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Community-Based Rehabilitation for Developmental Delays in Rural Taiwan: A Mixed-Methods Evaluation of Intervention Outcomes and Implementation Challenges

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ABSTRACT: Background: Equitable access to early childhood intervention (ECI) remains a persistent systemic challenge in under-resourced and rural communities, particularly for children with global developmental delay (GDD) and attention-deficit/hyperactivity disorder (ADHD). Community-based rehabilitation programs aim to reduce this disparity by delivering services in naturalistic environments, yet empirical evidence concerning their individualized effectiveness and implementation barriers in rural settings remains limited. Grounded in Bronfenbrenner's bioecological systems theory and family-centered practice, this study aimed to evaluate the preliminary effectiveness and examine the implementation challenges of a community-based ECI program for children with developmental delays in rural Taiwan. **Methods:** A convergent mixed-methods design was employed. The quantitative phase used a single-case A-B-M (baseline, intervention, maintenance) design with three preschoolers; because the intervention was not withdrawn and reintroduced, the design is distinct from classical reversal (ABAB) withdrawal designs. Session-level target-behavior percentages were analyzed through visual analysis and complemented by the non-overlap of all pairs (NAP) and Tau-U effect-size estimates. The qualitative phase involved semi-structured interviews with eight key stakeholders—parents, special educators, therapists, social workers, and supervisors—analyzed through inductive thematic coding. **Results:** Visual analysis together with Tau-U indicated notable and sustained improvements in the three target behaviors (name writing, tripod pencil grasp, and same-different discrimination) for all three participants. Qualitative findings revealed multilevel implementation barriers, including caregivers' limited awareness of ECI resources, inconsistent intergenerational parenting strategies, shortages of multidisciplinary professionals in rural catchments, and inflexible administrative procedures. **Conclusions:** These preliminary findings suggest that community-based rehabilitation is a promising model for supporting children with developmental delays in rural contexts, while highlighting that effectiveness is constrained by family-level and service-system barriers. Policy-makers and practitioners should prioritize culturally responsive, parent-mediated training that engages co-resident grandparents, expand localized professional capacity, and streamline administrative communication.

KEYWORDS: Early childhood intervention (ECI); developmental delays; attention-deficit/hyperactivity disorder (ADHD); mixed-methods research; rural health disparities; single-case experimental design (SCED); Tau-U; parent-mediated intervention; community-based rehabilitation

1 Introduction

Child development unfolds through a sequence of age-graded tasks in which each stage builds upon competencies consolidated in the preceding one [1]. Children whose progression is disrupted—whether by biological vulnerability, delayed acquisition of milestones, or environmental adversity—may require additional supports from parents, educators, and allied professionals to catch up with age-appropriate expectations [2,3]. Early intervention services are designed to provide such supports during this plastic developmental window, with substantial downstream benefits for cognitive, social, and adaptive functioning across the life course [4–7]. Under the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), global developmental delay (GDD) is characterized by significant delay across two or more developmental domains—cognitive, motor, communication, social, and self-care—whereas attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental condition marked by impairing levels of inattention, hyperactivity, or impulsivity that interfere with participation across everyday settings [8]. The present study is framed by Bronfenbrenner’s bioecological systems theory, which conceptualizes child development as the joint product of proximal processes within the microsystem (child, family, and caregivers) and the broader mesosystem and exosystem (community services and policy), and by family-centered practice, which positions caregivers as active interventionists rather than passive recipients of professional services.

The effectiveness of early intervention has been documented across diverse diagnostic populations. For autism spectrum disorder (ASD), Smith et al. [9], Smith et al. [10], and Vietze and Lax [11] used applied behavior analytic strategies to plan and deliver individualized training, reporting notable improvements in cognition, language, and autism-related symptoms. Callanan et al. [12], Ozcan and Cavkaytar [13], Rollins et al. [14], Wang [15], Wetherby and Woods [16], and Ghebre et al. [17] applied community-based parent-implemented models and reported progress in motor skills, language expression, and comprehension, together with reduced parent–child relational stress and enhanced parenting self-efficacy. By contrast, Green et al. [18] compared therapist-delivered, group-based, and parent-mediated interventions for ASD and found that parenting stress did not decline meaningfully over time. Comparable evidence has also accumulated for children with developmental delay and ADHD more broadly: parent-mediated programs have been shown to improve behavioral regulation, attention-related functioning, and parent–child interaction quality in preschoolers with GDD or ADHD symptomatology [19–22]. These cross-diagnostic findings support extending community-based, parent-mediated models beyond ASD to the heterogeneous population of children with developmental delays served in the present study. This extension is supported by recent evidence that parent-implemented programs can improve developmental outcomes among children with GDD and that caregiver-implemented language interventions benefit young children with language impairment or developmental risk [23,24].

Extensive literature indicates that early intervention significantly enhances children’s developmental trajectories across multiple domains, including motor proficiency, linguistic and communication abilities, activities of daily living, and socio-emotional functioning. Furthermore, such interventions mitigate family-related stress and substantially reduce long-term educational and societal expenditures [9–16,25–29].

In the context of Taiwan, the 2019 amendment to the Special Education Act stipulates the provision of early intervention services for children with disabilities starting at two years of age, effectively integrating medical resources for comprehensive rehabilitation, training, and therapeutic support [30]. Concurrently, the Protection of Children and Youths Welfare and Rights Act mandates that government entities, alongside public and private institutions, deliver essential services and support frameworks for vulnerable children. These provisions encompass protection, counseling, therapy, early intervention, disability rehabilitation, and specialized assistance [31]. Together, these legislative frameworks highlight the national commitment to prioritizing early intervention.

Empirical evidence suggests that situating early intervention services within community settings facilitates greater access to essential resources and support systems for children with developmental delays and their families. Furthermore, community-based programs foster deeper social integration and interaction, thereby strengthening the functional competencies and overall resilience of both the children and their family units [10,14,17,32–37]. However, in Taiwan, the distribution of early intervention resources varies significantly by region, leading to inconsistent quality and inadequate accessibility. Families living in remote areas with children who have developmental delays often encounter challenges in accessing these resources, incurring substantial time and transportation costs [38]. Systematic reviews of telehealth and telepractice further suggest that remote coaching can partially compensate for geographical barriers when families receive structured support and feedback [39–41]. To mitigate these systemic geographical disparities, recent global literature has increasingly emphasized the integration of telehealth and remote parent-coaching models as essential pathways to deliver accessible, community-based care [42]. The government has acknowledged the insufficient provision of early intervention services and the unequal distribution of medical and educational resources. In 2009, the Ministry of the Interior collaborated with private organizations to implement a community rehabilitation service plan and proposed the “Implementation Plan for Community Rehabilitation Services for Children with Developmental Delays” in 2011, prioritizing remote areas without resources related to early intervention services. This program utilizes a professional, multidisciplinary approach to provide parents with home intervention strategies to support children with developmental delays within the home [43,44]. Additionally, this program offers simple rehabilitation techniques and home assistive device recommendations for primary caregivers, focusing on cultivating the self-care abilities of children with developmental delays, establishing family support systems, improving family functioning, and fostering a community care model [43]. Lin [32] found that providing remote community rehabilitation programs with multidisciplinary teams enables primary caregivers to learn home-based intervention methods and skills. Nevertheless, the implementation of community-based rehabilitation services in remote areas encounters multifaceted barriers. These include logistical and transportation constraints, inadequate dissemination of service information, suboptimal parental engagement, and a critical scarcity of qualified professionals [45]. Consequently, the present study seeks to evaluate the efficacy of remote community rehabilitation programs for children with developmental delays. Furthermore, it aims to elucidate the specific challenges experienced by both parents and practitioners, ultimately providing evidence-based recommendations to optimize the delivery and impact of these interventions.

2 Literature Review

2.1 Service Models in Early Intervention

Bailey and Wolery [46] conceptualize early intervention as specialized professional services directed toward children with developmental delays—spanning from birth to six years of age—and their families. Encompassing education, therapeutics, preventive measures, and family advocacy, these multi-tiered services

are meticulously individualized to accommodate the unique requirements of each family unit. The primary objectives are to optimize the cognitive, linguistic, motor, and socio-emotional developmental domains of the children, while simultaneously fostering familial resilience and adaptive capacities. Ultimately, such comprehensive interventions serve to mitigate broader societal expenditures and safeguard the fundamental rights of the child [29,46,47].

The models of early intervention can be categorized into hospital-based, center-based, and home-based settings. Hospital-based early intervention programs aim to provide integrated care, improve health outcomes for infants and toddlers under three years old with developmental delays or at high risk, and offer support to families and primary care providers [48]. The center-based early intervention model is highly specialized and serves infants and young children with developmental delays, involving a transdisciplinary team that assesses their needs and formulates intervention goals and Individualized Family Service Plans (IFSPs). Vietze and Lax [11] provided center-based early intervention services for 106 ASD children, using applied behavior analysis procedures for intervention. The results showed significant improvements in the cognition, communication, motor, social-emotional, and adaptive behaviors of children with ASD. Additionally, home-based early intervention programs, known as “family-centered services”, focus on meeting family needs and enhancing functionality to improve developmental outcomes for children with developmental delays [49]. McBride et al. [50] asserted that family-centered services emphasize supporting family decisions and aim to improve family functioning. For example, Callanan et al. [12] used the Parent-Child Relationally Informed Early Intervention (PCRI-EI) theory to conduct a 12-week AB experiment with four children with disabilities. The results found that parental stress and parent-child relationship pressure are significantly reduced, and parents’ sense of competence is enhanced considerably. Callanan et al. [51] found that, through the experience of 14 therapists participating in The Parent Child Relationally Informed–Early Intervention (PCRI-EI) program, parents were active partners in therapy and brought family background and expectations into the goal-setting process to build a family-centered, therapeutic partnership. In addition, Meadan et al. [52] used video demonstration methods to train and coach three pairs of ASD parents and children. The results showed that all three parents learned to implement naturalistic teaching strategies. Moreover, ASD’s communication skills have also improved. Hughes-Scholes et al. [53] conducted a study of five professionals and nine families in early intervention programs. Results showed that professionals’ knowledge, understanding, confidence, and home visiting skills increased, and they had positive attitudes towards implementing the model. It can be seen that home-based early intervention programs, through training of parents and professionals and home visits by professionals, can support parents in implementing effective intervention strategies in the natural environment and promote the development of young children with disabilities [52,53]. Recent scoping and qualitative evidence further shows that caregiver coaching is most effective when providers use explicit modeling, guided practice, feedback, and joint planning, while also addressing caregivers’ perceived barriers and contextual constraints [54,55]. Movahedazarhouli [56] also examined parent-implemented interventions and family-centered service delivery approaches in early intervention and early childhood special education. The review found that parent-implemented interventions can improve children’s communication, social interaction, adaptive behavior, and developmental skills, while also enhancing parents’ confidence, knowledge, and engagement in the intervention process. Furthermore, robust systematic reviews and longitudinal randomized controlled trials strongly corroborate that parent-mediated interventions (PMI) yield enduring improvements in children’s social communication skills and adaptive behaviors over time [57,58]. Related reviews of family-mediated and play-based interventions

likewise report positive effects on social communication, language, and engagement outcomes in preschool-aged autistic children [59–61].

