsen-Hewett et al., 2023; Su et al., 2023; Vilaseca et al., 2023; Yazıcıoğlu and Akdal, 2023). In comparison, 2022 accounted for eight articles, representing the second-highest number of contributions. Notable works from this year were authored by Bhopti et al. (2022), Mas et al. (2022), Robles-Bello and Sánchez-Teruel (2022), Tupou et al. (2022), Shire et al. (2022), Al-Attiyah et al. (2022), Al Rubaie (2022), and Sarouphim and Kassem (2022). On the other hand, 2024 recorded the fewest articles, with only four publications (Abarca et al., 2024; Bagur et al., 2024; Rakap et al., 2024; Tarasun et al., 2024). This data highlights a clear variation in scholarly output, with a notable peak in 2023 and relatively lower activity in 2024. The data presented in Fig. 3 highlights the distribution of articles by country, highlighting a wide range of contributions. Spain stands out as the leading contributor with a total of 6 articles (Bagur et al., 2024; García-Ventura et al., 2023; Martínez-Rico et al., 2023; Mas et al., 2022; Robles-Bello and Sánchez-Teruel, 2022; Vilaseca et al., 2023). Australia follows with 4 articles (Bhopti et al., 2022; Callanan et al., 2023; Neilsen-Hewett et al., 2023; Tupou et al., 2022). The USA contributed 2 articles (Abarca et al., 2024; Howe et al., 2023), as did Türkiye with 2 articles (Rakap et al., 2024; Yazıcıoğlu and Akdal, 2023). Other contributions include 1 article each from Qatar (Al-Attiyah et al., 2022), Ecuador (Frugone-Jaramillo and Gràcia, 2023), Canada (Shire et al., 2022), Ethiopia (Ashengo and Dolisso, 2023), Saudi Arabia (Al Rubaie, 2022), China (Su et al., 2023), and Lebanon (Sarouphim and Kassem, 2022). Additionally, the study by Tarasun et al. (2024) spans both Ukraine and Sweden, reflecting a notable example of collaborative research. This comprehensive analysis includes all 22 articles, highlighting Spain as the most prolific contributor, followed by significant input from Australia, the USA, and Türkiye, with additional contributions reflecting the global representation in early intervention research.

Fig. 4 illustrates the distribution of articles based on their research design. The majority, with a total of nine studies, utilized a quantitative approach, reflecting its prominent role in the field (Al-Attiyah et al., 2022; Al Rubaie, 2022; García-Ventura et al., 2023; Martínez-Rico et al., 2023; Mas et al., 2022; Rakap et al., 2024; Robles-Bello and Sánchez-Teruel, 2022; Su et al., 2023; Yazıcıoğlu and Akdal, 2023). In contrast, eight studies adopted a qualitative approach, emphasizing in-depth exploration of specific themes (Abarca et al., 2024; Ashengo and Dolisso, 2023; Bagur et al., 2024; Callanan et al., 2023; Frugone-Jaramillo and Gràcia, 2023; Howe et al., 2023; Neilsen-Hewett et al., 2023). Lastly, six studies employed a mixed-methods approach, showcasing a balance between qualitative and quantitative methodologies (Bhopti et al., 2022; Sarouphim and Kassem, 2022; Shire et al., 2022; Tarasun et al., 2024; Tupou et al., 2022; Vilaseca et al., 2023). This analysis highlights the prevalence of quantitative research, complemented by substantial contributions from qualitative and mixed-methods studies, enriching the methodological diversity in early intervention research.

3.2. The developed themes

The thematic analysis of the 22 included studies generated three interrelated themes: (1) family-centered practices in early childhood intervention, (2) professional practices and innovations in early intervention, and (3) contextual and cultural dimensions of early intervention. Rather than representing isolated categories, these themes reflect recurring patterns across the reviewed literature concerning who is involved in intervention, how intervention is delivered, and the conditions under which intervention becomes effective. Across the studies, there was broad agreement that early intervention is strengthened when caregiver participation is active, professional support is responsive, and service delivery is adapted to contextual realities. However, the studies also differed in the extent to which they emphasized practitioner competence, coaching and telepractice, service integration, family well-being, and cultural responsiveness. These areas of convergence, variation, and remaining gaps are synthesized in Tables 4–6.

