
Effectiveness of Occupational Therapy Interventions to Promote Social Participation in Children and Young Adults with Autism Spectrum Disorder

Chelmella, Payton, OTS; Jackman, Ellie, OTS; Negash, Shushan, OTS; Richardson, Nicole, OTS; Vaccaro, Hannah, OTS

Key Words

- Autism Spectrum Disorder
- Occupational therapy
- Socialization
- Interventions
- Pediatric and young adults

A systematic review of the literature related to effective occupational therapy interventions on socialization for children and adolescents with Autism Spectrum Disorder (ASD). This review provides a comprehensive overview and discussion of 25 studies that addressed the variety of interventions that can be used when targeting social skills including sensory integration, animal-assisted interventions, technology, play, school-based, and caregiver-assisted interventions. The findings reveal that the use of these interventions is clinically significant yet there is limited evidence to support generalizability to the population. This review supports the premise that children and adolescents with ASD who experience socialization challenges as compared to typically developing peers can improve their social skills through these interventions.

Focused Clinical Question

What occupational therapy (OT) interventions are effective in improving the socialization of autistic children and young adults? Occupational therapy practitioners are involved in helping individuals with autism participate in their daily lives. Since individuals diagnosed with autism spectrum disorder report having significantly different challenges, it is important for occupational therapists to be aware of many different intervention approaches to support these individuals. In today's world, a high value is placed on socialization, making this an important area of focus for individuals with autism as many of them communicate differently from their neurotypical peers. This article highlights the evidence related to a variety of interventions aimed to improve socialization in autistic individuals. This is accomplished by having multiple evidence-based interventions for occupational therapists to choose from to provide a more individualized, holistic approach to treatment.

Statement of Problem and Background

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by “two major signs of impairment in social communication and interaction skills, limited and repetitive behaviors, interests, and activities” (American Psychiatric Association, 2000). Gutman et. al. states that 1 in 130 individuals have ASD and it typically involves difficulties with interpreting social interaction skills (2020). In their article, they state that children and adolescents diagnosed with ASD have difficulties detecting and interpreting a wide range of verbal and nonverbal social skills such as “facial expressions, body language, and vocal inflection” (Gutman et. al., 2020). Their difficulties do not just come from understanding those aspects of socialization, they also experience challenges resulting from restricted eye contact, awkward or clumsy body movements, and having speech that “can be characterized by unusual inflection, volume, pitch, and rhythm” (Gutman et. al., 2020). Occupational therapists in outpatient clinics, among other settings, frequently treat autistic individuals. Therapy with this population typically targets developing skills that will be carried on into adulthood and participation in the community (American Occupational Therapy Association [AOTA], 2018). This includes building and growing social skills that can improve quality of life and foster meaningful relationships. There are countless interventions that target socialization that therapists can pull from when forming treatment plans, so it is beneficial to have a variety of evidence-based intervention options to choose from and individualize to each client. Interventions appraised in this review included sensory integration, animal-assisted activities, technology, play, school-based, and caregiver-assisted activities.

Method for Conducting the Evidence-Based Review

This rapid systematic review aims to appraise the evidence for effective interventions to improve socialization that are within the scope of occupational therapy to use for autistic children and young adults.

Articles that met the following inclusion criteria were considered for review:

- Published in 2013 or after
- Under 26 years old
- Diagnosed with ASD
- Occupational Therapy
- Level I (RCTs only)-Level IV
- Social function, socialization, and social skills

Articles were excluded from the review for the following reasons:

- Published before 2013
- Over 26 years old
- Other therapies other than OT
- Level I review studies and level V studies
- Acute Care
- Inpatient
- Long term facilities

Covidence was used to screen articles according to the inclusion and exclusion criteria (Covidence, 2021). The initial search of PubMed and CINAHL databases retrieved 648 articles to be considered for abstract and title review. Five occupational therapy student reviewers completed the screening process, where two votes were required to send a study to the next screening step. After the title and abstract review, 91 articles were sent for full-text review. Twenty-four articles were selected that met all inclusion criteria to complete the systematic review. One study was manually entered from previous research due to its relevant and significant findings related to the current topic. Figure 1 displays the article extraction process done for this systematic review.

Table 1

Search Terms

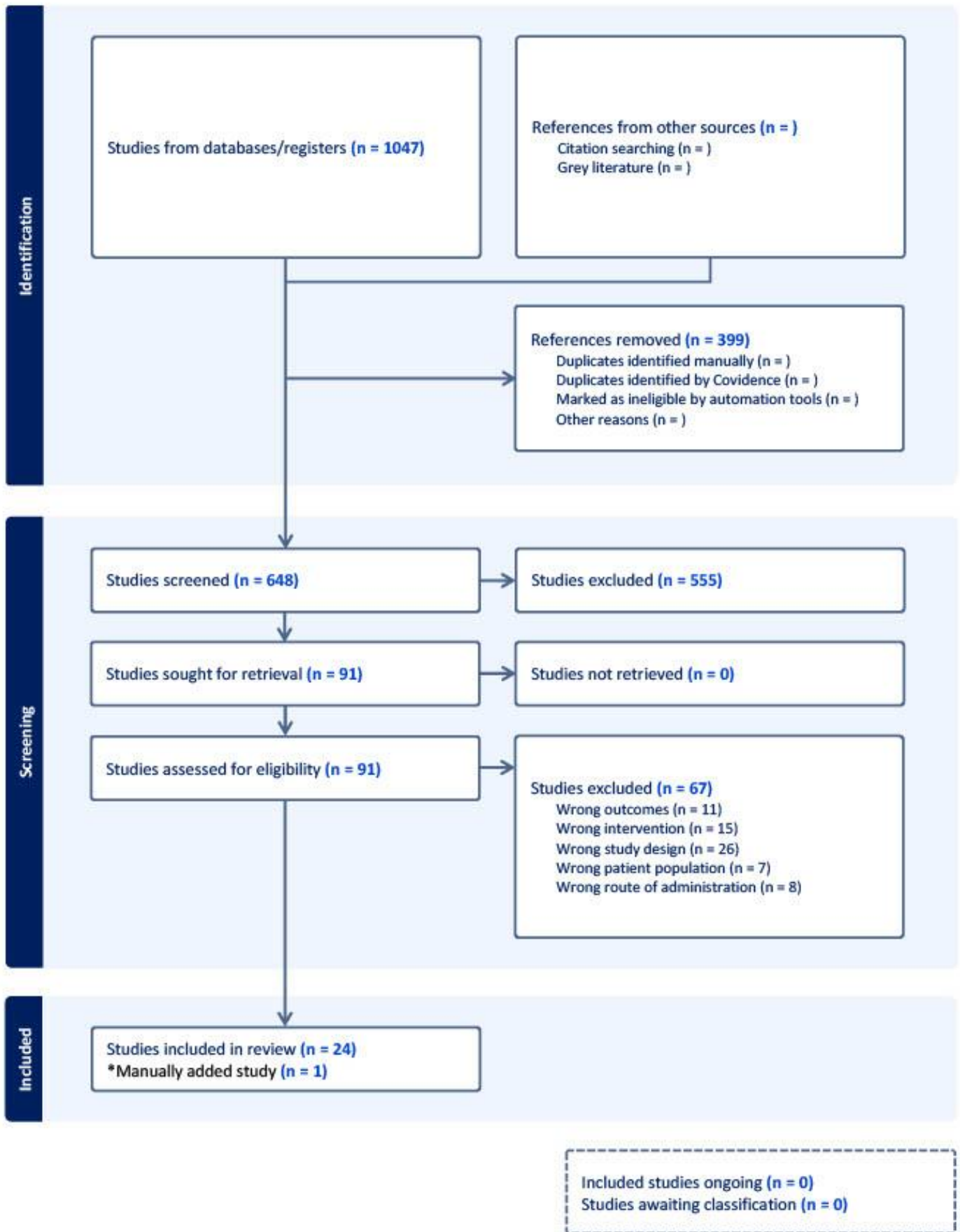
Database (s)	Search Terms	Filters
PubMed and CINAHL	((Autism) OR (ASD) OR (autism spectrum disorder)) AND ((children) OR (school age) OR (kids) OR (pediatrics) OR (adolescent) OR (child) OR (teen) OR (peds)) AND ((occupational therapy) OR (OT)) AND ((social participation) OR (socialization) OR (social skills) OR (social) OR (social function)) NOT ((physical therapy) OR (speech therapy) OR (music therapy) OR (applied behavior analysis)) NOT ((acute care) OR (long term care) OR (inpatient) OR (long term care))	Published in 2013 - 2023

