



A review article: DIRFloortime® on improving social communication skills in Thai children with autism spectrum disorder

Natwipa Wanicharoen

Communication Sciences and Disorders Division, Department of Occupational Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai Province, Thailand.

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ABSTRACT

Background: Autism Spectrum Disorder (ASD) is characterized by persistent deficits in social communication and interaction, necessitating early, developmentally appropriate intervention. The Developmental, Individual-differences, Relationship-based model (DIRFloortime®) is a relationship-centered, child-directed approach designed to strengthen foundational capacities such as engagement, reciprocal communication, and symbolic thinking. Although increasingly implemented in Thailand, its empirical evidence base remains limited.

Objectives: This review aimed to systematically synthesize existing Thai research examining the effects of DIRFloortime® on social communication outcomes in children with ASD and to explore its practical implications within the Thai context.

Materials and methods: A structured literature search was conducted across Scopus, Thai Journal Online (ThaiJO), Google Scholar, and reference lists of relevant publications. Empirical studies published in English or Thai that evaluated DIRFloortime® interventions in Thai children with ASD were included.

Results: Across studies, DIRFloortime® demonstrated consistent positive effects on functional emotional development, engagement, reciprocal interaction, and foundational social communication skills. Reductions in autism symptom severity and improvements in language-related outcomes were observed particularly in longer-duration interventions. Parental fidelity and caregiver involvement emerged as significant predictors of treatment outcomes.

Conclusion: Current evidence suggests that DIRFloortime® is a culturally congruent and developmentally meaningful intervention for Thai children with ASD. While methodological limitations remain, findings support its potential as a caregiver-mediated approach to enhancing social communication. Further large-scale, high-quality studies are warranted to strengthen the evidence base and inform national implementation strategies.

* Corresponding contributor.

Author's Address: Communication Sciences and Disorders Division, Department of Occupational Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai Province, Thailand.

E-mail address: natwipa.w@cmu.ac.th

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Introduction

Autism spectrum disorder (ASD) is characterized by persistent deficits in social communication and interaction, along with restricted and repetitive behaviors and atypical sensory responses.¹ Impairments in social communication are particularly significant, as they are associated with academic difficulties, behavioral challenges, and long-term relational problems.²⁻⁴ Early intervention is therefore essential to improve developmental outcomes.⁵

Developmental interventions, grounded in cognitive^{6,7} and social⁸ constructivist theories, emphasize child-directed learning through meaningful caregiver engagement and target foundational skills such as shared attention, imitation, and reciprocal interaction.⁹ The Developmental, Individual-differences, Relationship-based (DIR) model is a prominent relationship-based framework that promotes engagement, two-way communication, and higher-order thinking.¹⁰ However, effective implementation requires skilled and responsive caregivers or professionals.⁵

In Thailand, evidence on DIRFloortime® remains limited.¹¹⁻¹⁴ This review synthesizes the available Thai research and examines its implications for speech-language pathologists (SLPs) and parent-mediated intervention.

Autism spectrum disorder (ASD)

Autism spectrum disorder is a neurodevelopmental condition characterized by persistent deficits in social communication and social interaction, accompanied by restricted and repetitive patterns of behavior, circumscribed interests, and/or atypical sensory responses. These features emerge in early childhood and persist across development, presenting with varying degrees of severity and functional impact among individuals.¹

Although the presence of impairments in both core domains—social communication deficits and restricted, repetitive behaviors—is required for a diagnosis of ASD, difficulties in social communication warrant particular attention. Social communication encompasses the sharing of information, thoughts, feelings, and intentions through verbal and nonverbal means within socially meaningful contexts. It involves not only the transmission of messages but also the reciprocal exchange and mutual understanding that underpin effective interpersonal interaction.² Deficits in this domain are strongly associated with a wide range of adverse developmental outcomes, including diminished academic achievement, increased incidence of problem behaviors, and persistent challenges in establishing and maintaining meaningful interpersonal relationships.²⁻⁴