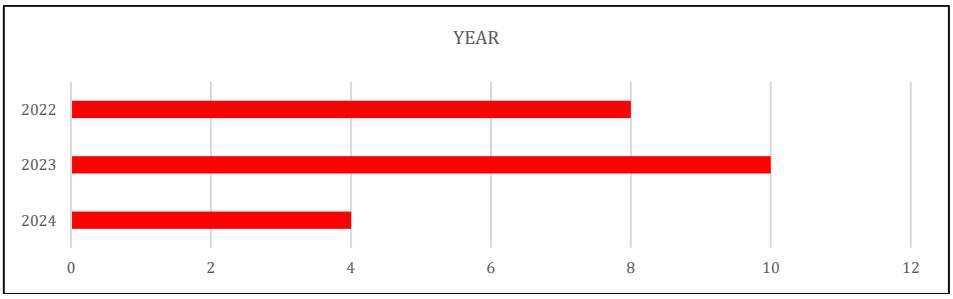

Fig. 2: Total of articles by year

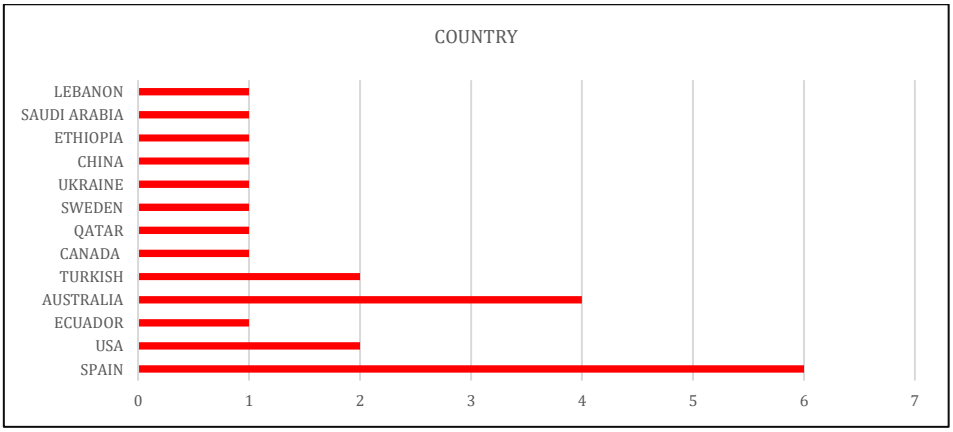

Fig. 3: Total of articles by country

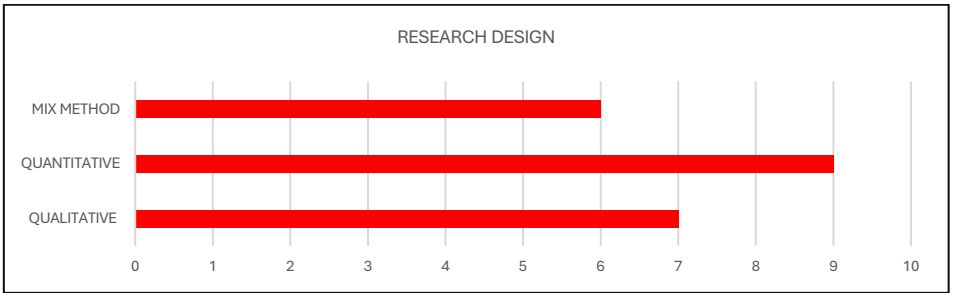

Fig. 4: Total of articles by research design

Table 4: Comparative synthesis of findings for Theme 1 (family-centered practices in early childhood intervention)

