

JASPER and Social Participation in Children with Autism: A Systematic Review

Payton M. Burns, OTS., Kennedy Lindsey, OTS., Rebekah K. McCoy, OTS.,

Alena Nardinger-Prosser, OTS

Doctor of Occupational Therapy Program, Hawai'i Pacific University

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Dr. Jana Cason and Dr. Michael Falcon

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Abstract

Importance: Social participation is a fundamental occupation of childhood and is often significantly affected in children with autism spectrum disorder (ASD). Identifying evidence-based interventions that improve social participation can help occupational therapy practitioners support meaningful engagement across home, school, and community settings.

Objective: To systematically evaluate the effectiveness of the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention in improving social participation outcomes for young children with autism spectrum disorder (ASD).

Data Sources: A literature search was conducted between May 14 and May 22, 2026, with follow-up searches performed on May 26, 2026. Hawai'i Pacific University's online library databases, including ERIC, MEDLINE, CINAHL Complete, Academic Search Complete, and Psychology & Behavioral Sciences Collection, were searched. Search terms included autistic children, autism spectrum disorder, ASD, toddlers, preschoolers, early childhood, and JASPER intervention, using Boolean operators (AND/OR) where appropriate.

Study Selection and Data Collection: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published studies on JASPER intervention and ASD were included in the systematic review. Data from presentations, non-peer reviewed literature, and dissertations were excluded.

Findings: Three Level II studies and four Level I randomized controlled trials met the inclusion criteria. Across all seven studies, JASPER improved joint attention, joint engagement, social communication, play skills, caregiver responsiveness, and caregiver-child interactions. Several studies also demonstrated that these improvements were maintained at follow-up, supporting the intervention's lasting effects.

Conclusion and Relevance: JASPER is an effective intervention for improving social participation outcomes in young children with ASD. Evidence from this review suggests that JASPER enhances joint attention, engagement, communication, and play through naturalistic, play-based interactions that promote meaningful participation across home, school, and community settings. These findings support the use of JASPER as an evidence-based occupational therapy intervention.

Key words: autism spectrum disorder, JASPER, joint attention, play skills, social communication, social participation

JASPER and Social Participation in Children with Autism: A Systematic Review

Autism spectrum disorder (ASD) is a neurodevelopmental condition that affects how individuals communicate, interact socially, and participate in everyday activities. According to the Centers for Disease Control and Prevention (CDC, 2022), autism affects approximately 1 in 36 children in the United States, making it one of the most prevalent developmental disabilities among children. Social participation is an important area of occupation for children because it supports learning, relationship building, communication, play, and engagement in family, school, and community life. However, children with ASD often experience challenges with social communication, joint attention, and play skills, which can limit opportunities for meaningful participation with others.

Many of the social challenges associated with ASD begin early in childhood. Children with autism frequently demonstrate difficulties with joint attention, or the ability to share attention and experiences with another person, as well as joint engagement, which involves actively participating in a shared interaction. They may also demonstrate less diverse and less complex play skills than their neurotypical peers. These skills are important because they provide the foundation for language development, social relationships, learning, and participation in daily activities. Research has shown that stronger joint attention, engagement, and play skills are associated with improved communication, cognitive development, and long-term social outcomes for children with ASD (JASPER, 2026). Developing these skills helps prepare children for greater participation in group activities and interactions with peers, fostering meaningful social development that supports participation across later developmental stages.

Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) is a naturalistic developmental behavioral intervention designed to address core deficits in social communication, joint attention, engagement, and play among children with autism spectrum disorder (JASPER, 2026). JASPER uses child-led play, meaningful interactions, and developmentally appropriate strategies to increase joint attention, social engagement, play skills, and communication. Unlike interventions that focus primarily on teaching isolated skills, JASPER emphasizes learning through natural social interactions and play experiences. Studies have examined JASPER in a variety of settings, including homes, clinics, preschools, and community-based early intervention programs, with intervention delivered by clinicians, teachers, teaching assistants, and caregivers. Findings have consistently demonstrated improvements in social communication, joint engagement, joint attention, and play outcomes (JASPER, 2026).