The level of evidence requirements and guidelines were adapted from Sackett et al. (1996), indicating the following:

- Level 1: Systematic reviews, meta-analyses, randomized controlled trials

Figure 1

PRISMA Diagram



- Level II: Two groups, nonrandomized studies (eg, cohort, case control)
- Level III: One group, nonrandomized (eg., before and after, pretest and posttest)
- Level IV: Descriptive studies that include analysis of outcomes (single subject design, case series)
- Level V: Case reports and expert opinions that include narrative literature reviews and consensus statements

Articles were analyzed by following critically appraised guidelines written by AOTA (2018). Relevant information from each study was entered into critically appraised paper worksheets, which included general participant demographics, intervention and control groups, outcome measures, results, intervention and measurement biases, and overall implications to occupational therapy practice.

Results

This review includes a total of 25 studies—10 Level I, 1 Level II, 12 Level III, and 2 Level IV studies. The findings have been grouped into six areas that represent interventions administered or potentially administered by occupational therapists working to improve social skills in children and young adults with ASD. The treatment categories reviewed included sensory integration, animal-assisted interventions, technology, play, school-based, and caregiver-assisted interventions.

Sensory Integration

Four level I studies and one level III study were reviewed that identified effective sensory integration (SI) interventions to improve social interaction and communication skills among autistic children and young adults. The first level I study by Kashefimeh and colleagues found that sensory integration therapy involving play activities compared to no treatment at all showed significant improvement in all domains of the SCOPE (short child occupational profile) assessment, which included volition, habituation, communication, and interaction skills, process skills, motor skills, the environment of occupational performance, and total score of all categories (2017). Kashefimeh et al., 2017 also found that SI intervention produced significantly greater improvement in all domains of the Sensory Profile assessment, except for the “emotional reaction” category. An additional study by Scaaf et al., 2014 found that SI-OT resulted in higher primary outcomes on the Goal Attainment Scale regarding socialization, self-care activities, and decreased behaviors resulting from sensory deficiencies compared to usual care. Furthermore, sensory integration intervention led to decreased caregiver assistance

when socializing, meaning participants were able to engage more on their own compared to the control group (Schaaf et al., 2014) (Omairi et al., 2022). Omairi et al., 2022 additionally found that the intervention’s group goal attainment was closer to their parent’s expectations than the control group’s goal attainment. One Level I article review found that when compared to fine motor intervention, sensory integration therapy produced significant differences in social responsiveness, fewer autistic mannerisms, and improvement in goals set by the Goal Attainment Scale, regarding social functioning, sensory processing, and motor skills. Lastly, Raditha and colleagues found when using sensory integration therapy, the intervention group was found to have significant improvement in the communication domain, socialization domain (coping skills), and daily living domain involving personal and community subdomains (2022).

Animal-Assisted Interventions

Two Level III and one Level IV studies were reviewed that dissected the effects of animal-assisted therapies on socialization in autistic children. Occupational therapy in an equine environment (OTee) was found to improve achievement of performance goals, social motivation, and communication, while simultaneously decreasing hyperactivity and irritability in children with ASD (Peters et al., 2020). Furthermore, OTee was proven more effective in increasing goal attainment, social functioning, and behavioral regulation, when compared to standard occupational therapy interventions in an outdoor environment (Peters et al., 2021). Animal-assisted interventions with therapy dogs had positive effects on communication, behavioral regulation, community participation, and social motivation in autistic children (London et al., 2020).

Technology

Two Level I, three Level III, and one Level IV studies were reviewed that identified several technology-based interventions and their effects on social skills in children and young adults with ASD. The first Level I study by Hochhauser and colleagues found that the use of conflict scenario videos and prompted questions significantly improved conflict resolution skills, self-confidence, and communication factors (2016). The participants’ teachers also reported an increase in communication, problem-solving, and the ability to negotiate conflicts. Similarly, Lang et al. (2021) found that the use of a storytelling app with social contextual information and interpersonal skills significantly increased gaze, attention in social situations, total fixation duration and count, and total visit duration. A study that implemented hugging a huggable

device before conversing with an unfamiliar person or robot showed significant differences in conversations in the psychological security score (Kumazaki et al. 2021). Two separate studies done by Chen and colleagues (2014, 2016) analyzed the effectiveness of augmented reality (AR) in responding to various social situations. Results showed significant differences in mean performance level, increase in social skills and ability to differentiate emotional facial expressions, and increased non-verbal social signals (Chen et al. 2014, Chen et al. 2016). Additionally, Kandalaft et al. (2013) found that the use of virtual reality (VR) to explore different social scenarios significantly increased ACS-SP scores, which measure social perceptual abilities. However, the change in SSPA scores, which measures conversational abilities, was not significant but did have an overall increase.

Play

One Level III study was analyzed. It compared a Learn to Play program to conventional play and its effect on socialization in children with ASD. The Learn to Play program, which had participants imitate play actions, yielded significant improvements in participation in the social aspect of pretend play, when compared to conventional play (Anu et al., 2019).

School-Based

Two Level I, one Level II, and two Level III studies were reviewed that identified effective methods for improving social interaction skills for children and young adults with ASD. These studies looked at different strategies for school-based interventions to see if they are beneficial. Two studies looked at the social cognitive training program (Cheung et al., 2020; Cheung et al., 2017). The cognitive training program includes developing client-centered goals, going through social scenarios and writing participants' answers, caregiver questionnaires about the child's social-cognitive understanding, and an interview evaluation at the end of the intervention program. These studies found that the program is beneficial in both increasing the knowledge and application of social skills and that it can be applied to other cultures, such as Hong Kong (Cheung et al., 2020; Cheung et al., 2017).