A recent meta-analysis by Issac *et al.*¹⁵ identified 66 epidemiological studies examining the prevalence of ASD, encompassing a total sample of 21,313,061 children worldwide. Of these, 25 studies were conducted in Europe, 22 in Asia, and 13 in the Americas, with three studies each originating from Africa and Australia. The pooled global prevalence of ASD was estimated at 0.77% among children, with a higher prevalence observed in boys (1.14%). Australia demonstrated the highest pooled prevalence estimate (effect size = 2.18), underscoring the need for sustained public health attention and resource allocation in that region.¹⁵ In Thailand, the prevalence of ASD among children aged 2-5 years in 2022 was estimated at 6 per 1,000, corresponding to 16,892 cases among 2,814,823 children nationwide.¹⁶

Early intervention is essential for children with ASD, as timely and appropriate support can significantly improve

developmental trajectories. Numerous intervention programs have been developed for children with autism, each grounded in distinct theoretical and philosophical frameworks. These approaches broadly encompass behavioral interventions, cognitive-behavioral models, and developmental paradigms.⁵ In the present review, we focus exclusively on a developmental intervention approach—specifically, the Developmental, Individual-differences, Relationship-based (DIR) model—as a framework for supporting children with ASD.

Developmental interventions

Developmental interventions are principally grounded in cognitive^{6,7} and social⁸ constructivist theories, which hypothesize that children actively construct knowledge and skills through exploration, interaction, and personal discovery. A defining feature of these interventions is their child-directed orientation.⁹ Rather than imposing externally structured tasks, developmental approaches prioritize meaningful social engagement—particularly interactions with primary caregivers—as the primary context for learning. These interventions seek to strengthen foundational capacities that are often delayed or underdeveloped in children with ASD but are essential for broader developmental progress. Targeted competencies typically include initiating social interactions, sharing attention and interest (e.g., through gestures and joint attention), observing and imitating others' behaviors, and participating in reciprocal exchanges such as turn-taking during play and early conversational routines.⁹

Developmental interventions are frequently described as child-led, as they capitalize on the child's intrinsic motivation to communicate, and naturalistic, reflecting their implementation within everyday environments and routines. Common strategies include modeling language and actions, imitating the child's behavior to attribute communicative intent, and employing interactional techniques—such as strategic pausing and expectant waiting—as well as environmental arrangements, such as placing preferred objects slightly out of reach, to elicit communicative attempts.⁹ Within these frameworks, caregivers are systematically trained to integrate such strategies into daily activities, thereby enhancing the frequency, duration, synchrony, and reciprocity of parent-child interactions.⁹

Although no universally endorsed set of principles has been formally delineated for developmental interventions, certain programs—such as Pediatric Autism Communication Therapy—illustrate foundational elements that are widely shared across developmental models. These typically include: 1) a developmental orientation, whereby intervention goals are organized according to a hierarchical progression of developmental stages; 2) a naturalistic mode of delivery, emphasizing authentic interactions within everyday caregiver-child contexts; and 3) a caregiver-mediated model, in which caregivers act as collaborative partners and are supported in building the skills, confidence, and autonomy necessary to

facilitate their child's ongoing learning and development.¹⁷

Among the most widely recognized developmental approaches is the Greenspan model, formally known as the Developmental, Individual-differences, Relationship-based (DIR) framework.¹⁰

Developmental, Individual-differences, Relationship-based (DIR)/Floortime (DIRFloortime®)

The DIRFloortime® approach was developed in 1989 by child psychiatrist Stanley Greenspan, MD, and child psychologist Serena Wieder, Ph.D. The Greenspan model is conceptualized as a relationship-based approach in which the primary objective is to cultivate the child's capacity to form meaningful interpersonal connections that serve as the foundation for cognitive and developmental growth.¹⁰ The DIR model is organized around three core components: 1) functional emotional developmental capacities, 2) individual differences in sensory processing and biological functioning, and 3) relationships and interactions. Together, these elements provide a comprehensive framework for understanding and supporting the developmental trajectories of children with ASD.¹⁸