For occupational therapy practitioners, social participation is a critical area of occupation that influences a child's ability to engage in meaningful activities and relationships across contexts (AOTA, 2020). While individual studies have reported positive outcomes associated with JASPER, the evidence has not been synthesized to provide a comprehensive understanding of its effectiveness on social participation outcomes. Examining the current evidence can help clinicians, educators, caregivers, and researchers better understand the role of JASPER in supporting meaningful engagement and social participation for children with autism.

The purpose of this systematic review was to examine and analyze the strength of the evidence regarding the effectiveness of the Joint Attention, Symbolic Play, Engagement, and

Regulation (JASPER) intervention in improving social participation outcomes for children with autism spectrum disorder.

Method

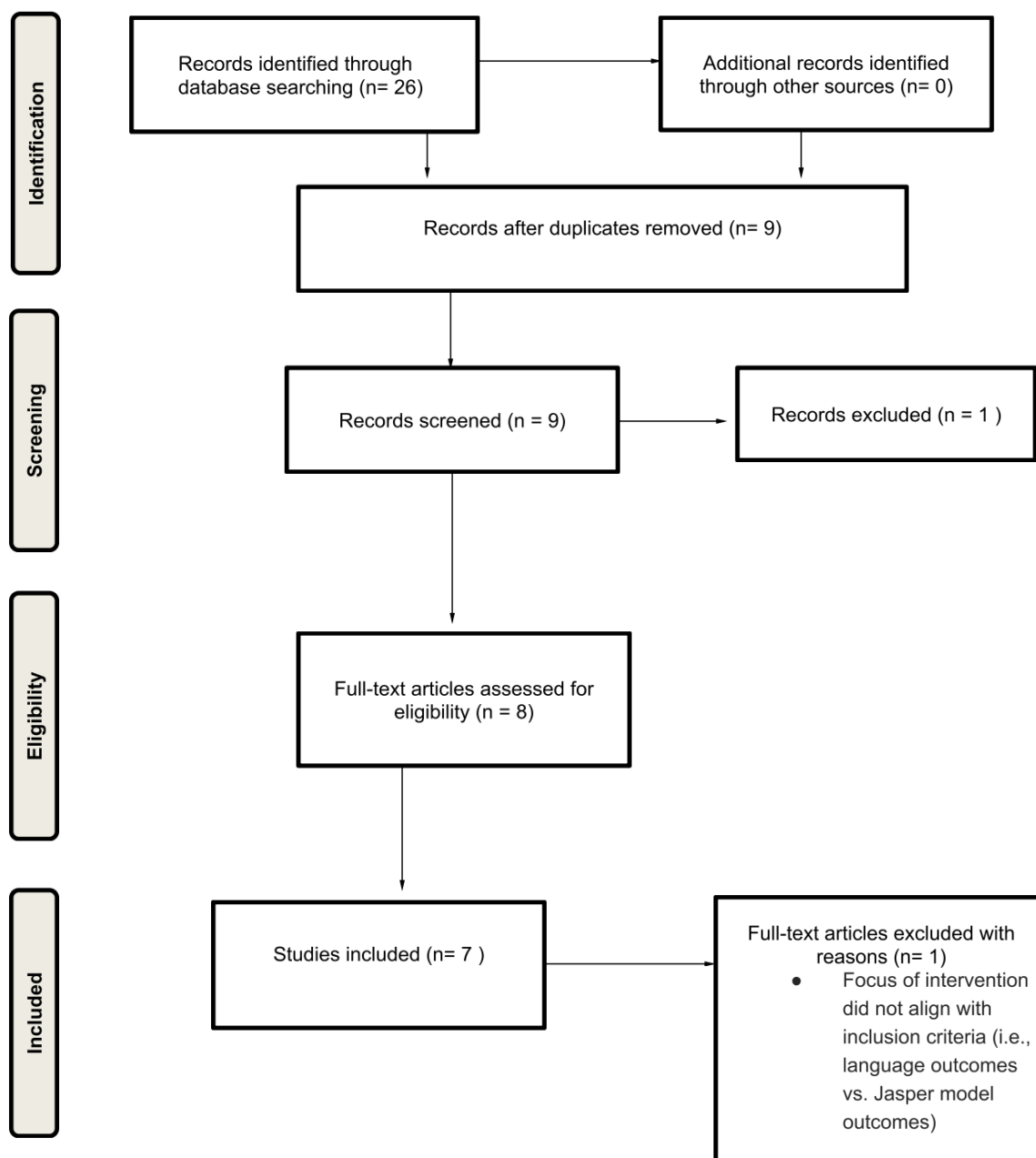
The Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention's impact on social participation outcomes in young children with autism spectrum disorder (ASD) was investigated in a systematic review. A comprehensive literature search was conducted using Hawai'i Pacific University's online library databases, including ERIC, MEDLINE, CINAHL Complete, Academic Search Complete, and Psychology & Behavioral Sciences Collection. Searches were completed between May 14 and May 22, 2026, with follow-up searches performed on May 26, 2026. Search terms included *autistic children*, *autism spectrum disorder*, *ASD*, *toddlers*, *preschoolers*, *early childhood*, and *JASPER intervention* using Boolean operators (AND/OR) where appropriate. The complete search strategy is provided in Appendix A.