Wilkes-Gillen and Falkmer compared working directly with the child (CHILD intervention) to working with the child's peers (PEER intervention) (2014). In the CHILD intervention, the child directly spent time with the therapist as would typically be done versus in the PEER intervention, the child's peers spent time with the therapist learning how to help include the child socially at school (Wilkes-Gillen & Falkmer, 2014). They found that the PEER intervention was more beneficial in improving the child's socialization (Wilkes-Gillen & Falkmer, 2014).

In a study by Boyd et. al., they implemented the ASAP (advancing social communication and play) intervention to compare it to BAU (business as usual) standard practice within the classroom (2018). The ASAP program has two content components (social communication and play) and two context components (1:1 intervention and group activity-based intervention). The teacher of each classroom is trained in how to lead whole class groups and schedule a time to meet with every child individually each week. They found that the children in the ASAP groups increased their engagement but they did not find changes in social communication and play as compared to the BAU group (Boyd et. al., 2018).

Gutman et. al. completed a study about role-play activities and their socialization (2012). The scenarios were focused on common interactions they would experience in the school. They acted out the scenario, talked about what went well and what would be better, and re-enacted it. They found that individuals with high-functioning autism (HFA) improved their verbal and nonverbal behaviors (Gutman et. al., 2012).

Caregiver-Assisted Interventions

Two Level I and three Level III studies were reviewed that identified various caregiver-assisted interventions and their impact on social interaction skills in children with ASD. Three studies found statistically significant improvements in social interaction skills while using the DIR/ Floortime Model which is a play and relationship-building intervention for autistic children (Mirzakhani et al., 2022; Helena, Reis, & Pereira, 2018; Lio et al., 2014). Mirzakhani et al. compared DIR/ Floortime to the Son-Rise intervention and both were found to yield statistically significant results on stereotyped behaviors and social interaction skills (2022). The Son-Rise intervention focused on teaching play-oriented methods that focus heavily on social development and social interactions with caregivers and peers. One study looked at the impact of family-centered early intervention and found that it appeared to be effective in enhancing the social interactions and communication functions of participants with ASD (Park et al., 2020). Kasari et al. compared the didactic SKILLS-based and activity-based ENGAGE intervention programs, the results yielded more consistent support for using these social skills and skills-based programs for children with social challenges secondary to ASD (2016).

Limitations

Limitations of this review include: small sample size, lack of gender diversity, parental/caregiver biases amid

younger populations, self-report measures, recall biases, treatment outside of intervention, lack of randomization among studies, administration style of interventions, and differences in control group conditions. Small sample sizes, lack of sample diversity, and other biases impact the ability to generalize the study results to a larger population of autistic individuals. Studies with younger-aged participants required caregivers to report results versus the individual, which could lead to a misinterpretation of the outcomes of the intervention. Several studies had large discrepancies between the control and intervention groups. For example, Kashefimedhr et al. (2017) compared sensory integration intervention to no treatment at all, whereas Pfeiffer et al. (2013) compared sensory integration to fine motor interventions. This can impact the significance of the results found when compared to the control groups. Not all studies included were administered by an occupational therapist, which can influence the transferability of interventions to OT practice. One limitation of the current Rapid Systematic Review is the amount of quality Level 1 RCT studies. Randomization that this level of evidence provides reduces potential research bias that could affect the quality of results and implications found. Therefore, including more Level I studies can provide a more accurate resource for clinicians to use in practice.

Implications to Occupational Therapy Practice

Twenty-five articles were reviewed that provided results on the most prevalent interventions for individuals with ASD to improve socialization. From the findings, thirteen studies yielded strong evidence and support for these various interventions in improving socialization for this specific population. Ten studies showed moderate strength of results, while two showed low levels of strong evidence. Although a few studies showed insubstantial evidence, strong levels of evidence were found in other articles looking at the same interventions. Numerous strong Level I, II, and III studies provided relevant data supporting the use of various interventions to improve social skills in children and young adults with ASD. This systematic review provides clinicians with an evidence-based resource to use in practice.

Every child is different and benefits from different levels of support. This is especially true of individuals with ASD. For this reason, being aware of a variety of interventions that are found to be helpful to individuals with ASD is incredibly important to be able to choose one that would fit the individual's needs. Increasing the number of reliable, evidence-based interventions that OTs have access to promotes autonomy and choice for autistic individuals and caregivers in a healthcare system that rarely provides that.

This review proves that the holistic and individualized nature of the occupational therapy profession is meaningful and impactful to autistic children and their families when it

comes to targeting socialization. The articles that were reviewed in this study showed there to be benefits for these individuals but also indicated a need for further research and development to provide clients and their families with the best care possible.

It would be beneficial for occupational therapists to design and implement additional RCTs and RSRs targeting these and additional interventions. Future research should focus on autistic individuals' perspectives on the outcomes of intervention rather than a caregiver or parent's perspective. By condensing and reviewing evidence-based research regarding socialization and autistic children, occupational therapists can have accessible information to use when developing intervention plans.

References

- American Psychiatric Association – APA. (2000). *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*. Philadelphia: APA.
- Anu, N. R., Sugi, S., & Rajendran, K. (2019). Pretend play as a therapeutic modality to enhance social competence in children with autism spectrum disorder: A quasi-experimental study. *The Indian Journal of Occupational Therapy*, 51(3), 96. https://doi.org/10.4103/ijoth.ijoth_11_19
- Boyd, B. A., Watson, L. R., Reszka, S. S., Sideris, J., Alessandri, M., Baranek, G. T., Crais, E. R., Donaldson, A., Gutierrez, A., Johnson, L. A., & Belardi, K. (2018). Efficacy of the ASAP intervention for preschoolers with ASD: A cluster randomized controlled trial. *Journal of Autism and Developmental Disorders*, 48(9), 3144–3162. <https://doi.org/10.1007/s10803-018-3584-z>
- Chen, C.H., Lee, I.J., & Lin, L.Y. (2016). Augmented reality-based video-modeling storybook of nonverbal facial cues for children with autism spectrum disorder to improve their perceptions and judgments of facial expressions and emotions. *Computers in Human Behavior*, 55, 477–485. <https://doi.org/10.1016/j.chb.2015.09.033>
- Chen, C., Lee, I., & Lin, L. (2014). Augmented reality-based self-facial modeling to promote the emotional expression and social skills of adolescents with autism spectrum disorders. *Research in Developmental Disabilities*; 36. DOI: 10.1016/j.ridd.2014.10.015.
- Cheung, P. P., Brown, T., Yu, M.-lin, & Siu, A. M. (2020). The effectiveness of a school-based social cognitive intervention on the social participation of Chinese children with autism. *Journal of Autism and Developmental Disorders*, 51(6), 1894–1908. <https://doi.org/10.1007/s10803-020-04683-1>