Within this framework, relational engagement is regarded as the driving force of development. By strengthening emotionally meaningful interactions, the model seeks to facilitate the acquisition of essential developmental capacities, including attention and self-regulation, engagement and relating, purposeful nonverbal communication, affective signaling, complex social problem-solving, symbolic communication, and ultimately abstract and logical thinking.¹⁰ Collectively, these developmental milestones organize emerging mental capacities and underscore the central role of affect and emotional experience in shaping cognitive, social, and communicative advancement.¹⁹

Floortime represents the practical application of the DIR framework. It is a play-based, interactive intervention approach that emphasizes individual differences, child-centered interests, and affective engagement between the child and caregiver. Grounded in Greenspan's developmental theory, floortime involves shared play and learning experiences—often conducted on the floor—to promote reciprocal and emotionally attuned interactions. The approach posits that previously unmet developmental milestones may be achieved through intensive, child-directed play and sustained relational engagement with caregivers or other significant adults.²⁰

The floortime process comprises five sequential steps: 1) observation, 2) opening circles of communication, 3) following the child's lead, 4) extending and expanding play, and 5) supporting the child in closing circles of communication. The process begins with careful observation to discern the child's affect, communicative style, and interests. The adult then initiates interaction in a manner that is attuned to the child's emotional state, thereby opening a communicative exchange. By following the child's lead, the caregiver fosters warmth,

shared engagement, and relational connection. Play is subsequently expanded to stimulate creative thinking and emotional expression. Finally, the child completes the communicative loop through purposeful responses, enabling repeated reciprocal exchanges that reinforce understanding of two-way communication and promote socio-emotional development.²⁰

The DIR model is highly dependent on the competence and responsiveness of the parent or professional implementing the intervention. Effective delivery requires accurate interpretation of the child's cues, timely recognition of opportunities for engagement, and contingent responses that extend and deepen interaction. Such demands call for advanced observational, reflective, and relational skills and may present challenges for maintaining consistent, high-fidelity implementation in community-based contexts.⁵ Moreover, the DIR framework advocates for a comprehensive, multidisciplinary approach that integrates family support, school and home programs, biomedical considerations, and related therapies.⁵ Coordinated intervention across diverse settings is intended to address the child's holistic needs and optimize developmental progress.²¹

Over the past decades, a growing body of research has examined the effects of the DIRFloortime® model on social communication outcomes among young and school-aged children with ASD in both clinical and home-based settings.²²⁻²⁶ For example, a recent systematic review by Divya *et al.*²² reported significant improvements across multiple functional domains in children who participated in Floortime interventions. Home-based Floortime was associated with gains in emotional functioning, communication abilities, and daily living skills, as well as enhanced parent-child interactions reported by mothers. The review further identified certain parental demographic factors as significant moderators of intervention outcomes and reported no adverse events for children or caregivers. Overall, these findings suggest that Floortime is a cost-effective, child-led approach that can be implemented early in development and may substantially support social and emotional growth when initiated promptly by healthcare professionals.²²

In Thailand, empirical investigations examining the effects of DIRFloortime® on social communication outcomes among children with ASD remain limited.¹¹⁻¹⁴ In the present review, we synthesize the available Thai evidence on the impact of DIRFloortime® on social communication development. Additionally, we examine the practical implications of implementing this approach within the Thai sociocultural context, with particular emphasis on its relevance for Thai speech-language pathologists and the active involvement of parents in the intervention process.

DIRFloortime® effects on social communication skills in Thai children with ASD

A comprehensive literature search was conducted across electronic databases, including Scopus and

Thai Journal Online (ThaiJO). Additional searches were performed through Google Scholar and manual screening of reference lists from relevant articles. The search included studies published from 2010 through December 2025. Articles published in English or Thai were included. Search terms were combined using Boolean operators and included the following keywords: “DIR” OR “developmental individual-differences Relationship-based” OR “Floortime” AND “Autism” OR “autism spectrum disorder” OR “ASD” AND “Thailand” OR “Thai children” AND “social communication” OR “communication” OR “functional emotional development”.