Identified studies were then evaluated using established inclusion and exclusion criteria. A PRISMA-style flow diagram was used to document the study selection process. Studies were included if they examined the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention in children with autism spectrum disorder (ASD), measured outcomes related to social participation, joint engagement, joint attention, play, communication, or caregiver-child interaction, and were published in peer-reviewed journals. Studies that did not assess JASPER as the primary intervention or that did not report relevant social participation outcomes were excluded.

A standardized evidence table was used for data collection. The study design, level of evidence, participant characteristics, intervention techniques, outcome measures, and study conclusions were extracted from each article. Data from the seven included studies were analyzed. The AOTA systematic review guidelines were used to assess risk of bias. Selection, performance, detection, attrition, and reporting bias were evaluated for both randomized and nonrandomized studies.

Seven studies published between 2016 and 2025 met the inclusion criteria. Based on the AOTA Levels of Evidence, four studies were classified as Level I and three studies were classified as Level II. The Level I studies consisted of randomized controlled trials, whereas the Level II studies included secondary analyses and one nonrandomized community implementation study. Six of the seven included studies demonstrated a low risk of bias, while one study was rated as having a moderate risk of bias. Overall, the methodological quality of the included studies was considered strong.

The number of children with ASD represented across studies ranged from 66 to 118 participants. Most participants were toddlers or preschool-aged children between 22 and 60 months of age. Caregivers, teachers, and teaching assistants frequently served as interventionists across home, clinic, school, classroom, and community-based settings. Outcome measures primarily evaluated joint engagement, joint attention, social communication, symbolic and functional play, caregiver responsiveness, and language development.

Figure 1*Flow Diagram*

Results

The final review contained seven studies that met the inclusion criteria. Overall, these studies looked at the JASPER intervention's effectiveness in a range of contexts, such as outpatient clinics, public early intervention programs, preschool classrooms, and caregiver-led home treatments. A total of 663 children were represented throughout all investigations, with sample sizes ranging from 66 to 118 participants. JASPER demonstrated positive effects on social participation outcomes across all included studies. These findings suggested that JASPER served as an effective early intervention for improving foundational social participation skills. Joint engagement, joint attention, social communication, caregiver-to-child connection, and play skills all showed consistent improvement.

When compared to children getting regular classroom programming, Chang et al. (2016) discovered that children receiving classroom-based JASPER showed noticeably larger improvements in joint engagement, joint attention, functional play, language development, and cognitive skills. In a similar vein, Shire et al. (2017) found that toddlers receiving classroom-based JASPER intervention significantly improved their play skills, social communication, joint engagement, and joint attention. Significant improvements were also achieved through parent-mediated therapies. Gulrud et al. (2016) and Shire et al. (2016) found that caregivers who received JASPER guidance used more responsive interaction techniques, which were related to higher levels of social contact and joint engagement with children. Shih et al. (2025) found that children's joint attention abilities continued to improve as caregivers implemented JASPER strategies following the intervention.

Several studies demonstrated that play outcomes significantly improved. Children who participated in JASPER demonstrated greater improvements in play complexity and diversity

than those in the control groups, according to Chang et al. (2024). Improvements in play skills were also linked to gains in cognitive development, visual perception, and expressive and receptive language. Children taking part in JASPER interventions also demonstrated enhanced social communication behaviors, such as behavioral management and collaborative attention initiations. Several studies found that benefits were maintained at follow-up, showing long-lasting intervention effects. Shire et al. (2019) found that teaching assistants were able to apply JASPER with high accuracy even when external research support was removed. Children in groups with both local and external support showed benefits in collaborative involvement and joint attention. On the other hand, children who received assistance with implementation from outside sources showed more improvements in their advanced play skills.