Secondly, Ridout and Eldevik [62] found that adaptive functioning, intellectual functioning, and core autism symptoms were the most important domains that assess the effectiveness of Early Intensive Behavioral Interventions (EIBI) for children with autism. Ozcan and Cavkaytar [13] learned teaching skills through a parent training program and successfully taught three young children with ASD and intellectual disabilities to acquire toileting skills. Early Social Interaction (ESI) is an intervention model implemented by parents. It teaches parents to select individualized goals from daily life to implement teaching. Wetherby and Woods [16] used a quasi-experimental research method to evaluate 17 children who entered ESI at the age of 2. The social communication skills of children with ASD were found to be significantly improved in 11 of the 13 social communication skills. Sone et al. [63] analyzed the effectiveness of seven Caregiver-Implemented Interventions in early intervention (EI) and also found that coaching parents to provide immediate feedback and to problem-solve in real time was more effective than traditional teaching methods.

2.2 Community-Based Services for Developmentally Delayed Children

Community-based early intervention programs are aimed at children under six who have abnormalities or are expected to have abnormalities in various developmental areas. It adopts a child-centered and multi-professional cooperation model to provide holistic services for children and families, encourage community residents to participate, and establish a community support system [64]. The Nova Scotia Early Intensive Behavior Intervention Model (NS EIBI) emphasizes that behavioral intervention for ASD is feasible and sustainable in community settings. It combines parent training and naturalistic one-to-one behavior intervention employing Pivotal Response Treatment (PRT). Smith et al. [9] conducted a 12-month intervention on 45 children with ASD and found positive growth in language, cognition, and adaptive behavior. Smith et al. [10] reported that 108 children with ASD participated in the EIBI program and used PRT combined with positive behavioral support. The results also showed significant improvements in key language and cognitive outcomes and significant reductions in behavioral problems and autism symptom severity in the high-functioning group. Secondly, the Early Start Denver Model (ESDM) is an early intervention model directly conducted by therapists and is widely used in ASD. It can be in one-on-one, group (G-ESDM), and through parent coaching (P-ESDM). A randomized community-based feasibility trial of modified ESDM also indicates that naturalistic developmental behavioral interventions can be adapted for community service systems, although implementation demands remain substantial [65]. Green et al. [18] compared the effects of individual, group, and parent-delivered interventions on the development of ASD and the mental health of their parents with 53 children aged 17–44 months. The intervention lasted 10 months, and the results showed that children in different groups had significant progress in cognitive skills and adaptive behaviors. Still, parents' parenting stress did not decrease over time. Ghebre et al. [17] investigated the impact of community-based interventions on the quality of life of 228 families in Zambia with both physical and mental disabilities. The study found that physical therapy was the most important predictor of emotional, physical, and disability-related support. Community caregiver visits and play groups were key factors in improving emotional quality of life. Tollan et al. [29] found that effective early intervention systems typically include early identification, timely access to services, collaboration among professionals, and active family involvement. In addition, the authors highlighted that high-quality early intervention services can positively support children's developmental outcomes and family well-being. Large-scale and community-partnered implementation studies have shown that brief parent-mediated

interventions can be delivered with acceptable feasibility in community systems when providers receive structured training and follow-up support [66–69].

Lin [32] indicated that the community-based early intervention model in Miaoli County incorporates both one-on-one and group-based service formats. This approach develops individualized service plans tailored to the specific needs of children and their families, leveraging a multidisciplinary team to integrate resources and enhance children's developmental trajectories. Furthermore, the model implements family-centered intervention strategies to cultivate parents' comprehension of and support for early intervention. Regarding Taitung County, Lin [32] further highlighted the establishment of community centers that deliver consistent intervention programs through multidisciplinary collaboration. These centers have successfully constructed a parent support network and routinely conducted infant developmental screenings, thereby raising local authorities' awareness and augmenting the frequency of such screenings.

Despite these structured models, a substantial body of literature has documented systemic barriers and operational challenges within early intervention services. For instance, Greenwood et al. [37] investigated the perspectives of 16 parents and 24 caregivers regarding community-based early childhood education for preschoolers with disabilities, identifying critical constraints such as economic limitations, a lack of professional expertise, and inadequate policy backing. Wang [15] delineated institutional hurdles, categorizing them into domains of curriculum and pedagogy, interdisciplinary collaboration, parental engagement, and administrative resource allocation. Similarly, Valverde et al. [26] evaluated Taiwan's home-based services, pinpointing deficiencies that encompass personnel shortages, unregistered service recipients, ambiguous operational standards, logistical difficulties exacerbated by extensive service areas, and financial pressures.

Additional research corroborates these structural challenges across various contexts. Ko [70] outlined policy and administrative bottlenecks, including suboptimal policy promotion, inadequate service frequency, flawed assignment indicators and tendering processes, service delivery gaps, personnel retention issues, and parental over-reliance. Specifically focusing on rural contexts, Hong [45] emphasized geographical and temporal constraints, challenges in service advocacy, passive parental engagement, and a critical scarcity of professionals. Lien [71] highlighted service dilemmas such as intra-familial conflicts, insufficient foundational professional knowledge, and obstructive parental attitudes. Huang [34] reported constraints related to resource scarcity, time limitations, curriculum gaps, concerns over speech development, and parental stress. Finally, institutional reports, such as those from the Theresa Opportunity Center [72], have cited operational obstacles encompassing personnel training deficits, skewed parental perceptions, suboptimal learning environments, household interference, equipment management issues, safety concerns, and challenges in team integration.

Evidently, community-based rehabilitation programs emphasize providing professional support for children with developmental delays within naturalistic settings. These models are strategically designed to foster inclusive peer interactions, promote engagement in routine community activities, and integrate supplemental community resources [9,10,64,73]. Within Taiwan, this intervention has been actively implemented across remote and under-resourced regions. Consequently, the empirical findings of the present study aim to furnish policymakers with the robust evidence necessary to further scale and promote this intervention model.

Accordingly, the primary objective of this research is to evaluate the effectiveness and implementation challenges of community-based rehabilitation programs for children with developmental delays. To achieve this, the study is guided by the following research questions: (1) What is the immediate effectiveness of the community-based rehabilitation program? (2) To what extent are the intervention outcomes maintained

over time? (3) What programmatic challenges are identified from the perspective of parents? (4) What implementation barriers are encountered from the perspective of early intervention practitioners?

3 Methods

3.1 Research Structure

Because of the substantial individual variability and small population sizes typical of children with developmental delays, randomized group comparisons are often impractical. Non-randomized studies (NRS) nonetheless provide meaningful evidence about the effects of complex public-health and educational interventions, particularly when randomization is unethical or infeasible [74–76]. Single-case experimental designs (SCEDs) offer strong internal validity through repeated within-participant comparisons and are widely recognized as evidence-based methods in special education research [77,78]. Accordingly, this study employed an A-B-M (baseline–intervention–maintenance) single-case design. It is important to clarify that the A-B-M design is not a classical reversal or withdrawal design: although the word ‘withdrawal’ has been used in earlier Taiwanese literature to describe the fading of therapist contact after the intervention phase, the intervention itself was not withdrawn and reintroduced as in the ABA or ABAB paradigms [78]. The A-B-M structure is more accurately described as a pre-experimental single-case design that evaluates immediate intervention effects ($A \rightarrow B$) together with their short-term maintenance once direct instruction is faded ($B \rightarrow M$). Each participant received three months of community-based rehabilitation services, with a one-hour session per week, totaling twelve sessions. The first 30 min involved direct intervention with the preschoolers, and the second 30 min provided strategic guidance to the parents. Target behaviors were individualized and defined operationally before baseline. A task-analysis teaching approach was combined with a four-step instructional sequence (explanation $\rightarrow$ demonstration $\rightarrow$ assistance $\rightarrow$ automation) and a graded reinforcement schedule, as detailed in Section 3.3. During the baseline phase, the target behavior was observed on at least three occasions prior to any intervention contact; once baseline data were judged stable on visual inspection, participants entered the intervention phase and received at least eight individual intervention sessions. The maintenance phase observed the target behavior across four weeks after direct instruction was faded, with at least four observations per participant. A qualitative strand of semi-structured interviews with parents, special education teachers, and community rehabilitation professionals ran concurrently, guided by a semi-structured interview outline developed from the literature and field experience, as shown in Fig. 1.

3.2 Participants

In line with the study purpose, recruitment proceeded in two stages. The first stage enrolled three young children in a single-case A-B-M (baseline-intervention-maintenance) design. Purposive sampling applied two inclusion criteria: (1) the child resided in a designated remote area of New Taipei City and held an official certificate of developmental delay; and (2) the child’s family was enrolled in the local community rehabilitation service program and had provided written informed consent. All three children attended local kindergartens but had restricted access to medical, special education, and social-welfare resources because of geography, and were therefore eligible for the ‘New Taipei City Government Subsidy Community Rehabilitation Service Program for Children with Developmental Delays’. Services were delivered at local childcare centers and health clinics, naturalistic community settings that form part of the children’s and caregivers’ everyday routines. The second stage comprised a qualitative strand; interview participants included parents, special education teachers, therapists, social workers, and supervisors ($N = 8$).