Four empirical studies conducted in Thailand collectively provide emerging evidence regarding the effects of the DIRFloortime® model on social communication outcomes in children with ASD.¹¹⁻¹⁴ Overall, the findings suggest that DIRFloortime® yields positive effects on functional emotional development and foundational social communication skills. These include a pilot randomized controlled trial (RCT),¹¹ a one-year prospective parent-training follow-up study,¹² a quasi-experimental hospital-based longitudinal study with 6-18 months of follow-up,¹⁴ and a community-based pilot intervention.¹³ Although these studies differ in methodological rigor, duration, and service context, they demonstrate convergent findings indicating improvements in social communication and functional emotional development.

The pilot RCT conducted by Pajareya and Nopmaneejumrusters¹¹ provides the strongest level of methodological evidence. Preschool children with ASD who received home-based DIRFloortime® (mean 15.2 hours per week for three months) in addition to routine care demonstrated significantly greater improvements in the Functional Emotional Assessment Scale (FEAS), Childhood Autism Rating Scale (CARS), and Functional Emotional Questionnaires compared with those receiving routine care alone. These findings indicate that DIRFloortime® confers additive benefits beyond standard behavioral services. Specifically, the study reported statistically significant gains in FEAS scores, reflecting advancement in engagement, purposeful emotional interaction, and social problem-solving capacities. These domains correspond to Greenspan’s Functional Developmental Levels (FDL) 1-4, encompassing self-regulation, engagement, and reciprocal communication.¹¹

The subsequent one-year prospective follow-up study by Pajareya and Nopmaneejumrusters¹² extended these findings. Sustained home-based implementation (mean 14.2 hours per week) resulted in statistically significant increases in FEAS and Functional Emotional Developmental Questionnaire (FEDQ) scores, as well as significant reductions in CARS scores ($p \leq 0.001$). Nearly half of the participants achieved gains of at least 1.5 FDL levels. Improvements in FEAS and FEDQ scores suggest enhanced shared attention, increased frequency of communicative exchanges (“circles of communication”), and improved affective reciprocity. Importantly, parental fidelity and baseline symptom

severity were significant predictors of outcome, underscoring the central role of caregiver engagement.

The quasi-experimental hospital-based longitudinal study by Singsathorn *et al.*¹⁴ demonstrated statistically significant improvements in speech, language, communication, sociability, and sensory-motor perception domains at 6-, 12-, and 18-month follow-up. The progressive nature of these improvements suggests a cumulative or dose-response effect and highlights the importance of sustained intervention. These findings indicate that early relational gains may consolidate into more stable communicative behaviors over time.

Similarly, the community-based pilot study by Yuwapoom *et al.*¹³ implemented a holistic DIR-informed model over three months in a district hospital setting. Children with ASD demonstrated significant improvements on the Greenspan Social-Emotional Growth Chart (SEGC), particularly in two-way communication and emotional engagement. Although changes in standardized developmental skill measures (DSI) were less pronounced in the short term, the study also reported significant reductions in parental stress as measured by the Parenting Stress Index (PSI). These findings underscore both the relational impact of the intervention and its feasibility in resource-limited community settings.

Reductions in global autism symptom severity were most evident in studies employing longer durations and controlled designs. Pajareya and Nopmaneejumrusters¹¹ reported significant reductions in CARS scores in the intervention group compared with routine care, suggesting that enhancing emotional reciprocity and social engagement may attenuate observable autistic symptomatology. Their one-year follow-up study¹² further demonstrated statistically significant decreases in CARS scores ($p \leq 0.001$), with greater improvements associated with higher parental fidelity, supporting a dose-response relationship between consistent relational intervention and symptom reduction. Singsathorn *et al.*¹⁴ likewise observed continued improvements in sociability and communication domains over time. Although Yuwapoom *et al.*¹³ did not report CARS outcomes, improvements in SEGC scores and parent-reported interaction quality indirectly suggest reduced symptom severity in relational domains.