The risk-of-bias analysis revealed that the methodological quality of the included studies was generally strong. One study received a moderate risk of bias rating, while six studies received a low-risk rating. Lack of participant and personnel blinding, which is challenging to do in behavioral intervention studies, was a common cause of possible bias. Outcome reporting and participant retention were consistently high across studies despite all of these limitations. Overall, JASPER was a successful intervention for enhancing social participation outcomes in young children with ASD, according to the available data. Joint involvement and attention, social communication, symbolic and functional play, caregiver responsiveness, and child-to-caregiver interactions all showed consistent improvements. The findings indicated that JASPER could be effectively implemented by educators, teaching assistants, and caregivers in clinical, educational, and community settings while maintaining positive outcomes for children with ASD.

Discussion

The results of this systematic review suggest that the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention may be effective in improving social participation outcomes for children with autism spectrum disorder (ASD). Across the seven studies included in this review, children who participated in JASPER demonstrated improvements in joint attention, joint engagement, social communication, and play skills. These findings are meaningful because these skills serve as foundational components of social participation and support children's ability to interact with caregivers, peers, and other members of their community. Collectively, the evidence suggests that JASPER targets core developmental challenges associated with ASD while promoting meaningful engagement in everyday activities. Within occupational therapy practice, these findings support the use of JASPER as an evidence-based, client-centered intervention for promoting social participation.

One consistent finding across the literature was the positive impact of JASPER on joint attention and joint engagement outcomes. Multiple studies reported significant improvements in children's ability to initiate and sustain shared interactions with others. These gains were observed across clinic-based, home-based, and school-based settings, suggesting that the intervention can be successfully implemented in a variety of environments. Because joint attention and joint engagement are strongly associated with later language, social communication, and relationship development, improvements in these areas may contribute to broader participation outcomes over time. The consistency of these findings across multiple Level I studies strengthens confidence in the effectiveness of JASPER for addressing social participation challenges in children with ASD.

A second theme that emerged from this review was the importance of play as a mechanism for social participation. Several studies found that children who received JASPER demonstrated greater improvements in play diversity, play complexity, symbolic play, and functional play skills compared with control groups. These findings support the developmental framework underlying JASPER, which uses play as a natural context for learning and social interaction. From an occupational therapy perspective, play is a primary occupation of childhood and serves as an important vehicle for developing communication, social relationships, and participation in daily life. Improvements in play skills may therefore have implications beyond the intervention setting by supporting children's engagement in family routines, educational environments, and peer interactions, which may translate to improved performance and participation in activities of daily living.

The studies also highlighted the role of caregivers, teachers, and paraprofessionals in supporting intervention outcomes. Parent-mediated and classroom-based studies demonstrated that caregivers and educational staff were able to learn and implement JASPER strategies with high levels of fidelity. Furthermore, studies examining caregiver responsiveness and strategy use found that greater implementation fidelity was associated with stronger child outcomes. These findings suggest that JASPER may be particularly valuable because it can be integrated into children's natural environments and delivered by individuals who interact with them regularly. This approach may increase opportunities for practice and promote the generalization of social participation skills across settings.

Although the findings of this review were generally positive, several limitations should be considered. Most studies were conducted by researchers affiliated with the development of

JASPER, which may limit the generalizability of findings. In addition, sample sizes varied across studies, and outcomes were often measured using different assessment tools, making direct comparison difficult. Several studies also focused on short-term outcomes, limiting understanding of the long-term sustainability of intervention gains. Future research should continue to examine long-term participation outcomes, evaluate JASPER in more diverse populations and settings, and explore factors that influence individual responsiveness to intervention. Despite these limitations, the current body of evidence provides support for JASPER as a promising intervention for improving social participation outcomes among children with autism spectrum disorder.

Strengths and Limitations

The studies included in this systematic review consistently evaluated the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention and demonstrated improvements in social participation, joint attention, communication, play, and engagement among young children with autism spectrum disorder (ASD). The review included four Level I studies and three Level II studies, and the overall risk of bias was low, strengthening confidence in the findings. In addition, the use of a standardized evidence table (Appendix B) and risk-of-bias assessment (Appendix C) supported a systematic and comprehensive evaluation of the available evidence.