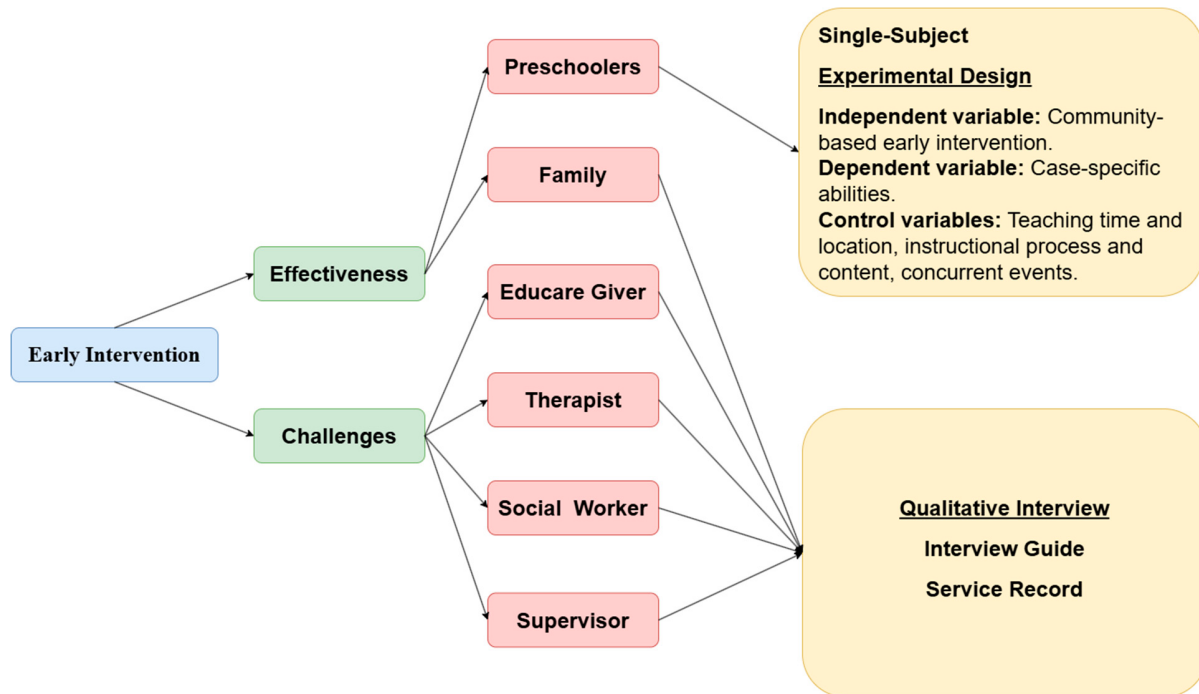


Figure 1: Research Structure.

3.2.1 Participant A

Participant A is a 5-year-old male—the elder of two children in his family—diagnosed with mixed developmental delay and attention-deficit/hyperactivity disorder (ADHD). Currently enrolled in a senior kindergarten program, he frequently exhibits behavioral challenges, including impulsivity and rule non-compliance. Furthermore, he demonstrates passive engagement during educational activities and experiences pronounced deficits in sustained attention, particularly within group settings. Prior to the intervention, baseline assessments administered via the Early Intervention and Early Childhood Special Education Curriculum Guide: Assessment Manual [79] indicated that Participant A's scores across eight developmental domains ranged from 68% to 92%. His highest proficiency was observed in sensory perception, whereas cognitive functioning emerged as his primary area of need. Given his impending transition to elementary school, collaborative goal-setting with his mother designated “writing his own name”—a specific skill within the cognitive domain—as the primary target for intervention.

3.2.2 Participant B

Participant B is a 4-year-and-8-month-old male—the elder of two male siblings in his family—diagnosed with global developmental delay and a suspected language delay. Currently enrolled in an intermediate kindergarten program, he exhibits limited expressive language skills and frequently fails to respond to educator prompts. Prior to the intervention, baseline assessments administered via the Early Intervention and Early Childhood Special Education Curriculum Guide: Assessment Manual [79] indicated that his scores across eight developmental domains ranged from 65% to 94%. His highest proficiency was observed in sensory perception, whereas fine motor skills emerged as his primary area of need. Having received community-based rehabilitation services for the past year, he is capable of interacting with the researchers using appropriate sentence structures when provided with adequate instructional guidance. Given his limited engagement in grasping and pre-writing activities at home—skills prerequisite for his impending transition

to elementary school—collaborative goal-setting with his mother designated “using the first three fingers to correctly hold a pen to draw or write” as the specific intervention target within the fine motor domain.

3.2.3 Participant C

Participant C is a 4-year-and-5-month-old male—the elder of two siblings in his family—diagnosed with mixed developmental delay. He exhibits significant challenges with expressive language; when responding to educator prompts, his verbal output is typically restricted to simple affirmative or negative replies (e.g., “yes”, “no”) or abbreviated phrases (e.g., “drink water”). Nevertheless, observations indicated that his ability to articulate basic needs improves substantially within familiar contexts or with acquainted individuals, as evidenced by spontaneous utterances such as, “Teacher, I have done it.” Corroborating this, his mother reported enhanced communicative proficiency within the home environment, suggesting that his social interaction and verbal expression are likely inhibited in the presence of unfamiliar persons. Prior to the intervention, baseline assessments administered via the Early Intervention and Early Childhood Special Education Curriculum Guide: Assessment Manual [79] indicated that his scores across eight developmental domains ranged from 67% to 90%. His highest proficiency was observed in sensory perception, whereas cognitive functioning emerged as his primary area of need. Specifically, during instructional sessions, Participant C demonstrated difficulty discriminating between similar objects or symbols—a developmental milestone typically expected by age three. Consequently, through collaborative goal-setting with his mother, the ability to “recognize more than two objects or pictures” was designated as the primary intervention target within the cognitive domain.

3.3 Teaching Steps

Each participant received one thirty-minute intervention session per week delivered by a trained special educator at the community rehabilitation site. Participant A was scheduled on Fridays, 2:30–3:30 p.m., Participant B on Fridays, 3:30–4:30 p.m., and Participant C on Mondays, 3:00–4:00 p.m. Every one-hour block was partitioned in a standardized fashion: the first 30 min were devoted to direct child-focused instruction, and the second 30 min to structured parent coaching. To maximize cross-case consistency, each child-focused segment followed the same four-step instructional sequence (explanation → demonstration → assisted practice → automation) with the same prompt-fading hierarchy (full physical → partial physical → model → gestural → verbal → independent), retreating to a more intrusive level only if two consecutive trials were unsuccessful. Reinforcement was delivered on a continuous schedule during early acquisition trials (social praise paired with a preferred activity or token) and thinned to an intermittent schedule once the child produced three consecutive correct responses. Participant A’s target behavior was writing his name; following explanation and demonstration, physical guidance and verbal prompts were used and faded until independent production was achieved. Participant B’s target was using a tripod (first-three-finger) grasp to draw or write; after explanation and demonstration of the correct pencil posture, pens of graded thickness were used with physical guidance and verbal prompts that were systematically faded. Participant C’s target was recognizing whether two or more everyday objects or pictures were the same or different; the therapist demonstrated with familiar items and then faded from physical to verbal prompts. The parent-coaching segment that followed was structured around four components: (i) brief review of the session’s target behavior and the prompt/reinforcement sequence the child had just received; (ii) live modeling of one or two teaching routines by the therapist; (iii) guided practice by the caregiver with real-time coaching and corrective feedback; and (iv) collaborative planning of a small set of embedded

learning opportunities to rehearse at home over the following week. Caregivers were encouraged to engage co-resident grandparents in these routines whenever possible.

Session-level scoring followed the rubric of the ‘Early Intervention and Early Childhood Special Education Curriculum Guide: Assessment Manual’. During each thirty-minute intervention segment, time sampling was applied in five-minute intervals (six intervals per session). For each interval, the therapist rated the quality of the target behavior on a 5-point ordinal scale anchored from 0 (no response) to 4 (independent, stable performance). Interval scores were summed to yield a session-level raw score, which was then converted to a percentage by dividing the obtained score by the maximum possible score (24). Thus, the percentages reflect performance quality scores rather than occurrence frequencies [80]. This standardized conversion was applied identically across baseline, intervention, and maintenance phases, so that the vertical axis of Figs. 2–4 expresses the same quantity in all three phases.

3.4 Research Tools

3.4.1 Early Intervention and Early Childhood Special Education Curriculum Guide

This study employed the Early Intervention and Early Childhood Special Education Curriculum Guide: Assessment Manual, published by the First Social Welfare Foundation (2004) [79], as the primary research instrument to collect quantitative data across the baseline, intervention, and maintenance phases for the three participants. Designed to evaluate the baseline proficiencies of children with developmental delays from birth to six years of age, this instrument demonstrates robust content validity—established through expert consensus in special education and curriculum design—making it a reliable framework for both initial assessment and instructional planning. The manual’s visual profiles facilitate a clear understanding of the child’s developmental trajectory for both parents and practitioners, functioning as a critical foundation for the early intervention team when formulating the Individualized Family Service Plan (IFSP).

The assessment categorizes development into eight distinct domains: sensory perception, gross motor skills, fine motor skills, cognitive abilities, communication skills, social adaptation, activities of daily living, and leisure and recreation. Assessment items within each domain are sequenced hierarchically according to standard developmental milestones. Furthermore, each item is paired with a “developmental age reference value”, which assists practitioners in evaluating current functioning and designating appropriate intervention targets.

The scoring system employs a five-point ordinal rating scale to quantify the level of instructional prompting required for target behaviors. The rubric is defined as follows: 0 (no response), 1 (substantial prompting required), 2 (minimal prompting required), 3 (emergent skill with inconsistent performance), and 4 (independent mastery). Consequently, these scores (0–4) reflect ordered gradations of performance quality rather than binary correctness. To ensure that subsequent visual and statistical analyses operate on a consistent, scale-invariant metric, these raw ordinal scores were converted into session-level percentages using the formula detailed in Section 3.3.