Language-related outcomes were less uniformly reported but reveal important trends. Singsathorn *et al.*¹⁴ demonstrated significant improvements in speech and language domains across follow-up periods, suggesting that relational gains may scaffold structural language development over time. Pajareya and Nopmaneejumrusters reported functional emotional improvements associated with enhanced gestural and symbolic communication, indicating progression from affective reciprocity toward representational communication.¹² In contrast, Yuwapoom *et al.*¹³ found limited short-term gains in standardized developmental skills (DSI) among children with ASD, despite improvements in emotional engagement. This discrepancy suggests that structural language development may require

longer intervention duration, greater intensity, or both.

Across all four studies, caregiver involvement emerged as a central mechanism of change. Both Pajareya and Nopmaneejumrulers emphasized structured parent training and home-based implementation, with parental fidelity significantly predicting outcomes.^{11,12} Yuwapoom *et al.*¹³ documented significant reductions in parental stress, suggesting that improved relational attunement benefits not only children but also caregiver well-being. Singathorn *et al.*¹⁴ similarly incorporated sustained caregiver participation within both clinic-based and home routines. These findings reinforce the theoretical premise of DIRFloortime®: relational attunement and emotionally meaningful interaction serve as primary drivers of social communication development, while reduced parental stress may further enhance interaction quality through a positive feedback mechanism.

However, it is important to note that, across all four studies, the intervention providers were not SLPs. In three studies, the DIRFloortime® intervention was implemented by physicians who had received certified training in DIRFloortime® approaches.¹¹⁻¹³ In the remaining study, the intervention was delivered by an occupational therapist; however, the authors did not specify whether formal certification in DIRFloortime® had been obtained.¹⁴ This observation highlights the interdisciplinary nature of DIRFloortime® implementation within the Thai context and underscores the need for further professional training and competency standards across related disciplines.

In summary, evidence from the four Thai studies suggests that DIRFloortime® primarily enhances the relational and affective foundations of social communication in children with ASD, with reductions in symptom severity and language gains emerging as secondary outcomes following sustained intervention. Stronger methodological designs demonstrated more robust evidence of efficacy, while community-based studies supported the feasibility and cultural relevance of the approach in Thailand. Notably, none of the reviewed studies implemented the intervention through SLPs; instead, interventionists primarily consisted of physicians with DIRFloortime® certification and an occupational therapist. These findings highlight both the interdisciplinary nature of DIRFloortime® implementation and the potential role of Thai SLPs in expanding relationship-based, communication-focused services for children with ASD.

Practical implications for Thai speech-language pathologists

Although none of the four reviewed studies implemented the DIRFloortime® intervention through SLPs,¹¹⁻¹⁴ the DIRFloortime® framework nevertheless holds substantial implications for the evolving role of Thai SLPs. Its relationship-based and communication-centered principles align closely with the core competencies

of the speech-language pathology profession, particularly in facilitating social communication, emotional engagement, and caregiver-mediated interaction in children with ASD. Rather than positioning the clinician solely as a direct service provider, this approach advances a coaching-oriented model in which SLPs support caregivers in cultivating emotionally attuned and reciprocal interactions with their children. In this capacity, SLPs enhance caregiver sensitivity to the child's communicative cues and facilitate affective scaffolding that promotes engagement and shared attention-core foundations of social communication.

Moreover, DIRFloortime® emphasizes integrating pragmatic and social-emotional communication goals within naturally occurring routines across home and community contexts. This orientation positions Thai SLPs to collaborate effectively with multidisciplinary teams in both hospital and community-based settings, thereby ensuring continuity of care and contextual relevance. Ongoing monitoring of intervention fidelity and developmental progression is essential to maintain implementation quality and optimize child outcomes. Importantly, this coaching-based model expands service accessibility, particularly in regions where intensive therapist-delivered programs are constrained by limited professional resources.

Parental involvement represents a central mechanism of change within the DIRFloortime® framework. Evidence demonstrating the predictive value of caregiver fidelity highlights the importance of structured parent education, systematic supervision, and regular follow-up. The establishment of peer-support networks may further strengthen caregiver confidence, mitigate stress, and promote sustained engagement. Critically, reframing play not merely as recreational activity but as purposeful therapeutic interaction can enhance parental commitment and support the consistent implementation necessary to achieve meaningful developmental gains.