Despite these strengths, several limitations should be considered. Only seven studies met the inclusion criteria, limiting the overall body of evidence available for review. Additionally, several studies were conducted by the same research group, which may limit the generalizability of the findings. This highlights the need for additional independent research. Variability in study designs, outcome measures, and intervention settings also made direct comparisons across

studies more challenging. Future research should continue to examine JASPER across more diverse populations and settings while evaluating long-term participation outcomes to strengthen the evidence supporting its use in occupational therapy practice.

Implications for Occupational Therapy Practice

Social participation is a key occupation identified in the Occupational Therapy Practice Framework (OTPF-4; AOTA, 2020). Helping children with ASD develop communication, joint attention, engagement, and play skills through meaningful, play-based interventions supports participation in everyday occupations. The JASPER intervention provides evidence-based strategies that promote these foundational skills through child-led play and caregiver involvement (JASPER, 2026). Based on the findings of this systematic review, occupational therapists can incorporate JASPER principles into practice to support meaningful social participation outcomes for young children with ASD.

- Promote verbal communication and social participation
- Support family-centered intervention through caregiver training
- Emphasize early intervention to improve long-term outcomes
- Use play as the primary intervention medium
- Facilitate symbolic and pretend play development
- Promote self-regulation
- Support sustained engagement, joint attention, and pretend play

Conclusion

The studies included in this systematic review provide evidence supporting the effectiveness of the Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) intervention for improving social participation outcomes in children with autism spectrum

disorder. Across home, clinic, school, and community settings, JASPER was associated with improvements in joint attention, joint engagement, social communication, play skills, and caregiver or teacher implementation of intervention strategies.

Additional research is needed to examine the long-term sustainability of these outcomes, identify factors that influence treatment responsiveness, and evaluate the effectiveness of JASPER across increasingly diverse populations and settings. Overall, the evidence suggests that JASPER is a promising intervention that addresses foundational social participation skills and supports meaningful engagement in the daily lives of children with autism. By strengthening joint attention, communication, engagement, and play, JASPER may help children participate more successfully in meaningful occupations across home, school, and community environments. These findings support the integration of JASPER into occupational therapy practice as an evidence-based intervention for promoting social participation in young children with ASD.

AI Disclosure Statement: During the preparation of this systematic review, the authors used ChatGPT to improve grammar and readability. After using this tool, the authors reviewed and edited the content. The authors take full responsibility for the final content.

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Appendix A*Systematic Review Search Terms*

Autistic children or children with autism or ASD

AND

Toddlers or preschoolers or early childhood

AND

Jasper intervention

Appendix B

Evidence Table

Author/Year	Level of Evidence Study Design Risk of Bias	Participants Inclusion Criteria Study Setting	Intervention and Control Groups	Outcome Measures	Results
Chang et al. (2024) https://doi.org/10.1007/s10803-023-06147-8	Level 2B Secondary analysis of 3 randomized control trials (RCTs). Low risk	Participants: total number of participants (n) = 109 preschool-aged children with autism (mean (M) age = 47.28 months; 87% male; 78% ethnically/racially diverse). Inclusion Criteria: Preschool-aged children with autism enrolled in 1 of 3 JASPER studies with similar intervention dosage (2–3 months)	Intervention Group: JASPER (n = 61) Joint Attention Symbolic Play Engagement and Regulation (JASPER) intervention delivered by therapists, caregivers, or teachers for 2–3 mo. Intervention focused on improving joint engagement, social communication, play diversity, and play complexity through developmentally appropriate play routines and naturalistic play-based strategies. Control Group (n = 48)	Play Skills • Structured Play Assessment (SPA) Social Communication • Early Social Communication Scales (ESCS) Cognition and Development • Mullen Scales of Early Learning (MSEL) Autism Diagnostic Assessment • Autism Diagnostic Observation Schedule–2 (ADOS-2)	Significant Findings Children receiving JASPER showed significantly greater improvements in play diversity and play complexity compared to the control group. Symbolic play mastery increased from 22.9% to 39.3% in the intervention group. Improvements in play skills were associated with gains in cognition, receptive language, expressive language, fine motor skills, and visual reception skills. Higher baseline joint attention predicted greater improvements in play outcomes. Nonsignificant Findings