- Cheung, P. P., Siu, A. M. H., Brown, T., & Yu, M.-lin. (2017). A social-cognitive intervention program for adolescents with autism: A pilot study. *Journal of Occupational Therapy, Schools, & Early Intervention*, 11(1), 37–48. <https://doi.org/10.1080/19411243.2017.1408442>
- Gutman, S. A., Raphael-Greenfield, E. I., & Rao, A. K. (2012). Effect of a motor-based role-play intervention on the social behaviors of adolescents with high-functioning autism: Multiple-baseline single-subject design. *American Journal of Occupational Therapy*, 66, 529–537. <http://dx.doi.org/10.5014/ajot.2012.003756>
- Helena I. S. Reis, Ana P. S. Pereira & Leandro S. Almeida (2018). Intervention effects on communication skills and sensory regulation on children with ASD, *Journal of Occupational Therapy, Schools, & Early Intervention*, DOI: 10.1080/19411243.2018.1455552
- Hochhauser, M., Weiss, P., & Gal, E. (2016). Enhancing Conflict Negotiation Strategies of Adolescents with Autism Spectrum Disorder using Video-modeling. *Assistive technology: the official journal of RESNA*; 30. DOI: 10.1080/10400435.2016.1268217.
- Kandalaf, M., Didehbani, N., Krawczyk, DC., Allen, T., & Chapman, SB. (2013). Virtual Reality Social Cognition Training for Young Adults with High-functioning Autism. *J Autism Dev Disord*; 43(1):34-44. doi: 10.1007/s10803-012-1544-6. PMID: 22570145.
- Kasari, C., Dean, M., Kretzmann, M., Shih, W., Orlich, F., Whitney, R., Landa, R., Lord, C. and King, B. (2016), Children with autism spectrum disorder and social skills groups at school: a randomized trial comparing intervention approach and peer composition. *J Child Psychol Psychiatr*, 57: 171-179. <https://doi.org/10.1111/jcpp.12460>
- Kashefimehr, B., Kayihan, H., & Huri, M. (2017). The effect of sensory integration therapy on occupational performance in children with autism. *OTJR: Occupation, Participation and Health*, 38(2), 75–83. <https://doi.org/10.1177/1539449217743456>
- Kumazaki, H., Sumioka, H., Muramatsu, T., Yoshikawa, Y., Shimaya, J., Iwanaga, R., Ishiguro, H., Sumiyoshi, T., & Mimura, M. (2021). Brief report: The effectiveness of hugging a huggable device before having a conversation with an unfamiliar person for autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 52(7), 3294–3303. <https://doi.org/10.1007/s10803-021-05173-8>
- Liao, S.T., Hwang, Y.S., Chen, Y., Lee, P., Chen, SJ., & Lin, LY. (2014) Home-based DIR/Floortime intervention program for preschool children with autism spectrum disorders: preliminary findings. *Phys Occup Ther Pediatr*; 34(4):356-67. DOI:10.3109/01942638.2014.918074.
- London, M. D., Mackenzie, L., Lovarini, M., Dickson, C., & Alvarez-Campos, A. (2020). Animal assisted therapy for children and adolescents with autism spectrum disorder: Parent perspectives. *Journal of Autism and Developmental Disorders*, 50(12), 4492–4503. <https://doi.org/10.1007/s10803-020-04512-5>
- Mirzakhani, N., Asadzandi, S., Ahmadi, M. S., Saei, S., & Pashmdarfard, M.. (2022). The effect of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behaviors of children with Autism Spectrum Disorders: a clinical trial . *Cadernos Brasileiros De Terapia Ocupacional*, 30, e3253. <https://doi.org/10.1590/2526-8910.ctoAO248732532>
- Occupational therapy's role with autism*. American Occupational Therapy Association (AOTA). (2018). Retrieved April 14, 2023, from <https://www.aota.org/-/media/Corporate/Files/AboutOT/Professionals/WhatIsOT/CY/Fact-Sheets/Autism%20fact%20sheet.pdf>
- Omairi, C., Mailloux, Z., Antoniuk, S. A., & Schaaf, R. (2022). Occupational Therapy Using Ayres Sensory Integration®: A Randomized Controlled Trial in Brazil. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association*, 76(4), 7604205160. <https://doi.org/10.5014/ajot.2022.048249>
- Park, H. I., Park, H. Y., Yoo, E., & Han, A. (2020). Impact of family-centered early intervention in infants with autism spectrum disorder: A single-subject design. *Occupational Therapy International*. <https://doi.org/10.1155/2020/1427169>
- Peters, B. C., Wood, W., Hepburn, S., & Bundy, A. (2020). Pilot study: Occupational therapy in an equine environment for youth with autism. *OTJR: Occupation, Participation and Health*, 40(3), 190–202. <https://doi.org/10.1177/1539449220912723>
- Peters, B. C., Wood, W., Hepburn, S., & Moody, E. J. (2021). Preliminary efficacy of occupational therapy in an equine environment for youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 52(9), 4114–4128. <https://doi.org/10.1007/s10803-021-05278-0>
- Pfeiffer, B., Koenig, K., Kinnealey, M., Sheppard, M., Henderson, L. (2013). Effectiveness of Sensory Integration Interventions in Children with Autism Spectrum Disorders: a pilot study. *American Journal of Occupational Therapy*, 65(1):76-85. DOI: 10.5014/ajot.2011.09205
- Raditha, C., Handryastuti, S., Puspongoro, H. D., & Mangunatmadja, I. (2022, August 27). *Positive behavioral effect of sensory integration intervention in young children with autism spectrum disorder*. Nature News. Retrieved March 3, 2023, from <https://www.nature.com/articles/s41390-022-02277-4>
- Sackett, D.L., Rosenberg, W.M., Muir Gray, J.A., Haynes, R.B., & Richardson, W.S. (1996). Evidence-based medicine: What it is and what it isn't. *British Medical Journal*, 312, 71–72.

- Schaaf, R. C., Benevides, T., Mailloux, Z., Faller, P., Hunt, J., van Hooydonk, E., Freeman, R., Leiby, B., Sendekci, J., & Kelly, D. (2014). An intervention for sensory difficulties in children with autism: a randomized trial. *Journal of autism and developmental disorders*, 44(7), 1493–1506. <https://doi.org/10.1007/s10803-013-1983-8>
- Tang, W. Y., Fong, K. N., & Chung, R. C. (2021). The effects of storytelling with or without social contextual information regarding eye gaze and visual attention in children with autistic spectrum disorder and typical development: A randomized, controlled eye-tracking study. *Journal of Autism and Developmental Disorders*, 52(3), 1257–1267. <https://doi.org/10.1007/s10803-021-05012-w>
- Wilkes-Gillan, S. & Falkmer, M.. 2014. A peer-mediated school intervention significantly improved the social skills and playground interactions of children with autism spectrum disorder. *Aust Occup Ther J* 61: 371-372. doi: 10.1111/1440-1630.12159

Appendix 1. Evidence Table

Outcome 1: Socialization				
Sensory-Integration				
<p>Kashefimedhr, et al. (2017)</p>	<p>Level of Evidence: Level 1 Study Design: Randomized Control Trial N= 31 %Female= 9% %Male= 91% Intervention Group, n= 16 Control Group, n= 15</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> ● Sensory difficulties ● Diagnosis of autism according to the DSM 	<p>Intervention Group: Sensory Integration Therapy (play activities and sensory enhanced interactions to elicit the child’s adaptive response)</p> <p>Equipment : swings, bolsters, climbing walls, inner tubes, and trampolines</p> <p>Therapist designed a “just right challenge” that involves their sensory processing skills and motor planning skills</p> <p>Addressed tactile, proprioception, and vestibular challenges</p> <p>Two sessions per week for 45 minutes totalling 24 SIT sessions</p> <p>Control Group: This group was on the therapy clinic waiting list, therefore, this group was not receiving any type of intervention other than their routine school OT they have previously been attending.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● Short Child Occupational Profile (assesses child’s strengths and challenges related to their developmental stage) ● Sensory Profile Measure ● Parent Report 	<p>Results:</p> <ol style="list-style-type: none"> 1. Significantly greater improvement in all domains of SCOPE assessment, including volition, habituation, communication and interaction skills, process skills, motor skills, environment of occ performance, and total scores of all categories. 2. Intervention group showed significantly greater improvement in all factors and domains of Sensory Profile, with the exception of the “emotionally reaction” factor.