No.	Study	Main focus	Key contribution/finding	Agreement with other studies	Difference/unresolved issue	Quality score
1	Bagur et al. (2024)	Family needs and service experience in Spain	Highlights family well-being, intervention practices, and barriers to access; stresses the need for stronger policy visibility and public awareness of ECI services	Agrees that family-centered ECI must support family well-being, not only child outcomes	Emphasizes system visibility and access barriers more than direct child developmental outcomes	6
2	Abarca et al. (2024)	Latin American mothers' experiences in a statewide EI model	Shows that culturally grounded EI becomes more meaningful when family values and "funds of knowledge" are incorporated	Agrees that family-centered intervention should be responsive to family realities and participation	Pushes the literature further toward cultural responsiveness rather than generic family involvement	6
3	García-Ventura et al. (2023)	Practitioner competence, confidence, and parent involvement	Finds that greater practitioner competence and confidence are associated with stronger parent involvement	Agrees with Callanan et al. (2023) and Mas et al. (2022) that parent engagement depends partly on practitioner practice	Focuses more on practitioner capability than on broader family or contextual barriers; lower appraisal score suggests more cautious interpretation	4
4	Frugone-Jaramillo and Gràcia (2023)	Family-centered practice in rural Ecuador	Demonstrates that the Routines-Based Model can improve family quality of life and family empowerment in a vulnerable rural context	Agrees that family-centered approaches support family well-being and work best when adapted to context	Highlights rural vulnerability and cultural relevance more explicitly than most other studies	6
5	Callanan et al. (2023)	Therapist experience with PCRI-EI model	Indicates that therapist skill development supports stronger family-centered partnerships and socioemotional parent-child connections	Agrees that practitioner competence is central to meaningful parent participation	Focuses on therapist development and relational quality rather than direct measurement of child outcomes	6
6	Vilaseca et al. (2023)	Parenting behaviors and child developmental outcomes	Shows that parental responsiveness, affection, and teaching behaviors predict children's cognitive and language development	Agrees that family-centered practice matters, but links it more directly to developmental outcomes	Adds stronger evidence on the mechanism through which parent behavior influences child outcomes	6
7	Bhopti et al. (2022)	Family quality of life across child age groups	Finds that family quality of life tends to decline as children move from early years to school age; identifies work loss and lack of respite as major pressures	Agrees that family well-being is crucial to intervention success	Highlights temporal strain on families and suggests that supportive care may weaken over time	6
8	Mas et al. (2022)	Family-centered practices and parent involvement	Suggests that participatory practices are more effective than purely relational practices in promoting parent involvement	Agrees that parent involvement is essential, and that practitioner practice shapes it	Offers a more specific distinction between types of family-centered practice; moderate appraisal score suggests cautious interpretation	5
9	Robles-Bello and Sánchez-Teruel (2022)	Measurement of family-centered practices in Spanish families	Confirms the reliability of the family-centered Practices Scale for families of children with Down syndrome in Spain	Agrees that family-centered practice requires contextually valid tools and culturally grounded application	More concerned with measurement validity than with intervention outcome comparison	6

The studies grouped under this theme showed broad agreement that family-centered practices are closely associated with stronger parent involvement, improved family well-being, and more responsive intervention processes. Several studies emphasized that practitioner competence and participatory practice play a central role in strengthening family engagement, while others highlighted family quality of life, empowerment, and parenting behaviors as important pathways through which intervention may support child development (Bagur et al., 2024; Callanan et al., 2023; García-Ventura et al., 2023; Mas et al., 2022; Vilaseca et al., 2023). Variation within the theme was evident in the specific dimensions emphasized. Some studies focused primarily on practitioner-parent partnership and parent participation, whereas others drew attention to cultural responsiveness, rural vulnerability, or the psychometric validation of family-centered assessment tools in specific contexts (Abarca et al., 2024; Frugone-Jaramillo and Gràcia, 2023; Robles-Bello and Sánchez-Teruel, 2022). Another recurring pattern concerned family well-being over time, with evidence suggesting that supportive family-centered practice may be challenged by caregiver strain, work-life pressures, and changing needs as children grow older (Bhopti et al., 2022). Taken together, the findings in this theme indicate strong convergence around the value of family-centered practice, with remaining variation centered mainly on how such practice is operationalized and adapted across different family and service contexts.