		conducted in urban Los Angeles communities. Intervention Setting: Homes, schools, and community-based programs in urban Los Angeles communities	Treatment as usual or active control interventions provided in community and school settings. Some participants continued receiving standard community-based autism services, including behavioral therapy programs.		Joint attention as a moderator for play complexity approached significance but was not statistically significant ($p = .096$).
Chang et al. (2016) https://doi.org/10.1007/s10803-016-2752-2	Level 1B RCT Low risk	Participants: $n = 66$ preschool children with autism spectrum disorder (ASD); M age = 50.26 months; 89% male Inclusion Criteria: Children with ASD confirmed using the ADOS-2, between 3–5 years old, and enrolled in one of six autism-specific preschool	Intervention Group: Immediate Treatment (IT) JASPER ($n = 38$) Teachers and teaching assistants implemented JASPER during classroom play center rotations using small-group and one-on-one play-based instruction. Teachers received 8 weeks of in-vivo coaching focused on joint attention, engagement, communication, and play skills. Control Group: Waitlist (WL) Control ($n = 28$)	Joint Engagement and Social Communication • Teacher-Child Play Interaction (TCX) • ESCS Play Skills • SPA Cognitive and Language Skills • MSEL Autism Diagnostic Assessment • ADOS-2	Significant Findings Children receiving JASPER demonstrated significantly greater improvements in joint engagement, joint attention, up requesting, functional play, language, and cognitive skills compared to the waitlist group. Teachers achieved and maintained high JASPER implementation fidelity throughout the intervention and follow-up periods. Nonsignificant Findings No significant treatment effects were found for symbolic play

		programs within a large urban public school district. Intervention Setting: Public preschool classrooms within a large urban school district.	Children continued receiving the standard Applied Behavior Analysis (ABA) based preschool curriculum and classroom programming without JASPER during the initial study period.	Teacher Fidelity • JASPER Strategy Implementation Fidelity Measure	or some ESCS joint attention and requesting outcomes.
Gulsrud et al. (2016) https://doi.org/10.1111/jcpp.12481	Level 1B RCT Low Risk	Participants: n = 86 toddlers with ASD; M age = 31.5 months Inclusion Criteria: Children ≤ 36 months old with ASD confirmed by Autism Diagnostic Interview-Revised (ADI-R) and ADOS, no significant physical disabilities, and parent-child dyads available	Intervention Group: JASPER Parent-Mediated Intervention (n = 43) 10-wk parent-mediated intervention focused on JASPER. Parents received weekly coaching on intervention strategies to increase joint engagement and social communication. Control Group: Parent Education Intervention (PEI); n = 43 10-wk PEI focused on parent education, stress reduction, and autism-	Joint Engagement • Parent–Child Interaction Coding Parent Strategy Use • Environmental Arrangement • Mirrored Pacing • Prompting • Communication Strategies Developmental and Language Skills • MSEL • Reynell Developmental Language Scales	Significant Findings Parents in the JASPER group demonstrated significantly greater increases in all four intervention strategies compared to the psychoeducational group. Mirrored pacing and environmental arrangement were significantly associated with increased joint engagement. Mirrored pacing mediated the relationship between treatment and joint engagement, suggesting it is an active ingredient of the JASPER intervention. Nonsignificant Findings

		for follow-up assessments. Intervention Setting: Early intervention classrooms and parent-child play interactions.	related information without hands-on coaching.	Parent Factors • Parenting Stress Index (PSI) • Caregiver Involvement Scale • Caregiver Diary Autism Diagnostic Measures • ADOS • ADI-R	Communication and prompting strategies were not significantly associated with joint engagement. Child and parent demographics did not significantly predict joint engagement outcomes.
Shih et al. (2025) https://doi.org/10.1002/jcv2.12247	1B Secondary analysis of an RCT Low risk	Participants: n = 86 toddlers with ASD and their primary caregivers. Children were between 22–36 months old (M age = 31.5 months), primarily male (81%), and enrolled in a 30-hour/week early intervention program including behavioral, speech, and	Intervention Group: Caregiver-Mediated JASPER (n = 43) Caregivers participated in 1-hour weekly sessions for 10 weeks involving active coaching in JASPER strategies including environmental setup, prompting for joint attention, expanding play, communication, mirrored pacing, and social engagement strategies. Control Group: PEI (n = 43) Caregivers attended weekly educational sessions about	Caregiver Strategy Use • Overall caregiver strategy fidelity • Environmental arrangement strategies • Prompting strategies • Communication strategies • Mirrored pacing strategies Child Social Communication Outcomes • Initiations of Joint Attention (IJA)	Significant Findings Caregivers in the JASPER group demonstrated significantly greater improvements in caregiver strategy use compared to the PEI group. JASPER caregivers maintained more communication and mirrored pacing strategies at follow-up. Children whose caregivers demonstrated stronger baseline JASPER strategies showed continued improvement in joint attention skills after intervention. Nonsignificant Findings