		Just used to compare to the intervention group.		
Schaaf, R. C., Benevides, T., Mailloux, Z., et al. (2014).	<p>Level of Evidence: 1 Study Design: RCT N= 32 %Female: 6 %Male: 26 Intervention Group, n= 17 Control Group, n= 15</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Between the ages of 4.0- 7.11 years old • Diagnosed with ASD. • Non-verbal cognitive level of >65 • Demonstrate difficulty processing and integrating sensory information. • Parents had to be willing to attend 3 weekly 1-hour sessions during the 10 weeks that the study is in progress. 	<p>Intervention Group: They received Occupational Therapy- Sensory Integration (OT-SI) that followed the Ayres sensory integration approach. The therapist facilitated the children’s participation in sensory-motor experiences in adaptive ways that fit their individual goals.</p> <p>Control Group: The usual care group received non-study related services that varied based on the children’s needs</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Goal Attainment Scaling (GAS) • Pediatric Evaluation of Disability Inventory (PEDI) • Vineland Adaptive Behavior Scales- II 	<p>Results: The key findings of the study were that participants with ASD in the treatment group scored significantly higher on the primary outcome measure, GAS, compared to those in the control group.</p> <p>Through the secondary outcome measure, the children in the treatment group needed significantly less assistance from their caregivers during socialization and self-care activities.</p> <p>Moreover, behaviors resulting from sensory deficiencies were shown to decrease with intervention compared to the usual care provided.</p>
Raditha, et al. (2022).	<p>Level of Evidence: Level 3 Study Design:</p>	<p>Intervention Group: Received SI-OT</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Vineland Adaptive 	<p>Results:</p>

	<p>Non-Randomized Control Trial N= 72 %Female: 28% %Male: 72% Intervention Group, n= 36 Control Group, n=36</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> Recently diagnosed with ASD Child had never participated in SIT or had only participated for less than 1 month Parents gave informed consent for interviews Completed the SI treatment without any other therapies and medications (intervention group only) 	<p>Exposed participants to multi-sensory simulations through play method</p> <p>Ayres Sensory Integration Interventions specifically designed based on each participant’s sensory profile</p> <p>Control Group: This group did not receive any therapy.</p>	<p>Behavior Scale-II Tool (measures communication domains and daily living skills)</p>	<ol style="list-style-type: none"> Communication domain (receptive and expressive subdomains) were significantly improved compared with the control group. Significant improvements were seen in the socialization domains, including coping skills subdomain compared with the control group. Daily living skills domain with personal and community subdomains showed significant improvement after intervention compared with control group.
<p>Omairi, et al. (2022).</p>	<p>Level of Evidence: Level 1 Study Design: Randomized Control Trial N= 17 %Female: 17.6% %Male: 82.4% Intervention Group, n= 9 Control Group, n= 8</p>	<p>Intervention Group: Manualized Ayres Sensory Integration based OT</p> <p>Individual sensorimotor activities that address the “just right challenge” to create adaptive behavior response</p> <p>Equipment used: mats,</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> PEDI Goal Attainment Scale 	<p>Results:</p> <ol style="list-style-type: none"> Intervention group showed statistically significant improvement compared to the control group on the PEDI functional skills self-care subscale and caregiver assistance social functional subscale. Mean scores for the parent

	<p>Inclusion criteria:</p> <ul style="list-style-type: none"> ● Diagnosis of ASD ● 0-8 years old ● Sensory integration difficulties ● Ability to complete at least 9 of 17 SIPT ● IQ in the 50th percentile or higher 	<p>swings, bolsters, and climbing wall</p> <p>All intervention sessions were videotaped.</p> <p>Continued usual care (therapy sessions they were already attending)</p> <p>Control Group: This group received “usual care” which involved the child's education and therapeutic services they were previously attending.</p> <p>All participants received similar education and therapeutic services that was their “usual care.”</p>		<p>determined scaled goals were significantly greater for the intervention group compared with the control group.</p> <p>3. The intervention group’s goal attainment was closer to their parents’ expectation than the control group’s goal attainment.</p>
<p>Pfeiffer, B., et al. (2013)</p>	<p>Level of Evidence: Level I Study Design: RCT N= 37 %Female: 13.5% %Male: 86.5% Intervention Group, n= 20 Control Group, n= 17</p> <p>Inclusion criteria: The participants had to be between the ages of 6-12 years old, be diagnosed with autism or pervasive developmental disorder</p>	<p>Intervention Group: The treatment group received sensory integration interventions that were based on concepts by Ayres. The interventions used were variable depending on the child’s individual needs. However, they were all grounded in 10 policies for delivering SI therapy. All SI interventions must have included environmental modifications and sensory options, encouraging adaptive thinking, activities</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● SRS (social responsiveness scale) ● VABS-2 ● Goal attainment scaling (GAS) 	<p>Results:</p> <ul style="list-style-type: none"> ● The results displayed significant differences in social responsiveness between the two groups. ● Participants in the SI group had fewer autistic mannerisms than the FM group. ● The SI group exhibited more improvement toward the goals set by GAS, including social functioning, sensory

	(PDD)-not otherwise specified (NOS), and have a T score of greater or equal to 60 on the Sensory Processing Measure.	that aren't too hard or too easy, and supporting a healthy therapeutic relationship. Control Group: The control group were given fine motor interventions that focused on three areas: constructional, fine motor crafts, and drawing and writing.		processing, and motor skills.
Animal-Assisted Interventions				
Peters, et al. (2020).	<p>Level of Evidence: Level 3 Study Design: Case Series N= 8 %Female: n/a %Male: n/a Intervention Group, n= 8 Control Group, n= n/a</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> ● Ages 6-13 ● ASD diagnosis ● NVIQ greater than or equal to 55 on Leiter-3 ● Irritability and hyperactivity subscales of ABC-C greater than or equal to 11 combined ● Meets PATH Intel's physical, mental, 	<p>Intervention Group: in an equine environment with the intervention delivered by an OT; once a week for 10 weeks for 45-60 minutes each session; greetings, ground activities, parent debrief, goodbyes; hippotherapy in an equine environment; therapy was specificized to each individual patient (for example using horse grooming activities to work on arm control of the client)</p> <p>Control Group: n/a</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● Visual inspection ● Statistical analysis (NAP or VAS and ABC-C) 	<p>Results:</p> <ul style="list-style-type: none"> ● There was a significant improvement in performance goals, social motivation, and communication. ● There was a decrease in hyperactivity and irritability. ● Results indicated a need for further research to be done regarding OTEE and its effect on autistic children.