3.4.2 Interviews

The authors developed an interview outline based on relevant literature on community rehabilitation services and their service experience. The interview process was conducted face-to-face between the researchers and the interviewees. The interview location was the community rehabilitation service center, and the interview time lasted from thirty minutes to one hour.

3.4.3 Research Diary

During the intervention or interview process, the authors recorded events, children's behavior, questions raised by the interviewees, and their reflections through a research diary. By writing a research diary, the authors can reflect on the entire research process, clarify, and analyze the research results.

3.4.4 Data Analysis

Data analysis proceeded in two strands. For the quantitative strand, inter-rater reliability and visual analysis were combined with effect-size estimation to evaluate intervention effects across phases. Two independent coders—the first author and a second rater, both graduates of the Department of Special Education with at least three years of community rehabilitation experience—re-scored every session from video recordings. Inter-rater reliability, computed as the percentage of interval-level agreement, was 100% at baseline and ranged from 95% to 99% during intervention and maintenance across the three participants. Visual analysis, following Kratochwill et al. [78], examined within-phase level, trend, variability, and immediacy of effect, and between-phase overlap. To complement visual analysis with a more objective estimate of intervention effects, we computed the non-overlap of all pairs (NAP) and the Tau-U effect size [77,78,81]; these metrics are reported alongside visual-analysis summaries in the results for the three participants.

For the qualitative strand, audio-recorded interviews were transcribed verbatim and checked against the recordings, preserving the phrasing of the participants to retain authenticity. Transcripts were imported into NVivo 14 (Denver, CO, USA) and coded in three progressive cycles—open, axial, and selective coding [82–84]. Two researchers independently performed open and axial coding on the full data set; coding decisions were documented in a shared codebook, and inter-coder discrepancies were resolved through iterative consensus discussion rather than by overriding one coder's judgment. Themes were derived inductively from clusters of axial codes and refined through constant comparison with the research diary and field notes; a written audit trail linked raw excerpts to codes, codes to categories, and categories to the final themes. Citations follow the convention 'data source–role–date'—for example, 'Interview–Mother A–01 January 2022' and 'Interview–Therapist A–03 April 2022'. Trustworthiness was supported by (1) member checking, in which verbatim transcripts were returned to participants for confirmation; and (2) triangulation across interview data, research diaries, and session notes to examine convergence across sources. This approach is consistent with flexible coding practices for contemporary interview research, in which iterative codebook refinement and consensus-based interpretation are used to preserve analytic transparency [85].

4 Results

4.1 Assessing Intervention Outcomes for Developmentally Delayed Toddlers

4.1.1 Participant A

During the baseline periods, Participant A could only perform basic writing strokes and simple symbol writing, such as circles and triangles. However, he did not possess the ability to write his name or related stroke concepts; the accuracy rate was only 10%. During the intervention period, the researchers designed a description learning sheet with physical assistance and gave him immediate reinforcement when he completed the task. In the later stage of the intervention, verbal prompts and reinforcements were used to reduce distractions. Participant A's name-writing ability scores ranged from 25 to 35, with an average of 32.5. As can be seen from Fig. 2, during the 5th, 7th, and 11th intervention sessions, Participant A's concentration during the intervention process was poor, and he was often distracted, resulting in a noticeable drop in

score. During the maintenance period, Participant A's ability to write his name ranged from 55 to 90, with an average of 67.5, as shown in Table 1. Especially during the 14th and 15th sessions, Participant A showed marked improvement in writing his name and achieved this goal independently without the guidance of the researchers.

Secondly, the comparison of Participant A's effectiveness between phases is shown in Table 2. From baseline to intervention, Participant A showed a mean level difference of 22.5, a positive trend direction, and 0% overlapping data, indicating notable progress in writing his name. From baseline to maintenance, the mean level difference was 57.5 with a positive trend and 0% overlap, indicating marked and sustained improvement in Participant A's ability to write his name. The NAP and Tau-U analyses for Participant A both yielded values of 1.00 for the baseline-to-intervention and baseline-to-maintenance comparisons, indicating a very strong intervention effect.

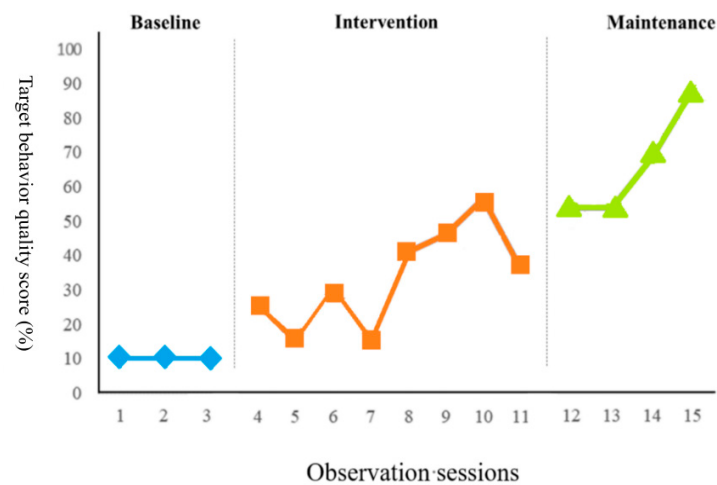


Figure 2: Participant A's Intervention Line Graph.

Table 1: Summary of Participant A's Analysis of Intra-phase Changes.

Stage	Baseline Period	Intervention Period	Maintenance Period
Length	3	8	4
Trend	Stable	Increasing	Increasing
Level average (%)	10	32.5	67.5
Level range (%)	10–10	25–35	55–90
Level stability (%)	100%	25%	25%
Level change (%)	0	10	35

Table 2: Summary of Participant A's Analysis of Inter-phase Changes.

Stage	Baseline Period/ Intervention Period	Intervention Period/ Maintenance Period	Baseline Period/ Maintenance Period
Trend direction and change	Stable to Unstable	Unstable to Unstable	Stable to Unstable
Level change (%)	10–32.5	32.5–67.5	10–67.5
Overlap rate (%)	0	50	0

4.1.2 Participant B

During the baseline period, Participant B could only compensate by using four fingers and struggled to control coloring, unable to complete related writing activities, and the accuracy rate was only 10%. After the researchers explained and demonstrated the correct pen-holding posture at the beginning of the intervention period, we provided thicker colored pens and used physical assistance to let participant B practice drawing lines, and immediately gave him reinforcement when he completed the task. In the later stage of the intervention period, verbal prompts and reinforcements were used with pens of different thicknesses to let Participant B practice coloring and line drawing. Thus, during the intervention period, Participant B's ability to correctly use the first three fingers to grasp, draw, or write ranged from 25 to 82.5, with a mean of 60.6. During the maintenance period, Participant B's ability level ranged from 55 to 72.5, with a mean of 64.4, as shown in Fig. 3 and Table 3.

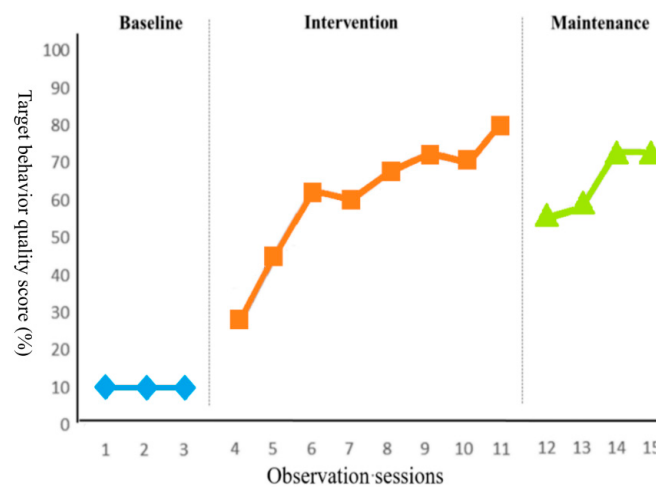


Figure 3: Participant B's Intervention Line Graph.

Table 3: Summary of Participant B's Analysis of Intra-phase Changes.

Stage	Baseline Period	Intervention Period	Maintenance Period
Length	3	8	4
Trend	Stable	Increasing	Increasing
Level average (%)	10	60.6	64.4
Level range (%)	10–10	25–82.5	55–72.5
Level stability (%)	100	37.5	100
Level change (%)	0	57.5	17.5

Secondly, the comparison of Participant B's effectiveness between phases is shown in Table 4. From baseline to intervention, Participant B showed a mean level difference of 50.6, a positive trend direction, and 0% overlapping data, indicating a notable progression in Participant B's ability to use a tripod grasp for drawing and writing. From baseline to maintenance, the mean level difference was 54.4 with a positive trend and 0% overlap, indicating marked and sustained maintenance of the tripod-grasp behavior. The NAP and Tau-U analyses both yielded values of 1.00, indicating a very strong intervention effect.

Table 4: Summary of Participant B's Analysis of Inter-phase Changes.

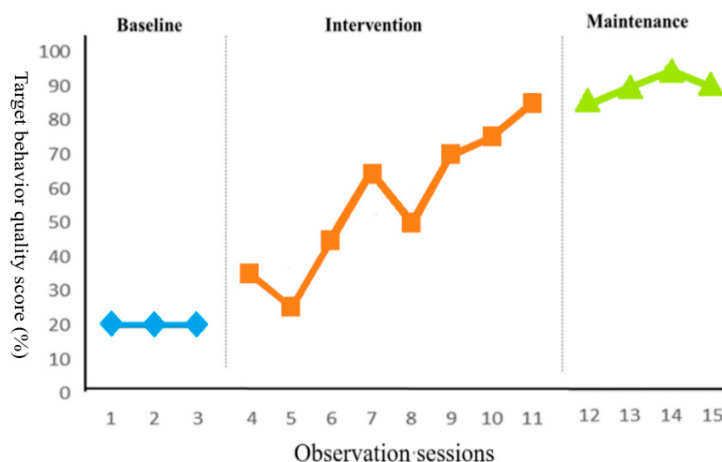
Stage	Baseline Period/ Intervention Period	Intervention Period/ Maintenance Period	Baseline Period/ Maintenance Period
Trend direction and change	Stable to Unstable	Unstable to Unstable	Stable to Unstable
Level change (%)	10–60.6	60.6–64.4	10–64.4
Overlap rate (%)	0	100	0

4.1.3 Participant C

From the results in Fig. 4 and Table 5, we found that Participant C was only 20% correct in identifying 2 or more items as the same or different during baseline. At the beginning of the intervention period, the researchers verbally explained and demonstrated the identification of two familiar objects or pictures in daily life and immediately provided reinforcement when Participant C completed the task. In the later stage of the intervention period, two or more objects or pictures in daily life are used for identification, and verbal prompts and reinforcement strategies are used. Therefore, in the intervention period, Participant C's ability to recognize whether 2 or more items are the same or different ranged from 25 to 85, with an average level of 56.3. During the maintenance period, Participant C's ability to recognize whether 2 or more items ranged from 85 to 95, with an average level of 90.