		occupational therapies. Inclusion Criteria: Children diagnosed with ASD confirmed using the ADI-R and ADOS with no significant physical disabilities or uncontrolled seizures. Intervention Setting: Clinic-based early intervention setting at UCLA	autism, behavioral management, communication, social interaction, and caregiver stress without direct hands-on coaching with the child present.	• Joint engagement • Play diversity Additional Measures • Caregiver Diary • MSEL	Baseline caregiver strategies did not significantly affect joint engagement or play diversity outcomes. Environment and prompting strategies were no longer significantly different between groups at follow-up.
Shire et al. (2016) https://doi.org/10.1007/s10803-016-2702-z	Level 2B RCT Low Risk	Participants: n = 85 toddlers with ASD; M age = 31 months; primarily male Inclusion Criteria: Children ≤36 months old with ASD confirmed	Intervention Group: JASPER Parent-Mediated Intervention (n = 43) 10-wk parent-mediated intervention with 1-hr weekly live coaching sessions focused on JASPER. Parents practiced intervention strategies	Parent Responsiveness • Maternal Behavior Rating Scale (MBRS) Joint Engagement • Caregiver–Child Interaction (CCX) coding	Significant Findings Parents in the JASPER group demonstrated significantly greater improvements in responsive behavior and child-initiated joint engagement compared to the psychoeducation group. Higher parent responsivity combined with greater use of JASPER

		by ADOS and ADI-R and enrolled in an outpatient early intervention program. Intervention Setting: Outpatient early intervention program and caregiver-child play interactions.	directly with their child during sessions. Control Group: Parent Education Intervention (PEI; n = 42) 10-wk PEI with weekly 1-hr sessions focused on autism education, child development, communication, behavior management, and parent support without the child present.	Developmental and Language Skills • MSEL • Reynell Developmental Language Scales Autism Diagnostic Measures • ADOS • ADI-R	strategies was associated with more time jointly engaged with their child. Nonsignificant Findings Children's developmental level was not significantly associated with parent responsivity.
Shire et al. (2019) https://doi.org/10.1007/s10803-018-03875-0	Level 2B Two-group nonrandomized community implementation study Moderate risk	Participants: n = 118 toddlers with ASD across two school-year cohorts. Year 1: n = 55 (M age = 31.71 months; primarily male) Year 2: n = 63 (M age = 32.16 months; primarily male)	Intervention Group 1: Year 1 Externally Supported JASPER (n = 55) Teaching assistants delivered JASPER intervention with intensive training, live coaching, weekly remote feedback, and support from the external research team and local supervisor.	JASPER Strategy Implementation • TCX Joint Engagement • TCX Joint Engagement Coding Social Communication • IJA • IBR Play Skills • Structured Play Coding • Short Play and	Significant Findings Teaching assistants maintained high-quality JASPER implementation during the locally supported year. Children in both cohorts demonstrated significant improvements in joint attention and joint engagement. Children in the externally supported year demonstrated greater gains in play skills compared to the locally supported year. Nonsignificant Findings