	and emotional standards			
Peters, et al. (2021).	<p>Level of Evidence: Level 3</p> <p>Study Design: Multi-Site Randomized Control Design</p> <p>N= 21</p> <p>%Female: 24%</p> <p>%Male: 76%</p> <p>Intervention Group, n= 11</p> <p>Control Group, n= 10</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> ● Ages 6-13 ● SCQ score greater than or equal to 15 ● ASD diagnosis ● Meets clinical cut-offs for ASD on the ADOS, ADOS-2, or SRS-2 5 ● Score greater than or equal to 55 on the Leiter-3 ● Irritability and hyperactivity subscales of ABC-C greater than or equal to 25 combined ● Can participate in 10 minutes of riding while following safety rules ● Meets PATH Intel's physical, mental, and emotional 	<p>Intervention Group: at 2 different PATH Intl member riding facilities, 5 different OTs, once a week for 10 weeks for 60 minutes each session, receiving horse therapy (OTee HORSEPLAY – Occupational Therapy in an Equine Environment: Harnessing Occupation to Address Self-Regulation, Social Communication and Play in Youth with Autism)</p> <p>Control Group: in public botanic garden or university garden, 6 different OT students, once a week for 10 weeks for 60 minutes each session, activities in nature (standard OT interventions)</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● GAS ● ABC-C ● SRS-2 ● PEDI-CAT ASD ● 3 open-ended questions 	<p>Results:</p> <ul style="list-style-type: none"> ● Social abilities, cognitive abilities, and performance goals had greater improvements following OTee, as opposed to OTGE. ● Salivary cortisol levels decreased following OTee, indicating decreased stress levels among children. ● Social communication, social motivation, irritability, and hyperactivity improvements were partial (communication and hyperactivity changes were not significant; motivation and irritability changes were significant) after OTee. ● General goal attainment, social functioning, and behavioral regulation were significantly increased after OTee versus OTGE.

	standards			
London, et al. (2020).	<p>Level of Evidence: Level 4 Study Design: Case Series N= 17 %Female: 6% %Male: 94% Intervention Group, n= 17 Control Group, n= n/a</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • ASD diagnosis for over 12 months • Parents attended a preparation workshop • Children must be comfortable with and like dogs • Can attend all sessions • Parents living with children in the home • Parents present for at least 3 OT sessions • Voluntarily participating 	<p>Intervention Group: in a therapy clinic by occupational therapists in conjunction with dogs and dog trainers; once a week for 5 weeks, 1 hours sessions; animal assisted therapy with assistance dogs for children with ASD</p> <p>Control Group: n/a</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Semi-structured interviews with parents 	<p>Results:</p> <ul style="list-style-type: none"> • Intervention increased communication, behavioral regulation, interest in new activities, and community participation in the children according to parent interviews. • The use of AAT increased the child's motivation and enjoyment during the session. • Parents support the use of AAT for their autistic children.
Author/Year	Level Of Evidence/Study Design/ Participation/ Inclusion	Intervention and Control Groups	Outcome Measures	Results
Technology				

<p>Kumazaki, et al. (2021).</p>	<p>Level of Evidence: Level 3 Study Design: Self-Report, within subjects design N= 10 %Female: 0% %Male: 100% Intervention Group, n= 10 Control Group, n= 10 (all 10 participants completed both intervention and control)</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> ● Ages 15-24 ● Male ● IQ > or equal to 70 ● ASD diagnosis 	<p>Intervention Group: This group hugged the Hugvie huggable device to represent physical contact for 5 minutes in waiting room before having a conversation with an unfamiliar human or humanoid robot. 2, 5 minute sessions</p> <p>Control Group: Participants represented “normal” waiting room behavior that did not include hugging the Hugvie device before having a conversation with an unfamiliar human or humanoid robot. 2, 5 minute sessions</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● Self Report ● Electrodermal Activity (tracked on watch that participants wore) 	<p>Results:</p> <ol style="list-style-type: none"> 1. Statistically significant differences in the conversations with an unfamiliar person between intervention (Hugvie device) group and control group for the psychological security score (total self-reported scores) 2. Statistically significant differences in the conversations with the humanoid robot between intervention and control group for the EDA (signs of stress or anxiety) and the psychological security total score. 3. Marginally significant differences in the conversations with an unfamiliar person between intervention and control groups for the EDA outcome measure.
<p>Chen, C., et al. (2014)</p>	<p>Level of Evidence: Level III Study Design: Multiple base-line, pre-/post-test N= 3 %Female: 33.3% %Male: 66.7% Intervention Group, n= 3</p>	<p>Intervention Group: Participants used an AR system intervention program for 6 weeks to analyze virtual 3D facial expressions. They listened to a short story, answered questions, and chose an appropriate mask (facial expression) that corresponded with the scene.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ● ARSFM learning system (amount of correct answers) 	<p>Results:</p> <ul style="list-style-type: none"> ● Significant mean difference in performance level between the baseline and intervention phases phase, and between the baseline and follow-up ● AR system enabled participants to improve

	<p>Inclusion criteria: Between the ages of 10-13 years old, have been clinically diagnosed with ASD, have no other specific disabilities, full-scale intelligence quotient of more than 85, and been clinically evaluated according to the DSM-IV. Participants's sensory abilities were in the normal range. They all had poor communication and social skills.</p>	<p>The options for facial expressions were based on the following six emotions: happiness, sadness, fear, disgust, surprise, and anger.</p>		<p>social skills and differentiate emotional facial expressions</p> <ul style="list-style-type: none"> • The ARSFM facilitated the social skills training of adolescents with ASD and increased their ability to recognize various social signals in daily situations.
<p>Hochhauser, M., et al. (2016)</p>	<p>Level of Evidence: Level I Study Design: RCT N= 61 %Female: 9.8% %Male: 90.2% Intervention Group, n= 36 Control Group, n= 25</p> <p>Inclusion criteria: 12-18 years old, diagnosed with ASD by a child neurologist or psychiatrist and confirmed by the social communication questionnaire, and have a receptive vocabulary score of greater than 70 determined by the PPVT.</p>	<p>Intervention Group: Conflict scenario videos were given over the course of 6 wks. The participants role-played possible solutions to the presented conflicts. After, they would discuss their choices and view videos on other ways to respond to the situation. They then had to choose the response that displayed the best adaptive strategy.</p> <p>Control Group: The participants did not receive any type of intervention.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • FFNS (five factor negotiation scale) 	<p>Results:</p> <ul style="list-style-type: none"> • Significant improvement in conflict resolution skills • Significant improvement in the intervention group when compared to the control, especially in self-confidence and communication factors • Results indicate the intervention group showed greater overall negotiation skills than the control group • Teachers reported an increase in communication, problem solving, and ability to negotiate conflicts