Studies within this theme consistently indicated that professional innovation in early intervention is most often expressed through coaching, telepractice, assistive technology, and service integration. A clear area of agreement was that structured coaching can strengthen caregiver or practitioner strategy use and support more effective intervention delivery, particularly when coaching is sustained and linked to implementation fidelity (Rakap et al., 2024; Shire et al., 2022; Tupou et al., 2022). A second recurring pattern concerned the expansion of service accessibility through remote delivery. Multiple studies reported that telepractice and remote support models were viewed as feasible and useful, especially in rural or underserved settings, although their success depended on contextual tailoring, usability, and system readiness (Howe et al., 2023; Martínez-Rico et al., 2023; Shire et al., 2022). Variation within this theme emerged in the level at which innovation was examined. Some studies concentrated on direct coaching effects or technology use in practice, whereas others focused

more on broader service integration, community infrastructure, and professionalization needs (Al-Attiyah et al., 2022; Neilsen-Hewett et al., 2023). The main gap identified across the studies concerns sustainability: although innovation was generally associated with improved flexibility and access, the reviewed evidence also suggests that these gains depend on training, structural support, and coordination rather than on innovation alone.

Table 5: Comparative synthesis of findings for Theme 2 (professional practices and innovations in early intervention)

No.	Study	Main focus	Key contribution/finding	Agreement with other studies	Difference/unresolved issue	Quality score
1	Rakap et al. (2024)	Home-based coaching and Milieu Teaching strategies	Shows that parent training combined with home-based coaching improves mothers' use of intervention strategies and strengthens children's expressive language outcomes	Agrees that structured coaching can enhance caregiver competence and child-related outcomes	Emphasizes fidelity and direct skills application more strongly than broader system or service issues; should be interpreted with some caution relative to higher-scoring studies	5
2	Howe et al. (2023)	Remote evidence-based practice in rural communities	Demonstrates that remote delivery can expand access to early intervention in underserved areas when tailored to local community needs	Agrees with Martínez-Rico et al. (2023) and Shire et al. (2022) that telepractice can improve accessibility and feasibility	Focuses more on conceptual and contextual fit than on formal outcome measurement	6
3	Martínez-Rico et al. (2023)	Telepractice social validity in ECI	Validates a parent-reported scale showing that telepractice can be acceptable, feasible, and useful from family perspectives	Agrees that technology-supported delivery can strengthen access and support delivery	Contributes stronger measurement evidence on acceptability than on long-term developmental outcomes	6
4	Neilsen-Hewett et al. (2023)	Service integration in regional contexts	Identifies systemic barriers such as weak infrastructure and complex referral pathways, while also highlighting relationships and key-worker approaches as supports	Agrees that innovation must be supported by broader systems and professional coordination	Emphasizes implementation barriers more than direct intervention effectiveness; lower appraisal score suggests more cautious interpretation	4
5	Tupou et al. (2022)	Teacher perceptions of ESDM coaching	Finds that the intervention model is socially valid and acceptable to teachers, while also identifying the need for stronger coaching in behavioral teaching strategies	Agrees that coaching and professional support are important for sustainable practice	Highlights acceptability and teacher readiness rather than direct child outcome gains	6
6	Shire et al. (2022)	Caregiver-mediated coaching and follow-up support in JASPER intervention	Shows that structured coaching and follow-up support improve caregiver strategy use and contribute to gains in children's joint engagement and play diversity	Agrees that caregiver coaching is a strong mechanism for intervention effectiveness	Adds more evidence for sustained caregiver-mediated practice than some of the other innovation studies	6
7	Al-Attiyah et al. (2022)	Assistive technologies in early childhood settings	Reports strong teacher engagement with assistive technologies and supports their usefulness in early intervention settings	Agrees that innovation and technology can strengthen service delivery	Focuses more on educator perception and uptake than on long-term intervention impact	6

Table 6: Comparative synthesis of findings for Theme 3 (contextual and cultural dimensions of early intervention)