Table 5: Summary of Participant C's Analysis of Intra-phase Changes.

Stage	Baseline Period	Intervention Period	Maintenance Period
Length	3	8	4
Trend	Stable	Increasing	Increasing
Level average (%)	20	56.3	90
Level range (%)	20–20	35–85	85–90
Level stability (%)	100	25	100
Level change (%)	0	50	5

**Figure 4:** Participant C's Intervention Line Graph.

Secondly, the comparison of Participant C's effectiveness between phases is shown in Table 6. From baseline to intervention, Participant C showed a mean level difference of 36.3, a positive trend direction, and 0% overlapping data, indicating notable progression in the ability to recognize whether two or more

items or cards were the same or different. From baseline to maintenance, the mean level difference reached 70.0 with a positive trend and 0% overlap, indicating marked and sustained maintenance of same-different discrimination. The NAP and Tau-U analyses for Participant C both yielded values of 1.00 for the baseline-to-intervention and baseline-to-maintenance comparisons, also indicating a very strong intervention effect. Collectively, across the three participants, the level-change, trend, and overlap indicators—defined respectively as the difference between phase means, the direction of the best-fit line within each phase, and the proportion of intervention data points falling within the baseline range—corroborate a pattern of notable and sustained improvement.

Table 6: Summary of Participant C's Analysis of Inter-phase Changes.

Stage	Baseline Period/ Intervention Period	Intervention Period/ Maintenance Period	Baseline Period/ Maintenance Period
Trend direction and change	Stable to Unstable	Unstable to Unstable	Stable to Unstable
Level change (%)	20–56.3	56.3–90	20–90
Overlap rate (%)	0	25	0

4.2 Challenges Encountered by Parents in Participating in Community Rehabilitation Services

This section presents the interview findings from the mothers of Participants A, B, and C (hereafter referred to as Mother A, Mother B, and Mother C, respectively) to explore the difficulties parents experienced when participating in community rehabilitation services, as well as their expectations regarding possible improvements to related support systems.

4.3 Lack of Access to Relevant Rehabilitation Information

The interview findings indicated that parents living in rural communities generally have limited opportunities to obtain information related to rehabilitation and early intervention services. Most parents reported that they were unfamiliar with rehabilitation resources before their children were identified as having developmental concerns. In many cases, parents only learned about relevant services through referrals from schools, healthcare centers, or community agencies.

At the beginning, the school teacher thought there was an issue with the child and informed us that there was a foundation here offering services. I think advocacy is quite important because there are some newcomers or those who have married here. (Interview—Mother A—01 January 2022)

When I took my child to get vaccinated at the health center, the nurse gave me a developmental screening questionnaire and told me about a rehabilitation service plan for children with developmental delays in this community. (Interview—Mother B—02 January 2022)

At first, teachers and health center staff told me there was a rehabilitation service plan for children with developmental delays in the community. I had never heard of or participated in related rehabilitation services before. (Interview—Mother C—03 January 2022)

4.4 Inconsistent Parenting Approaches among Family Members

All three mothers agreed that parental involvement is a key factor influencing the effectiveness of early intervention services. However, because the participants' families lived together with grandparents or great-grandparents, differences in parenting beliefs and intervention approaches among family members were commonly observed.

Because it's rural, there are more cases of cross-generational parenting. Sometimes grandparents are not sure which is the right strategy, or they are different from the strategies implemented by parents, which can cause us great distress (Interview—Mother A—01 January 2022).

Because every family situation is different, I am happy to participate in the child's rehabilitation service plan. However, his grandparents have a more conservative concept and think that it's okay if the child talk late. The doctor told me that there was a problem with his language development (Interview—Mother C—03 January 2022).

4.5 Insufficient Professional Resources

Another major concern identified by the participants was the limited availability of professional rehabilitation resources in rural areas. All three mothers pointed out that early intervention and rehabilitation services were not adequately promoted within their communities. As a result, many parents remained unaware of available government-supported services unless they were informed by teachers or healthcare personnel. According to the parents, these professionals visited rural communities infrequently because of insufficient manpower, making it difficult for children to receive regular treatment and follow-up support.

I hope professionals can come more frequently... At the same time, I also hope to have a dedicated rehabilitation classroom, because teachers can bring more teaching aids, and children also need space for large movements. (Interview—Mother B—02 January 2022)

Many families living in rural areas cannot bring their children with developmental delays to urban areas for treatment, so I hope that physical, occupational, speech, and other therapists can come to provide treatment at least once a month instead of only once every six months. (Interview—Mother C—03 January 2022)

The researchers summarized three primary challenges encountered by parents participating in community rehabilitation services: (1) limited access to rehabilitation and early intervention information, resulting in insufficient awareness of available community resources; (2) inconsistencies in parenting attitudes and intervention strategies among family members, particularly in multigenerational households; and (3) insufficient professional rehabilitation resources, including shortages of specialized personnel and inadequate rehabilitation spaces in rural areas.

4.6 Challenges Encountered by Professionals Participating in Community Rehabilitation Services

In addition to interviewing parents, the researchers conducted interviews with special education teachers, therapists, social workers, and supervisors to explore the difficulties professionals in community rehabilitation service programs face and their perspectives on possible strategies to improve service implementation.

4.7 Parental Involvement and Self-Concept Awareness

The interview findings indicated that many professionals believed parents often lacked sufficient understanding of the purpose and concepts of community rehabilitation services. According to the professionals, inadequate awareness may result in either excessive anxiety or insufficient attention toward children's developmental conditions. In addition, limited parental participation and low confidence in their own abilities were considered important factors influencing the effectiveness of intervention implementation.

Practitioners observe that within the context of community-based rehabilitation, parents frequently demonstrate a limited comprehension of the service model's core concepts. This cognitive gap often manifests as either undue anxiety or apathetic detachment. Suboptimal parental engagement further exacerbates these

dynamics. Furthermore, a persistent misconception among parents is viewing intervention strictly as the exclusive domain of professionals, rather than recognizing their own capacity as active, direct implementers. This passive reliance significantly undermines the overall efficacy of the rehabilitation programs.

Most families in this rural area have cross-generational education and do not pay much attention to early intervention services, some may have difficulty understanding written instructions. Therefore, it is difficult to ask grandparents to go home and teach young children to practice relevant skills. (Interview—Special Education Teacher—01 April 2022)

Currently, many parents still don't understand their child's situation. So, I think raising awareness on this aspect of children with developmental delays is necessary... Even parents find out too late that their children need early intervention services. (Interview—Therapist A—03 April 2022)

Most parents who face early intervention problems tend to blame themselves first. Secondly, they will have worries and fears, so cultivating parents' self-confidence is the most important thing. Most parents want early intervention services in the community because they think it is impossible to fulfill the teacher's requirements at home. Secondly, parents also think that I am not a professional, so there must be no problem in leaving their children to professionals. (Interview—Social Worker—04 April 2022)

4.8 Time and Human Resource Constraints among Professional Personnel

Another challenge identified by professionals was the shortage of available manpower and the difficulty of allocating sufficient time for community rehabilitation services. Because many service cases were located in remote rural areas, long travel distances and transportation demands placed additional physical and psychological burdens on frontline personnel, thereby affecting service quality and frequency.

For some older special education teachers, their physical strength is limited. I feel that doing three cases in a day plus driving is already the limit. Since driving for long periods can affect mental health, I think it would be better to have a fixed schedule. (Interview—Special Education Teacher—01 April 2022)

In the process of community rehabilitation services, I found that some cases had speech and movement problems, which required the cooperation of multiple professionals or medical examinations. However, due to a lack of manpower, I can only provide my own expertise to the parts that this child needs. (Interview—Therapist A—02 April 2022)

I am only a part-time therapist. I work in the hospital from Monday to Friday. I can only participate in the community rehabilitation service program on Saturdays or Sundays. Therefore, the number of cases I can receive is not large, and the frequency of services is not high. Secondly, except for special education teachers, most therapists provide professional evaluation and consultation only once every six months for each case. Therefore, many parents may not inform their children's condition in detail, so it is difficult to give them specific suggestions. (Interview—Therapist B—03 April 2022)

4.9 Communication and Processes with Administrative Systems

Professionals also reported that inconsistencies between administrative regulations and practical implementation created additional challenges during service delivery. In particular, delays in administrative procedures and communication difficulties within government systems often affect the efficiency and flexibility of community rehabilitation services.

Due to the relevant regulations of “The New Taipei City Government’s subsidized community rehabilitation service program” and the bureaucracy of the administrative system of government agencies, there are often delays in the application process, approval date, and time for professionals to start providing services for community rehabilitation service programs. For example, in the case of fund disbursement operations, the administrative system may not complete the process, resulting in the inability to disburse funds. Smaller foundations like ours may not have sufficient funding allocation for frontline professional personnel, and this situation will affect the execution of the service plan. (Interview—Supervisor—05 April 2022)

I feel that sometimes communication with the administrative system is not smooth. Like recently, with the epidemic getting worse, I once asked whether everything would be switched online, or what measures would be taken? However, the administrative system did not immediately respond. (Interview—Supervisor—07 April 2022)

In summary, the researchers summarized four major challenges currently faced by professionals participating in community rehabilitation services: (1) limitations in resource allocation affecting practical implementation and intervention effectiveness; (2) insufficient parental involvement and awareness of self-concepts, which hinder the implementation of rehabilitation strategies; (3) difficulties related to time management, transportation, and manpower shortages among professional personnel; and (4) inflexible administrative procedures and communication barriers within the service system, which negatively affect service coordination and implementation.