<p>Kandalajt, M., et al. (2013)</p>	<p>Level of Evidence: Level III Study Design: Pre-/post-test N= 8 %Female: 25% %Male: 75% Intervention Group, n=8</p> <p>Inclusion criteria: All participants had to have a diagnosis of high functioning autism or PDD-NOS from a licensed psychiatrist.</p>	<p>Intervention Group: Social scenarios were given which were based on meeting a new person, dealing with a conflict, negotiating financial or social decisions, and interviewing for a job. The participants and clinicians would log onto the VR system and would appear as avatars. The clinician would be there to guide the participants in the right direction on the VR and provide prompts.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • ACS-SP (advanced clinician solutions social perception subscales) • SSPA (social skills performance assessment version 3.2) 	<p>Results:</p> <ul style="list-style-type: none"> • The results for the ACS-SP total score were significant • SSPA scores were not significant, but did increase after the intervention • Participants reported social benefits directly related to the intervention, such as drawing them out into social situations, and increasing confidence and insight.
<p>Tang, et al. (2021).</p>	<p>Level of Evidence: Level 1 Study Design: Randomized Control Study N= 52 %Female: 19% %Male: 81% Intervention Group, n= 26 Control Group, n= 26</p> <p>Inclusion criteria: ASD Participants</p> <ul style="list-style-type: none"> • 6-12 years old • ASD diagnosis • Studied in mainstream primary school • Composite IQ score of 80 or more • Parent consent 	<p>Intervention Group: (13 ASD and 13 TD), done by occupational therapists using a story-telling app, 2 a week for 4 weeks for 30 minutes each session, story-telling with social context</p> <p>Control Group: (13 ASD and 13 non-ASD), done by occupational therapists using a story-telling app, 2 a week for 4 weeks for 30 minutes each session, story-telling without social context</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Tobii Eye Tracker • Trail making test 	<p>Results:</p> <ul style="list-style-type: none"> • Storytelling with social contexts increased TVD, TFC, TFD, and modality-specific attention in ASD and TD populations. • Storytelling with social contexts in picture-form improved gaze and attention in social situations for ASD and TD populations. • Storytelling with social contexts in video-form yielded no improvements in ASD or TD populations.

	<p>TD Participants</p> <ul style="list-style-type: none"> • 6-12 years old • No developmental disorder or intellectual disability • Attended mainstream primary school • Parent consent 			
<p>Chen, et al. (2016).</p>	<p>Level of Evidence: Level 4 Study Design: Case Study N= 6 %Female: 17% %Male: 83% Intervention Group, n= 6 Control Group, n= n/a</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • 11-13 years old • ASD diagnosis • FIQ greater than 90 	<p>Intervention Group: in a 3 m by 6 m room in a day-treatment room with a table and chairs, an Intel Core i7 personal computer, a 52-inch LCD monitor, and Sony Vaio Duo Windows 8 tablet computers; 7 sessions for 35-40 minutes each session</p> <ul style="list-style-type: none"> • Children went through an intervention phase where they received an augmented reality intervention. They watched ARVMS learning materials, then they selected one out of six facial expressions and one of six adjectives to answer each question. From there, the participant tried to mimic the expression and 	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • 2 questions after short script during intervention sessions 	<p>Results:</p> <ul style="list-style-type: none"> • Social skills and ability to identify emotional expression (and attainment of these skills) were improved. • Scores: <ul style="list-style-type: none"> ○ Baseline Phase: 30.53%-53.75% ○ Intervention Phase: 93.57%-98.57% ○ Maintenance Phase: 86.66%-94.28% • Observation of nonverbal social signals, overall social skills, identification of six basic facial features, and focus were all targeted and improved by AR technology.

		<p>imagined feeling the emotion related to it. The therapists walked the participant through the correct answer when the participant answered incorrectly.</p> <ul style="list-style-type: none"> Participants also went through a baseline phase and maintenance phase to prepare them and maintain what was learned after the intervention. <p>Control Group: n/a</p>		
Author/Year	Level Of Evidence/Study Design/ Participation/ Inclusion	Intervention and Control Groups	Outcome Measures	Results
Play				
Anu, N. R., Sugi, S., & Rajendran, K. (2019).	<p>Level of Evidence: Level 3 Study Design: Quasi-Experimental Study N= 42 %Female= 17% %Male= 83% Intervention Group, n= 21 Control Group, n= 21 Inclusion criteria:</p> <ul style="list-style-type: none"> Z score below the 	<p>Intervention Group: Learn to Play program→ play actions, object substitutions, play scripts, doll/teddy bear play, social interaction, and role play</p> <p>Child was taught imitation of one play action→ done for 3 days followed by increasing number of play actions with variety of play materials</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> ChiPPA CDDC SIPDC 	<p>Results:</p> <ol style="list-style-type: none"> Significant difference between experimental and control group according to post test scores. Experimental group had significantly higher positive ranks based on the Wilcoxon signed-rank test, meaning the experimental group improved on the components of pretend

	<p>average in the CiPPA</p> <ul style="list-style-type: none"> • Autism Diagnosis • Ages 3-7 • Can verbalize a word or two 	<p>6 days a week for one hour session (total of 80-100 sessions)</p> <p>Control Group: Conventional Play→ involved use of toys and play materials where children were given the opportunity to choose their own play materials and then play and interact with peers</p> <p>1 hour individual therapy sessions for 6 months (60-75 sessions total)</p>		<p>play, including the social aspect.</p> <p>3. Control group pre and post test scores showed high negative rates of pretend play skills according to Wilcoxon sign-ranked analysis.</p>
	Level Of Evidence/Study Design/ Participation/ Inclusion	Intervention and Control Groups	Outcome Measures	Results
School-Based				
<p>Wilkes-Gillan & Falkmer (2014) https://doi.org/10.1111/1440-1630.12159</p>	<p>Level of Evidence: Level 1</p> <p>Study Design: Randomized Control Trial</p> <p>N= 60</p> <p>Intervention Group (CHILD), n=30</p> <p>Intervention Group (PEER), n=30</p> <p>Control Group, n=30</p>	<p>Intervention Group: CHILD Intervention – child with ASD met with trained therapist during lunch for 20 minutes twice per week for 6 weeks. The therapist used direct instruction and role-playing to target skill development.</p> <p>PEER Intervention - three typically developing peers from the target child's classroom met with a therapist for 20 minutes twice per week for 6 weeks. Through direct instruction,</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Social network (SN) survey • Teacher Perception of Social Skills • Playground Observation of Peer Engagement 	<p>Results: The PEER group was a large, clinically significant effect while the CHILD group was a small non-significant effect. The results support previous research findings that interventions should be executed in the child's natural environment to ensure generalization of social skills.</p>