No.	Study	Main focus	Key contribution/finding	Agreement with other studies	Difference/unresolved issue	Quality score
1	Tarasun et al. (2024)	Comparative ECEC systems in Ukraine and Sweden	Shows that policy design, professional preparation, and inclusive system structures strongly shape the effectiveness of EI delivery; identifies Swedish practice as a more developed reference point	Agrees that system context and coordinated policy support are crucial to effective EI implementation	Focuses more strongly on cross-national system comparison than on specific intervention outcomes	6
2	Su et al. (2023)	Early detection and intervention in urban and rural China	Reveals substantial disparities in identification, access, and program availability between urban and rural contexts	Agrees that equitable access depends heavily on contextual and structural conditions	Highlights geographic inequality more explicitly than cultural adaptation alone	6
3	Ashengo and Dolisso (2023)	Early identification and intervention for adaptive behavior in Ethiopia	Identifies inconsistency in early identification and policy implementation, indicating weak coordination in support systems	Agrees that policy and service gaps hinder timely and effective intervention	Places stronger emphasis on implementation inconsistency and adaptive behavior support than on family-centered delivery	6
4	Yazıcıoğlu and Akdal (2023)	Early Mathematics Intervention Program in Türkiye	Demonstrates that targeted intervention can improve specific developmental domains, particularly early mathematics skills in preschool children at risk	Agrees that tailored intervention matters for reducing developmental disparities	Focuses on one developmental area, so its implications for broader EI models remain more specialized	6
5	Al Rubaie (2022)	Rehabilitation support for mothers of children with Down syndrome in Saudi Arabia	Emphasizes that EI effectiveness is shaped by culturally relevant support for mothers, including cognitive, social, and psychological preparation	Agrees that family roles and cultural expectations influence the uptake and relevance of EI	Focuses more on maternal rehabilitation and policy direction than on child-level program comparison	6
6	Sarouphim and Kassem (2022)	Portage home-based intervention in Lebanon	Shows that home-based intervention can improve child developmental outcomes while maintaining high parental satisfaction	Agrees that culturally and contextually aligned programs can support both developmental gains and family engagement	Contributes stronger evidence on home-based delivery and parent satisfaction than on broader policy systems	6

The studies classified under this theme showed a strong shared pattern: early intervention outcomes are shaped not only by program design, but also by the policy, cultural, and infrastructural contexts in which services are delivered. Several studies emphasized disparities in access, especially where

urban-rural differences, weak referral systems, or inconsistent policy implementation delayed early identification and intervention (Ashengo and Dolisso, 2023; Su et al., 2023; Tarasun et al., 2024). Another consistent finding was that cultural alignment matters for program uptake and family engagement. Studies in Saudi Arabia and Lebanon, for example, highlighted the importance of culturally relevant parental support, family partnership, and home-based intervention structures that fit local expectations and needs (Al Rubaie, 2022; Sarouphim and Kassem, 2022). Variation within the theme was visible in the specific entry points through which context influenced intervention: some studies focused on national systems and policy structures, others on culturally shaped family roles, and others on targeted developmental programs such as early mathematics intervention (Yazıcıoğlu and Akdal, 2023). Although the reviewed studies differed in setting and emphasis, they converged in showing that context-sensitive implementation is a necessary condition for equitable and effective early intervention. The principal unresolved issue concerns how such contextual responsiveness can be maintained consistently across settings with very different policy environments, service capacities, and cultural expectations.

4. Discussions

4.1. Family-centered practices in early childhood intervention

The reviewed evidence suggests that the value of family-centered practice lies not only in involving parents in intervention, but in repositioning early intervention as a relational and context-responsive process. Across the reviewed studies, family-centered approaches were consistently associated with stronger parent participation, improved family well-being, and more responsive support structures, indicating that intervention effectiveness depends partly on how well professional input is aligned with family realities rather than on program design alone (Bagur et al., 2024; Bhopti et al., 2022; Callanan et al., 2023; Vilaseca et al., 2023). This matters because it shifts the focus of early intervention from child-targeted techniques alone to the quality of the practitioner-family relationship, the fit between intervention and everyday family life, and the extent to which caregivers are supported as active partners in the intervention process.