5 Discussion

This study delivered community-based early intervention services for children with developmental delays in naturalistic settings embedded within local childcare centers and health clinics, which integrate community medical and welfare resources. Across the three participants, baseline-to-intervention overlap was 0% and trend direction was consistently positive; although Participant A’s performance dipped twice because of within-session distraction, all three children achieved notable gains on their individualized targets, and the gains were sustained during the maintenance phase. Considered together with the Tau-U estimates reported in Tables 2, 4 and 6, these preliminary findings suggest that the community-based rehabilitation model is a promising approach for supporting children with developmental delays in rural settings. However, because the evidence is based on three individualized single-case series with a short intervention period, the results should be interpreted as preliminary rather than definitive, and the claim is best framed as a plausible, individually tailored effect rather than a population-level conclusion.

This result is also consistent with the research results of Smith et al. [9], Smith et al. [10], Rollins et al. [14], and Wang [15]. Smith et al. [9] and Smith et al. [10] conducted behavioral interventions combined with parent training on children with ASD in community settings. The results showed that children with ASD showed improvements in language, cognition, and adaptive behavior, and these results were achieved through a model based on a low-cost community rehabilitation services program. Rollins et al. (2016) is also a community-based early intervention program; intervention staff make weekly home visits and interact with parents face-to-face [14]. The results also showed noticeable effects on eye contact, social participation, and language interaction in children with ASD. Wang [15] also established a community-based early intervention program, with parents of children with developmental delays as the primary service targets and cross-professional collaboration to support parents [15]. After 7–20 months of intervention, most children’s motor skills, language expression, and comprehension abilities were noticeably improved.

Secondly, according to the results of this study, the average scores of participants A, B, and C during the intervention period did not reach 100%. This may be because the intervention period lasted only two months, and the number of sessions was only eight. In comparison, the intervention periods in Smith et al. [9] and Smith et al. [10] lasted as long as one year, and the intervention in Wang [15] extended from 7 to 20 months; the results of these studies were more favorable compared to the present study.

The interview data echo and extend the quantitative findings. These implementation challenges are consistent with recent caregiver-perception and telehealth parent-training literature, which shows that caregiver confidence, provider-caregiver relationships, and practical support structures shape whether home practice is sustained beyond professional contact [54,55,86]. Because the families live in remote areas, parents reported insufficient information about early intervention and limited familiarity with community-based programs; in addition, inconsistent parenting attitudes and strategies across family members—especially between parents and co-resident grandparents—appeared to dilute the intensity of home rehearsal, which in turn offers one plausible explanation for why the session-level percentages during the intervention phase plateaued below 100%. At the service-system level, shortages of multidisciplinary professionals, constrained funding, and rigid administrative workflows further limited the dosage and flexibility of the program. These patterns replicate prior findings from Hong [45], Huang [34], Lin [32], Bhrasadiya et al. [87], and Haine-Schlagel et al. [19], and align with international evidence that cultivating parental self-efficacy and delivering culturally responsive, self-directed training are pivotal for sustaining family engagement in community-based programs [19–22]. For example, Sone et al. [63] found that coaching parents to provide immediate feedback and problem-solving is an effective early intervention strategy. Differentiating by professional role, special educators emphasized travel burden and restricted teaching space; therapists highlighted constraints on availability because of concurrent hospital duties and the need for multidisciplinary referrals; social workers and supervisors foregrounded administrative friction and gaps in information transmission. This role-specific patterning points to the need for interdisciplinary, role-tailored support rather than uniform capacity-building. Taken together, these findings position caregiver empowerment and administrative streamlining as the central levers for improving implementation fidelity in rural community rehabilitation.

Professionals further highlighted that many cases reside in remote areas, so travel time and physical exertion directly affected the quality of service delivery—a finding consistent with Hong [45] and Lin [32], who reported that both professional headcount and available service hours were insufficient. Similarly, administrative delays in application review and communication gaps between administrative and implementation units appeared to attenuate service quality, echoing Sapiets et al. [88] and Lin [32].

Existing literature indicates that while mothers typically serve as the primary participants in early intervention (EI)—focusing heavily on the child’s linguistic, behavioral, and socio-emotional development [89]—paternal involvement significantly enhances intervention outcomes and helps alleviate the constraints associated with exclusive maternal participation [89–92]. Given the community-based nature of the EI program examined in this study, mothers may encounter participation barriers due to occupational or caregiving demands. Therefore, encouraging inter-parental coordination and alternating participation is vital for optimizing intervention efficacy.

Furthermore, drawing upon the empirical findings, both parents and professionals articulated several actionable recommendations. These include amplifying EI advocacy to bridge parental information gaps and equipping caregivers with pragmatic parenting strategies for daily implementation. Stakeholders also recommended relaxing spatial restrictions on interventions, thereby empowering professionals to leverage community facilities and foster the social integration of children with developmental delays. To

address workforce shortages, expanding personnel quotas and allocating sufficient budgets for qualified professionals is imperative. Moreover, streamlining administrative communication protocols is proposed to ensure implementing agencies receive precise directives, consequently minimizing service disruptions. This echoes the assertions of Haine-Schlagel et al. [19], who emphasized the necessity for EI program leaders and administrative systems to enhance communication and institutionalize data-tracking mechanisms. Finally, the development of comprehensive informational brochures is advised to facilitate parents' comprehension of available services, a strategy that strongly aligns with the collective recommendations of the participants in this study.

This study has several limitations that should temper the interpretation of its findings. First, only three children who participated in the New Taipei City community rehabilitation service program were studied, and the findings should not be generalized to other service systems without additional replication. Second, the intervention period was relatively short—approximately twelve thirty-minute sessions over three months—which may have limited how far session-level percentages could rise within the intervention phase and constrained conclusions about long-term sustainability and generalization; future studies with longer and more intensive intervention periods are warranted. Third, the qualitative strand drew primarily on parents and service-delivery professionals; the perspectives of co-resident grandparents, who in this rural sample often served as day-to-day caregivers, were not directly captured. Future research should incorporate grandparents and other key caregivers as interview participants to more fully represent the intergenerational parenting context. Fourth, consistent with single-case experimental designs, the study relied on visual analysis and non-overlap effect sizes rather than inferential statistics; accordingly, wording such as 'noticeable' has been avoided in favor of 'notable' and 'marked'. Finally, parent participation was not itself an independent variable, and changes in family functioning or parenting self-efficacy were not formally measured; future work should link child-level outcomes to caregiver-level indicators to clarify the mechanism of action of community-based, parent-mediated intervention.

6 Conclusions

Using a single-case A-B-M design complemented by semi-structured interviews, this study examined the preliminary effectiveness and implementation challenges of a community-based rehabilitation program for three children with developmental delays in rural Taiwan. All three participants achieved notable and sustained improvements on their individualized target behaviors—name writing, tripod pencil grasp, and same-different discrimination—with consistently positive trend direction, 0% overlap between phases. For Participants A, B, and C, both NAP and Tau-U values reached 1.00 in the baseline-to-intervention and baseline-to-maintenance comparisons, indicating complete non-overlap between phases and very strong intervention effects.

The interviews clarified that these gains are embedded in—and constrained by—a set of recurring implementation barriers: (1) limited parental awareness of early intervention resources in rural catchments; (2) inconsistent parenting strategies across co-resident family members, especially between parents and grandparents; (3) shortages of local multidisciplinary professionals and restricted physical space; and (4) rigid administrative processes that introduce delays in service delivery. The main contribution of this study is therefore to link child-level single-case evidence with service-system evidence in the same sample, demonstrating that community-based rehabilitation can produce meaningful individual-level change while pinpointing the levers—caregiver empowerment (including grandparent engagement), expansion of local professional capacity, and streamlined administrative communication—that will determine whether such gains are realized at scale. These findings also carry implications for early developmental screening:

strengthening rural outreach and intergenerational caregiver education is likely to raise both the detection and the effective uptake of early intervention for children with developmental delays.

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Availability of Data and Materials: The data presented in this study are available upon reasonable request from the corresponding author, due to restrictions related to privacy, legal, and ethical considerations.

Ethics Approval: The protocol for this research was reviewed and confirmed to meet the criteria for ethical review exemption on 12 July 2021, by the Sanxia Disability Welfare Service Center (affiliated with the Eden Social Welfare Foundation). This exemption aligns with the Ministry of Health and Welfare’s directive regarding the “Scope of Human Research Exempt from Ethical Review by Institutional Review Boards” (Directive No. 1010265079, issued 05 July 2012; <https://www.cdc.gov.tw/Category/ListPage/tTG8SBJmXOyepzL2GdTcPg>). Written informed consent was obtained from all participants prior to their inclusion in the study. All procedures involving human participants were conducted in accordance with the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2017), the Declaration of Helsinki (World Medical Association, 1964), and subsequent amendments or comparable ethical standards.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Xiao SZ. Introduction of human development. Taipei, Taiwan: Yongda; 2018 [cited 2026 May 1]. Available from: <https://www.sanmin.com.tw/product/index/013265557>. (In Chinese).
2. Landry SH, Smith KE, Swank PR, Miller-Loncar CL. Early maternal and child influences on children’s later independent cognitive and social functioning. *Child Dev.* 2000;71(2):358–75. [CrossRef].
3. Dott J, Licandro U. Multiple views, sobering outcomes: A systematic review on the participation of children with disabilities in early childhood education and care. *Front Educ.* 2025;10:1666615. [CrossRef].
4. Dunst CJ. Rethinking early intervention. *Anal Interv Dev Disabil.* 1985;5(1–2):165–201. [CrossRef].
5. Dunst CJ. Revisiting “rethinking early intervention”. *Top Early Child Spec Educ.* 2000;20(2):95–104. [CrossRef].
6. Black MM, Walker SP, Fernald LCH, Andersen CT, DiGirolamo AM, Lu C, et al. Early childhood development coming of age: Science through the life course. *Lancet.* 2017;389(10064):77–90. [CrossRef].
7. Guralnick MJ. Early intervention for children with intellectual disabilities: An update. *J Appl Res Intellect Disabil.* 2017;30(2):211–29. [CrossRef].
8. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. Washington, DC, USA: American Psychiatric Association; 2013. [CrossRef].
9. Smith IM, Koegel RL, Koegel LK, Openden DA, Fossum KL, Bryson SE. Effectiveness of a novel community-based early intervention model for children with autistic spectrum disorder. *Am J Intellect Dev Disabil.* 2010;115(6):504–23. [CrossRef].
10. Smith IM, Flanagan HE, Garon N, Bryson SE. Effectiveness of community-based early intervention based on pivotal response treatment. *J Autism Dev Disord.* 2015;45(6):1858–72. [CrossRef].