Future directions

Findings from the four Thai studies collectively indicate that DIRFloortime® represents a feasible, culturally congruent, and developmentally meaningful intervention for children with ASD.¹¹⁻¹⁴ To translate these research findings into sustainable impact, future efforts must extend beyond efficacy studies toward policy advancement and systemic implementation.

Firstly, integration into the national early intervention framework is warranted. Given consistent evidence demonstrating improvements in functional emotional development and social communication, DIRFloortime® should be considered for inclusion within Thailand's national early childhood intervention policies. Policymakers may explore incorporating caregiver-mediated, relationship-based approaches alongside established behavioral models within services administered by the Ministry of Public Health and the Ministry of Education. Developing

national clinical guidelines that recognize DIRFloortime® as an evidence-informed intervention would expand access and diversify available treatment pathways.

Secondly, workforce development and capacity building are essential. A coordinated national training initiative targeting speech-language pathologists, developmental pediatricians, nurses, and community health workers should be established. As caregiver coaching and implementation fidelity are critical determinants of treatment outcomes, structured certification pathways and continuing professional development programs in DIRFloortime® are recommended. Integrating relevant training modules into university curricula for SLPs and allied health professionals would further ensure long-term sustainability.

Thirdly, expansion into primary and community healthcare systems is imperative. Evidence from community-based implementation demonstrates feasibility within district hospitals and primary care settings. Accordingly, policy initiatives should prioritize scaling DIR-informed parent coaching programs across community health centers, particularly in rural and underserved regions. Embedding such interventions within Thailand's primary healthcare infrastructure would help mitigate disparities in service access.

Fourthly, standardized parent training and support systems should be institutionalized. At the practice level, structured parent education programs, systematic follow-up mechanisms, and peer-support networks are critical to maintaining caregiver engagement. Developing nationally standardized manuals and culturally adapted Thai-language materials would promote consistency in implementation. Public awareness initiatives that frame play as purposeful therapeutic engagement may further enhance parental participation and reduce stigma.

Fifthly, sustainable funding mechanisms must be established. Caregiver-mediated models such as DIRFloortime® offer potential cost advantages in resource-constrained settings. Policymakers should consider reimbursement structures that support parent coaching sessions and home-based intervention, thereby incentivizing family-centered care. Economic evaluations are necessary to inform resource allocation within Thailand's universal health coverage system.

Finally, effective implementation will require intersectoral collaboration. Coordinated efforts across healthcare, education, and social welfare sectors are essential to ensure continuity of care. Integrated service models linking hospitals, early childhood centers, and special education services can promote consistent developmental support and strengthen long-term outcomes for children with ASD.

Conclusion

Although available evidence from Thai studies examining the DIRFloortime® model and social communication outcomes remains limited, the

DIRFloortime® model holds promise as a culturally congruent and developmentally grounded intervention for enhancing social communication in children with ASD. Across diverse service settings, DIRFloortime® consistently demonstrates positive effects on functional emotional development, reciprocal engagement, and foundational communicative capacities, with downstream benefits observed in symptom severity and language outcomes when intervention is sustained. The model's emphasis on caregiver-mediated, emotionally attuned interaction aligns well with Thailand's family-centered cultural context and supports the evolving role of speech-language pathologists as relational coaches. Although the current evidence base remains limited in scope and methodological rigor, findings collectively suggest that DIRFloortime® represents a feasible and meaningful framework for early intervention. Continued rigorous research and systematic implementation efforts are warranted to strengthen its empirical foundation and guide national policy and practice in Thailand.

Ethical approval

This is a review article, which did not directly involve human subjects. Therefore, ethical approval was not required for this paper.

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Conflict of interest

The author declares no conflict of interest.

CRedit authorship contribution statement

Natwipa Wanicharoen: conceptualization, investigation, project administration, supervisor, writing: draft, review and edit, correspondence.

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