The findings also suggest that family-centered practice is not implemented in a uniform way. Some studies emphasized practitioner competence and participatory practice as the main drivers of parent engagement, whereas others highlighted family quality of life, cultural responsiveness, or parenting behaviors as the pathways through which intervention may influence developmental outcomes (Abarca et al., 2024; Frugone-Jaramillo and Gràcia, 2023; García-Ventura et al., 2023; Mas et al., 2022; Robles-Bello and Sánchez-Teruel, 2022). In this respect, the literature extends previous understanding by showing that family-centeredness should not be treated as a single intervention feature, but as a broader implementation condition shaped by professional skill, cultural relevance, and the changing pressures faced by families over time. The unresolved issue, therefore, is not whether family-centered practice is beneficial, but how it can be implemented consistently across different service settings while maintaining both relational quality and practical support. Most studies in this theme were methodologically strong, although some findings relating to practitioner competence and parent involvement also drew on lower-scoring studies and should therefore be interpreted with somewhat greater caution.

4.2. Professional practices and innovations in early intervention

The evidence reviewed in this theme suggests that professional innovation in early intervention is valuable not because it introduces new tools or delivery modes alone, but because it broadens the conditions under which support can remain accessible, responsive, and practically usable. Across the studies, coaching, telepractice, and assistive technologies were associated with stronger caregiver or practitioner engagement, improved flexibility of service delivery, and better access to intervention in settings where conventional models may be limited (Al-Attiyah et al., 2022; Howe et al., 2023; Martínez-Rico et al., 2023; Shire et al., 2022). This pattern matters because it indicates that professional effectiveness in EI is increasingly tied to adaptability.

In other words, the contribution of innovation lies less in novelty itself and more in its capacity to sustain intervention quality across rural contexts, service constraints, and changing family needs. In this respect, the findings extend previous understanding of EI by showing that effective professional practice now depends not only on evidence-based content, but also on delivery flexibility, usability, and the ability to maintain meaningful support beyond traditional face-to-face formats.

At the same time, the reviewed studies show that innovation does not function independently of wider system conditions. Coaching models appeared most effective when they were structured, sustained, and linked to implementation fidelity, while telepractice and technology-supported delivery were most convincing when supported by contextual tailoring, social validity, and professional readiness (Howe et al., 2023; Martínez-Rico et al., 2023; Rakap et al., 2024; Tupou et al., 2022). Besides that, findings on service integration indicate that innovation alone cannot overcome weak infrastructure, referral complexity, or uneven coordination across services, particularly in underserved settings (Neilsen-Hewett et al., 2023). The unresolved issue, therefore, concerns sustainability rather than simple feasibility.

Although the literature supports the promise of coaching, telepractice, and technology-supported intervention, it remains less clear how these approaches can be embedded consistently within systems that vary in workforce preparation, structural support, and integration capacity. Most studies in this theme were methodologically strong, although some conclusions regarding home-based coaching and service integration also drew on lower-scoring studies and should therefore be interpreted with somewhat greater caution.

4.3. Contextual and cultural dimensions of early intervention

A central implication of this theme is that early intervention cannot be understood as a portable model that functions in the same way across all settings. The reviewed studies indicate that intervention effectiveness is shaped not only by program content, but also by the policy structures, service infrastructure, cultural expectations, and regional inequalities within which services are delivered.

Evidence from Ukraine, Sweden, China, and Ethiopia points to a recurring pattern: where systems are coordinated, professional preparation is stronger, and access pathways are clearer, early intervention is more likely to be timely, inclusive, and sustainable (Ashengo and Dolisso, 2023; Bakar et al., 2023; Su et al., 2023; Tarasun et al., 2024). This matters because it shifts the interpretation of EI away from program effectiveness alone and toward the broader conditions that enable intervention to become accessible and meaningful in practice.

The findings also show that cultural responsiveness is not a secondary consideration, but part of what makes intervention relevant and usable for families. Studies from Saudi Arabia and Lebanon, for example, suggest that family roles, parental expectations, and locally meaningful forms of support influence both uptake and perceived value of intervention, while targeted work in Türkiye further shows that contextual adaptation can also operate through domain-specific programs rather than only through broad system reform (Al Rubaie, 2022; Sarouphim and Kassem, 2022; Yazıcıoğlu and Akdal, 2023).