11. Vietze P, Lax LE. Early intervention ABA for toddlers with ASD: Effect of age and amount. *Curr Psychol*. 2020;39(4):1234–44. [CrossRef].
12. Callanan J, Ronan K, Signal T. Activating parents in early intervention: Preliminary findings from an empirical case study. *Int J Disabil Dev Educ*. 2020;67(1):1–17. [CrossRef].
13. Ozcan N, Cavkaytar A. Parents as teachers: Teaching parents how to teach toilet skills to their children with autism and mental retardation. *Educ Train Dev Disabil*. 2009;44(2):237–43. [CrossRef].
14. Rollins PR, Campbell M, Hoffman RT, Self K. A community-based early intervention program for toddlers with autism spectrum disorders. *Autism*. 2016;20(2):219–32. [CrossRef].
15. Wang TM. Effectiveness of a parent support program for families with developmentally delayed children aged 0 to 3 years. *Bull Spec Educ*. 2013;38(2):1–28. [CrossRef].
16. Wetherby AM, Woods JJ. Early social interaction project for children with autism spectrum disorders beginning in the second year of life: A preliminary study. *Top Early Child Spec Educ*. 2006;26(2):67–82. [CrossRef].
17. Ghebre M, Hepperlen R, Biggs J, Lunda E, Mwandileya W, Rabaey P, et al. Community-based interventions improve the quality of life for children living with disabilities, Zambia. *Child Care Health Dev*. 2026;52(1):e70203. [CrossRef].
18. Green CC, Bent CA, Smith J, Chetcuti L, Uljarević M, Pye K, et al. An evaluation of child and parent outcomes following community-based early intervention with randomised parent-mediated intervention for autistic pre-schoolers. *Child Youth Care Forum*. 2024;53(5):1213–33. [CrossRef].
19. Haine-Schlagel R, Brookman-Frazee L, Janis B, Gordon J. Evaluating a learning collaborative to implement evidence-informed engagement strategies in community-based services for young children. *Child Youth Care Forum*. 2013;42(5):457–73. [CrossRef].
20. Ingersoll B, Wainer A. Initial efficacy of project ImPACT: A parent-mediated social communication intervention for young children with ASD. *J Autism Dev Disord*. 2013;43(12):2943–52. [CrossRef].
21. Nefdt N, Koegel R, Singer G, Gerber M. The use of a self-directed learning program to provide introductory training in pivotal response treatment to parents of children with autism. *J Posit Behav Interv*. 2010;12(1):23–32. [CrossRef].
22. Stahmer AC, Brookman-Frazee L, Rieth SR, Stoner JT, Feder JD, Searcy K, et al. Parent perceptions of an adapted evidence-based practice for toddlers with autism in a community setting. *Autism*. 2017;21(2):217–30. [CrossRef].
23. Dong P, Xu Q, Zhang Y, Li DY, Zhou BR, Hu CC, et al. A multicenter clinical study on parent-implemented early intervention for children with global developmental delay. *Front Pediatr*. 2023;11:1052665. [CrossRef].
24. Finestack LH, Elmquist M, Kuchler K, Ford AB, Cakir-Dilek B, Riegelman A, et al. Caregiver-implemented communication interventions for children identified as having language impairment 0 through 48 months of age: A scoping review. *J Speech Lang Hear Res*. 2022;65(8):3004–55. [CrossRef].
25. Bakken L, Brown N, Downing B. Early childhood education: The long-term benefits. *J Res Child Educ*. 2017;31(2):255–69. [CrossRef].
26. Valverde BBR, Jurdi APS, da Silva Pereira AP. Family benefits of early intervention: A scoping review. *Psic Teor Pesq*. 2023;39:e39303. [CrossRef].
27. Meisels SJ, Shonkoff JP. Early childhood intervention: A continuing evolution. In: *Handbook of early childhood intervention*. Cambridge, UK: Cambridge University Press; 2000. p. 3–32. [CrossRef].
28. Ramey CT, Ramey SL. Effective early intervention. *Ment Retard*. 1992;30(6):337–45.
29. Tollan K, Jezrawi R, Underwood K, Janus M. A review on early intervention systems. *Curr Dev Disord Rep*. 2023;10(2):147–53. [CrossRef].
30. Laws & Regulations Database of The Republic of China (Taiwan). The special education act. 2023 [cited 2026 May 1]. Available from: <https://law.moj.gov.tw/LawClass/LawAll.aspx?pcode=H0080027>. (In Chinese).
31. Laws & Regulations Database of The Republic of China (Taiwan). Child and juvenile welfare and rights protection act. 2021 [cited 2026 May 1]. Available from: <https://law.moj.gov.tw/LawClass/LawAll.aspx?pcode=D0050001>. (In Chinese).
32. Lin YJ. The study of community based services for children with developmental delays in low resource communities. *Bull Spec Educ*. 2013;38(1):1–29. (In Chinese). [CrossRef].

33. Rogers SJ, Stahmer A, Talbott M, Young G, Fuller E, Pellecchia M, et al. Feasibility of delivering parent-implemented NDBI interventions in low-resource regions: A pilot randomized controlled study. *J Neurodev Disord.* 2022;14:3. [CrossRef].
34. Huang HY. Perceptions of parents with developmentally delayed children toward community-based early intervention services [master's thesis]. Taichung, Taiwan: Providence University; 2018 [cited 2026 May 1]. Available from: <https://hdl.handle.net/11296/ys9mb4>.
35. Hung TM. A study of collaboration on community based services between early intervention childhood educators and social workers in low resource communities [master's thesis]. Taichung, Taiwan: National Taichung University of Education; 2024 [cited 2026 May 1]. Available from: <https://hdl.handle.net/11296/6za72z>. (In Chinese).
36. Pacia C, Holloway J, Gunning C, Lee H. A systematic review of family-mediated social communication interventions for young children with autism. *Rev J Autism Dev Disord.* 2022;9(2):208–34. [CrossRef].
37. Greenwood M, Gercama I, Lynch P, Moore K, Mankhwazi M, Mbukwa J, et al. 'Let's grow together': Understanding the current provision of early childhood development and education for children with disabilities in rural Malawi through community-based participatory research. *Int J Disabil Dev Educ.* 2022;69(4):1200–15. [CrossRef].
38. Sun SH, Chang HY. A pilot study on the current situation of developmentally delayed children's health care resources in Taiwan. Taipei, Taiwan: Children's Bureau of the Ministry of the Interior; 2011 [cited 2026 May 1]. Available from: <http://140.128.69.63/ir/bitstream/310903500/44201/1/100301100000A1002.pdf>. (In Chinese).
39. Shin Y, Park EJ, Lee A. Early intervention for children with developmental disabilities and their families via telehealth: Systematic review. *J Med Internet Res.* 2025;27:e66442. [CrossRef].
40. Orel M, Licardo M. Systematic review of telepractice for early intervention with families of children with autism spectrum disorder. *Adv Autism.* 2025;11(1):19–37. [CrossRef].
41. Pan CY, Kuo TY, Kuo FL. Meta-analysis of effectiveness of parent-mediated telehealth interventions in children with Autism spectrum disorder. *Res Autism Spectr Disord.* 2023;107:102209. [CrossRef].
42. Little LM, Pope E, Wallisch A, Dunn W. Occupation-based coaching by means of telehealth for families of young children with autism spectrum disorder. *Am J Occup Ther.* 2018;72(2):1–7. [CrossRef].
43. Ministry of the Interior. A trial program of home-and community-based services for children with developmental delays. 2009 [cited 2026 May 1]. Available from: <https://www.rootlaw.com.tw/LawArticle.aspx?LawID=A040040061018200-0981014>.
44. Ministry of the Interior. Community based service program for children with developmental delays. 2011 [cited 2026 May 1]. Available from: <https://reurl.cc/bdaqME>.
45. Hong CS. Community-based services for children with developmental delay in rural area [master's thesis]. Taipei, Taiwan: National Taipei University of Education; 2014 [cited 2026 May 1]. Available from: <https://hdl.handle.net/11296/cp33y4>.
46. Bailey DB, Wolery M. Teaching infants and preschoolers with disabilities. 2nd ed. Englewood Cliffs, NJ, USA: Prentice Hall; 1992.
47. Welbourne P. Social work with children and families: Developing advanced practice. Abingdon, UK: Routledge; 2012. [CrossRef].
48. Cohen E, Jovcevska V, Kuo DZ, Mahant S. Hospital-based comprehensive care programs for children with special health care needs: A systematic review. *Arch Pediatr Adolesc Med.* 2011;165(6):554–61. [CrossRef].
49. Dunst CJ, Bruder MB. Valued outcomes of service coordination, early intervention, and natural environments. *Except Child.* 2002;68(3):361–75. [CrossRef].
50. McBride SL, Brotherson MJ, Joanning H, Whiddon D, Demmitt A. Implementation of family-centered services: Perceptions of families and professionals. *J Early Interv.* 1993;17(4):414–30. [CrossRef].
51. Callanan J, Signal T, McAdie T. Involving parents in early intervention: Therapists' experience of the parent child relationally informed-early intervention (PCRI-EI) model of practice. *Int J Disabil Dev Educ.* 2023;70(5):674–87. [CrossRef].
52. Meadan H, Meyer LE, Snodgrass MR, Halle JW. Coaching parents of young children with autism in rural areas using Internet-based technologies: A pilot program. *Rural Spec Educ Q.* 2013;32(3):3–10. [CrossRef].
53. Hughes-Scholes CH, Gatt SL, Davis K, Mahar N, Gavidia-Payne S. Preliminary evaluation of the implementation of a routines-based early childhood intervention model in Australia: Practitioners' perspectives. *Top Early Child Spec Educ.* 2016;36(1):30–42. [CrossRef].