		Inclusion Criteria: Toddlers enrolled in a public early intervention program for children with ASD receiving classroom-based services. Intervention Setting: Public early intervention classrooms in low-resource community settings.	Intervention Group 2: Year 2 Locally Supported JASPER (n = 63) Teaching assistants delivered JASPER intervention to a new cohort of toddlers using only local internal supervision without external research team support.	Communication Evaluation (SPACE) Language Measures • MSEL	Children in the locally supported year did not demonstrate significant improvements in some higher-level play outcomes and combination play skills.
Shire et al. (2017) https://doi.org/10.1111/jcpp.12672	Level 1B RCT Low risk	Participants: n = 113 toddlers with ASD; M age = 31.63 months; 78% male Inclusion Criteria: Children enrolled in a state-funded	Intervention Group: JASPER Intervention (n = 55) 10-wk classroom-based JASPER intervention delivered by supervised teaching assistants during 30-min daily social group sessions. Intervention focused on joint attention,	Joint Engagement • TCX Social Communication • IJA • Initiations of Behavior Regulation (IBR) • SPACE	Significant Findings Children receiving JASPER demonstrated significantly greater improvements in joint engagement, joint attention, functional play, social communication, and play skills compared to the treatment-as-usual group. Gains were maintained at follow-up.

		early intervention program for ASD between 24–36 months of age. Intervention Setting: Public early intervention classrooms in low-resource community settings in New York City.	symbolic play, engagement, regulation, and social communication using play-based strategies. Control Group: Treatment as Usual Waitlist (n = 58) 30-min daily social skills programming focused on music, movement, book reading, free play, sensory play, and group activities within the standard early intervention classroom program.	Play Skills • Structured play coding within TCX and SPACE Language and Development • MSEL Clinical Impressions • Clinical Global Impressions Scale (CGI)	Teaching assistants implemented JASPER with high fidelity across a wide range of children. Nonsignificant Findings None
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Note. [Define any acronyms used]

- ABA = Applied Behavior Analysis
- ADI-R = Autism Diagnostic Interview-Revised
- ADOS = Autism Diagnostic Observation Schedule
- ADOS-2 = Autism Diagnostic Observation Schedule-Second Edition
- ASD = Autism Spectrum Disorder
- CCX = Caregiver-Child Interaction
- CGI = Clinical Global Impressions Scale
- ESCS = Early Social Communication Scales
- IJA = Initiations of Joint Attention
- IBR = Initiations of Behavior Regulation
- IT = Immediate Treatment
- JASPER = Joint Attention Symbolic Play Engagement and Regulation
- M = Mean
- MBRS = Maternal Behavior Rating Scale

- MSEL = Mullen Scales of Early Learning
- n = Number of Participants
- PEI = Parent Education Intervention
- PSI = Parenting Stress Index
- RCT = Randomized Controlled Trial
- SPACE = Short Play and Communication Evaluation
- SPA = Structured Play Assessment
- TCX = Teacher–Child Play Interaction
- UCLA = University of California, Los Angeles
- WL = Waitlist

Appendix C

Risk-of-Bias Table

Risk-of-Bias Table

Risk-of-Bias Table for Randomized Controlled Trial (RCT) and Non-RCT (Two or More Group Design)										
	Selection Bias (Risk of bias arising from randomization process)			Performance Bias (effect of assignment to intervention)		Detection Bias		Attrition Bias	Reporting Bias	Overall risk-of-bias (low, moderate, high)
Citation	Random Sequence Generation	Allocation Concealment (until participants enrolled and assigned)	Baseline difference between intervention groups	Blinding of Participants During the Trial	Blinding of Study Personnel During the Trial	Blinding of Outcome Assessment: Self-reported outcomes	Blinding of Outcome Assessment: Objective Outcomes (assessors aware of intervention received?)	Incomplete Outcome Data (data for all or nearly all participants)	Selective Reporting (results being reported <u>selected on basis</u> of the results?)	
Chang et al. (2024)	?	?	+	-	-	?	+	+	+	L
Chang et al. (2016)	+	?	+	-	-	?	+	+	+	L
Gulsrud et al. (2016)	+	?	+	-	-	-	+	+	+	L
Shih et al. (2025)	?	?	+	-	-	-	+	+	+	L
Shire et al. (2016)	+	?	+	-	-	-	+	+	+	L
Shire et al. (2019)	-	-	+	-	-	?	+	+	+	M
Shire et al. (2017)	+	?	+	-	-	?	+	+	+	L

Note. Categories for risk of bias are as follows: Low risk of bias (+), unclear risk of bias (?), high risk of bias (–). Scoring for overall risk of bias assessment is as follows: 0–3 minuses, low risk of bias (L); 4–6 minuses, moderate risk of bias (M); 7–9 minuses, high risk of bias (H).

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