Taken together, these studies extend previous understanding by showing that context influences EI at multiple levels: through policy design, through service coordination, and through the cultural fit between intervention and family life. The unresolved issue, therefore, concerns consistency. Although the literature strongly supports the need for context-sensitive and culturally aligned EI, it remains less clear how such responsiveness can be sustained systematically across settings that differ widely in infrastructure, policy maturity, and social expectations. Compared with the other themes, this evidential pattern can be interpreted with greater confidence, as all studies in this theme met the highest appraisal level in the present review.

5. Limitations and future directions

This review should be interpreted in light of several limitations. First, the search was restricted to studies published between 2022 and 2024. This enabled the review to focus on recent developments in early intervention, particularly in relation to family-centered delivery, telepractice, service integration, and context-responsive implementation. However, this narrow timeframe may have excluded earlier foundational studies that continue to shape the field.

Second, only English-language journal articles were included. This may have introduced language bias and reduced the representation of relevant evidence published in other languages or in non-journal formats. Third, the search was limited to two databases, Scopus and ERIC. Although both databases provide substantial coverage of education and related fields, relevant studies indexed elsewhere may not have been captured. In the same way, the exclusion of grey literature may have increased the likelihood of publication bias, since unpublished or non-indexed studies were not considered.

Another limitation concerns the relatively small number of included studies (n = 22), which restricts the breadth of evidence available for synthesis. In addition, a meta-analysis was not undertaken because the included studies were too heterogeneous in research design, intervention type, outcome focus, and reporting format to support meaningful quantitative pooling. This means that the review relied on qualitative synthesis rather than effect-size comparison. Furthermore, although the review followed PRISMA guidance, the protocol was not prospectively registered in PROSPERO or another review registry. This should be acknowledged as a limitation in terms of procedural transparency.

Finally, the evidence base itself remains uneven. Longitudinal studies were limited, and intervention outcomes were not reported in a fully consistent way across studies, which makes direct comparison difficult. Future research should therefore broaden database coverage, consider grey literature where feasible, include wider publication timeframes, and strengthen the use of longitudinal and comparative designs with clearer outcome reporting. Such developments would support more comprehensive evidence base and may enable meta-analysis where sufficient comparability exists.

6. Conclusion

This review demonstrates that the effectiveness of early intervention for children with disabilities is shaped as much by the conditions of delivery as by the intervention models themselves. Across the reviewed studies, three linked features emerged as especially important: meaningful family participation, adaptable professional support, and implementation that is responsive to contextual and

cultural conditions. Taken together, these findings show that early intervention should not be understood only as a set of child-focused techniques, but as a relational and system-dependent practice whose value depends on how well services are aligned with family realities, practitioner capacity, and local service environments.

The review makes two contributions. First, it brings together recent evidence that is often discussed in fragmented ways across separate intervention types, professional approaches, and implementation settings. Second, it shows that the central challenge in early intervention is no longer only identifying effective approaches, but understanding how these approaches can be delivered consistently, equitably, and meaningfully across diverse contexts. This has direct implications for policy and practice. Efforts to strengthen early intervention should therefore extend beyond program design to include practitioner preparation, family partnership, service coordination, and culturally responsive implementation. Future research should build on this by broadening the evidence base, strengthening longitudinal and comparative work, and improving consistency in outcome reporting so that stronger cross-study synthesis can be achieved.

List of abbreviations

ECI	Early childhood intervention
ECEC	Early childhood education and care
EI	Early intervention
ERIC	Education resources information center
ESDM	Early start Denver model
JASPER	Joint attention, symbolic play, engagement, and regulation
MX	Mixed methods
PCRI-EI	Parent child relationally informed – early intervention
PRISMA	Preferred reporting items for systematic reviews and meta-analyses
PROSPERO	International prospective register of systematic reviews
QA	Quality assessment
QL	Qualitative
QN	Quantitative
RD	Research design
SLR	Systematic literature review

Acknowledgment

This research was supported by the Ministry of Higher Education (MoHE) Malaysia through the Fundamental Research Grant Scheme (FRGS/1/2024/SS10/UPSI/02/4).

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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