54. Seruya FM, Feit E, Tirado A, Ottomanelli D, Celio M. Caregiver coaching in early intervention: A scoping review. *Am J Occup Ther.* 2022;76(4):7604205070. [[CrossRef](#)].
55. Kim GY, Tuck KN, Eddy MM, Bhattashali A, Bigelow KM. Caregivers' perceptions on caregiver-implemented intervention and coaching. *Early Child Res Q.* 2025;70:264–73. [[CrossRef](#)].
56. Movahedazarhouli S. Parent-implemented interventions and family-centered service delivery approaches in early intervention and early childhood special education. *Early Child Dev Care.* 2021;191(1):1–12. [[CrossRef](#)].
57. O'Toole C, Lee AS, Gibbon FE, van Bysterveldt AK, Conway P, Hart NJ. Parent-mediated interventions to promote communication and language development in children with Down syndrome aged between birth and six years. *Cochrane Database Syst Rev.* 2016:1–15. [[CrossRef](#)].
58. Pickles A, Le Couteur A, Leadbitter K, Salomone E, Cole-Fletcher R, Tobin H, et al. Parent-mediated social communication therapy for young children with autism (PACT): Long-term follow-up of a randomised controlled trial. *Lancet.* 2016;388(10059):2501–9. [[CrossRef](#)].
59. Seo E, Ha Y, Jeon P, Yoo E. Early parent-mediated training for social-communication skills in toddlers and preschoolers with ASD: A systematic review and meta-analysis. *J Autism Dev Disord.* 2025:1–15. [[CrossRef](#)].
60. Deniz E, Francis G, Torgerson C, Toseeb U. Parent-mediated play-based interventions to improve social communication and language skills of preschool autistic children: A systematic review and meta-analysis protocol. *PLoS One.* 2022;17(8):e0270153. [[CrossRef](#)].
61. Waddington H, Reynolds JE, MacAskill E, Curtis S, Taylor LJ, Whitehouse AJ. The effects of JASPER intervention for children with autism spectrum disorder: A systematic review. *Autism.* 2021;25(8):2370–85. [[CrossRef](#)].
62. Ridout S, Eldevik S. Measures used to assess treatment outcomes in children with autism receiving early and intensive behavioral interventions: A review. *Rev J Autism Dev Disord.* 2024;11(3):607–19. [[CrossRef](#)].
63. Sone BJ, Lee J, Roberts MY. Comparing instructional approaches in caregiver-implemented intervention: An interdisciplinary systematic review and meta-analysis. *J Early Interv.* 2021;43(4):339–60. [[CrossRef](#)].
64. Jimenez-Arberas E, Casais-Suarez Y, Fernandez-Mendez A, Menendez-Espina S, Rodriguez-Menendez S, Llosa JA, et al. Evidence-based implementation of the family-centered model and the use of tele-intervention in early childhood services: A systematic review. *Healthcare.* 2024;12(1):112. [[CrossRef](#)].
65. Mirenda P, Colozzo P, Smith V, Kroc E, Kalynchuk K, Rogers SJ, et al. A randomized, community-based feasibility trial of modified ESDM for toddlers with suspected autism. *J Autism Dev Disord.* 2022;52(12):5322–41. [[CrossRef](#)].
66. Pacheco-Molero M, Morales-Murillo C, León-Estrada I, Gutiérrez-Ortega M. Barriers perceived by professionals in family-centered early intervention services: A systematic review of the current evidence. *Int J Early Child.* 2025;57(2):357–77. [[CrossRef](#)].
67. Brian J, Drmic I, Roncadin C, Dowds E, Shaver C, Smith IM, et al. Effectiveness of a parent-mediated intervention for toddlers with autism spectrum disorder: Evidence from a large community implementation. *Autism.* 2022;26(7):1882–97. [[CrossRef](#)].
68. Drmic I, Brian J, Roncadin C, Shaver C, Pase M, Rugajs N, et al. Community implementation of a brief parent mediated intervention for toddlers with probable or confirmed autism spectrum disorder: Feasibility, acceptability, and drivers of success. *Front Pediatr.* 2024;11:1295294. [[CrossRef](#)].
69. Shire SY, Shih W, Barriault T, Kasari C. Exploring coaching and follow-up supports in community-implemented caregiver-mediated JASPER intervention. *Autism.* 2022;26(3):654–65. [[CrossRef](#)].
70. Ko CS. A case study of early-intervention home visiting services in Taipei County. *Bull Spec Educ.* 2009;34(3):1–24. [[CrossRef](#)].
71. Lien PY. The barriers and solutions of home-based early intervention service provided by educare givers—An example of the Taitung office of Taiwan association of child development and early intervention (TACDEI) [master's thesis]. Hualien, Taiwan: National Dong Hwa University; 2018 [cited 2026 May 1]. Available from: <https://hdl.handle.net/11296/7wfwaf>.
72. Theresa Opportunity Center. Love begins at home: Family-centered early intervention services. Tainan, Taiwan: Catholic Tainan County Private Theresa Opportunity Center Foundation; 2003 [cited 2026 May 1]. Available from: https://www.theresa.org.tw/share_publication.html.
73. Moore TG. Rethinking early childhood intervention services: Implications for policy and practice. In: Proceedings of the 10th Biennial National Conference of Early Childhood Intervention Australia; 2012 Aug 9; Perth, Australia.

74. Higgins JP, Ramsay C, Reeves BC, Deeks JJ, Shea B, Valentine JC, et al. Issues relating to study design and risk of bias when including non-randomized studies in systematic reviews on the effects of interventions. *Res Synth Methods*. 2013;4(1):12–25. [[CrossRef](#)].
75. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al. *Cochrane handbook for systematic reviews of interventions*. Hoboken, NJ, USA: John Wiley & Sons, Inc.; 2024.
76. Wells GA, Shea B, Higgins JP, Sterne J, Tugwell P, Reeves BC. Checklists of methodological issues for review authors to consider when including non-randomized studies in systematic reviews. *Res Synth Methods*. 2013;4(1):63–77. [[CrossRef](#)].
77. Horner RH, Carr EG, Halle J, McGee G, Odom S, Wolery M. The use of single-subject research to identify evidence-based practice in special education. *Except Child*. 2005;71(2):165–79. [[CrossRef](#)].
78. Kratochwill TR, Hitchcock JH, Horner RH, Levin JR, Odom SL, Rindskopf DM, et al. Single-case intervention research design standards. *Remedial Spec Educ*. 2013;34(1):26–38. [[CrossRef](#)].
79. The First Social Welfare Foundation. *Early intervention and early childhood special education curriculum guide: Assessment manual*. Taipei, Taiwan: The First Social Welfare Foundation; 2004 [cited 2026 May 1]. Available from: <https://isbn.tw/9789572938713>.
80. Cooper JO, Heron TE, Heward WL. *Applied behavior analysis*. 3rd ed. London, UK: Pearson Education Inc.; 2020.
81. Ledford JR, Eyster PB, Windsor SA, Chow JC. Single-case design effect-size distributions: Association with procedural parameters. *Sch Psychol*. 2024;39(6):589–600. [[CrossRef](#)].
82. Adu P. *A step-by-step guide to qualitative data coding*. 1st ed. Abingdon, UK: Routledge; 2019. [[CrossRef](#)].
83. Baralt M. Coding qualitative data. In: *Research methods in second language acquisition: A practical guide*. Hoboken, NJ, USA: John Wiley & Sons, Inc.; 2011. p. 222–44. [[CrossRef](#)].
84. Deterding NM, Waters MC. Flexible coding of in-depth interviews: A twenty-first-century approach. *Sociol Methods Res*. 2021;50(2):708–39. [[CrossRef](#)].
85. McKim C. Meaningful member-checking: A structured approach to member-checking. *Am J Qual Res*. 2023;7(2):41–52. [[CrossRef](#)].
86. Adedipe DT, Walton KM. Telehealth parent training for challenging behavior in children with developmental disabilities: A systematic review and meta-analysis. *Rev J Autism Dev Disord*. 2025:1–21. [[CrossRef](#)].
87. Bhurasadiya N, Coutinho F, Ramachandran S, Brien M, Vennila J, Venkatachalapathy N, et al. Effect of multidisciplinary interventions using the Enabling Inclusion® program on gross motor function and functional independence in children with disabilities in rural South India. *BMC Pediatr*. 2025;25:960. [[CrossRef](#)].
88. Sapiets SJ, Hastings RP, Totsika V. Predictors of access to early support in families of children with suspected or diagnosed developmental disabilities in the United Kingdom. *J Autism Dev Disord*. 2024;54(4):1628–41. [[CrossRef](#)].
89. Wrigglesworth M, van der Linde J, Eccles R, Graham M, du Toit M. Developmental outcomes of children from an urban middle-income South African setting. *Int J Disabil Dev Educ*. 2023;70(7):1425–37. [[CrossRef](#)].
90. Curtiss SL, McBride BA, Uchima K, Laxman DJ, Santos RM, Weglarz-Ward J, et al. Understanding provider attitudes regarding father involvement in early intervention. *Top Early Child Spec Educ*. 2021;41(2):147–59. [[CrossRef](#)].
91. Acar S, Chen CI, Xie H. Parental involvement in developmental disabilities across three cultures: A systematic review. *Res Dev Disabil*. 2021;110:103861. [[CrossRef](#)].
92. An ZG, Xu Z, Dai R. A comprehensive literature review of interventions for fathers of young children with disabilities. *J Child Fam Stud*. 2025;34(11):3012–27. [[CrossRef](#)].