	<p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Age 6-11 • ASD diagnosis 	<p>modeling, and role-playing, peers were taught how to: encourage positive social interactions, initiate play, and facilitate games for children who had difficulty making friends.</p> <p>Control Group: No intervention</p>		
<p>Cheung et. al. (2020) https://doi.org/10.1007/s10803-020-04683-1</p>	<p>Level of Evidence: Level 2 Study Design: Mixed methods, two-group pre and post test design</p> <p>N= 74</p> <p>9.5% Female, 90.5% Male</p> <p>Intervention Group, n=74</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Age 6-14 years • Interested in playing with peers of similar age • Can read, understand, and complete questionnaires • Children had a parent or guardian fluent in Cantonese and willing to participate in the 	<p>Intervention Group: Groups of 6-9 children were met to take part in the social cognitive intervention program for 1 hour at a time. Interventions had teaching and practical sessions (including games and role-play). Teaching sessions had visually scaffolded materials using PowerPoints and were presented verbally. They had a lesson schedule, homework for the next week, and a summary of social skill tactic reminders.</p> <p>Control Group: No intervention. Initial test and tested 10 weeks later.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Parent perceived changes in social skills (GAS and SSIS-RS-C) • ToM Knowledge (GAS and ToM Measures) 	<p>Results: School-based social skills intervention, which promotes the generalization of social skills in a naturalistic environment, has become a promising new trend for intervention. The school based social cognitive program is a promising intervention trend that is easy to implement and is a cost-effective intervention. They recommend using the program as the generalizability and applicability in cross-cultural context (such as Hong Kong) were examined and supported.</p>

	<ul style="list-style-type: none"> study <ul style="list-style-type: none"> Parents and children had resided in Hong Kong for a minimum of 2 years 			
<p>Boyd et. al. (2018) https://doi.org/10.1007/s10803-018-3584-z</p>	<p>Level of Evidence: Level 1 Study Design: Cluster Randomized Trial</p> <p>N= 78 classrooms (161 participants) were selected and equally allocated to the ASAP intervention or Business-as-usual (BAU) control condition</p> <p>13.7% Female, 86.3% Male</p> <p>Intervention Group, n=40 classrooms (1 of these dropped out of the study) totaling 85 children in the intervention (3 of these excluded after classroom dropped out)</p> <p>Control Group, n=38 classrooms (2 of these dropped out of the study) totaling 76 children in the control (3 of these excluded after randomization because classroom dropped out)</p> <p>Inclusion criteria:</p>	<p>Intervention Group: Implementing sections of the ASAP (advancing social-communication and play) manual specify dosage, offer guidelines for the use of evidence-based instructional strategies, and provide a compendium of possible activities for group and 1:1 contexts to address each goal in the social-communication and play hierarchies.</p> <p>Control Group: Teachers continued with their standard practice and received no supplemental training or coaching from ASAP staff.</p>	<p>Outcome Measures:</p> <p>Primary Child Outcomes:</p> <ul style="list-style-type: none"> Social Communication and Play Skills (Structured Play Assessment) <p>Secondary Child Outcomes:</p> <ul style="list-style-type: none"> Caregiver Teacher Rating Form (CTRF) 	<p>Results: Children who participated in ASAP were significantly less likely to be unengaged, and conversely, more likely to be engaged in an appropriate engagement state. These children were rated as being significantly more engaged. They found changes in child engagement but not in social-communication or play. Improvement in children’s communication skills are associated with decreases in challenging behavior; but since they didn’t find significant effects on social-communication outcomes they are not surprised that they did not see concomitant differences for challenging behavior. They found no significant treatment effects for the primary child outcomes of social-communication or play. No significant group differences were found for the secondary child outcome of challenging behavior. Significant group by time interactions were found for the secondary outcome of child engagement in favor of the ASAP group. Children who participated in the ASAP group were significantly less likely to be unengaged, and</p>

	<ul style="list-style-type: none"> • Age 3-5 years • Enrolled in a public school classroom • Educational classification of developmental delay or autism and/or clinical diagnosis that placed them on the autism spectrum • Met diagnostic criteria on the autism diagnostic observation schedule-generic • Enrolled in the classroom by October 31st of each year 			conversely, more likely to be engaged in an appropriate engagement state (based on the “some engagement” variable).
<p>Gutman et. al. (2012) http://dx.doi.org/10.5014/ajot.2012.003756</p>	<p>Level of Evidence: Level 3</p> <p>Study Design: Multiple-baseline single-subject ABA design (baseline, intervention, follow-up probe)</p> <p>N=7</p> <p>0% Female, 100% Male</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Diagnosis of HFA in their IEP • Age 15-21 (actual ages 15-17) 	<p>Intervention Group: Role-play activity. Example: asking a friend to study after school; talking to peers in the lunchroom, joking with teammates on the soccer field. Participants role played the scenarios, the group discussed the motor behaviors, and they practiced the scenarios again.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Recording sheet developed by the researchers and reviewed by a panel of OTs 	<p>Results: Adolescents with high functioning autism (HFA) improved their verbal and nonverbal behaviors as a result of a role-play intervention. Phase 1 had the most learning, so it might be even more beneficial to increase the dose and duration of phase 1. It wasn't tested to see if gains transferred, but teachers, administrators, and parents reported gains in real-life situations. A motor based role playing program helps clients sequence motor skills with social skills may uniquely enhance social skill use in adolescents with HFA; pairing of participants should be based on</p>

	<ul style="list-style-type: none"> Intelligence levels of “normal” or above as determined by high school aptitude tests 			similar functional social skills at baseline; future programs should be designed to provide a greater number of intervention sessions in the first 3 months and later intervention phases can be shorter.
<p>Cheung et. al. (2017) https://doi.org/10.1080/19411243.2017.1408442</p>	<p>Level of Evidence: Level 3 Study Design: Mixed research design</p> <p>N=7</p> <p>0% Female, 100% Male</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> In grades 7 or 8 Has ASD Reported by educational psychologists, school social workers, or parents to have challenges with social skills 	<p>Intervention Group: The group participated in a social cognitive training program with a different core social skill as the teaching focus at each of the 10 sessions. They developed client centered goals, went through social scenarios and wrote participants’ answers, caregiver questionnaires about the child’s social-cognitive understanding, and an interview evaluation at the end of the intervention program.</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> The Chinese Version Social Skills Improvement System Rating Scales (SSIS-RS-C) 	<p>Results: The social-cognitive intervention program helped adolescents with autism improve socialization. They found that they increased knowledge of social skills, socializing with friends more often, and increased positive social behaviors. They found that there were still partial gains maintained 2 months following the intervention. There were increased strange stories test scores and parent reports of improvement in mental state and social skills. Only some of the things were maintained.</p>
Caregiver-Assisted Interventions				
<p>Mirzakhani, N., Asadzandi, S., Ahmadi, M. S., et al. (2022)</p>	<p>Level of Evidence: 1 Study Design: RCT N= 60 %Female: 17 %Male: 43 Intervention Group, n= 20</p>	<p>Intervention Group: Son-Rise focuses on involving the family to enable their children to build learning, skill acquisition, and social skills. The therapist uses an imitation technique to show the child</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> Autism Social Skills Profile 	<p>Results: Son-Rise and Floor Time interventions were found to have a statistically significant impact on social interaction skills of children with ASD.</p> <p>In regards to the effect on stereotyped behaviors, the Son-Rise</p>

	<p>2nd Intervention Group, n=20 Control Group, n=20</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • ASD diagnosis, age range 6 to 8 years, • Children referred to rehabilitation centers in Alborz province • In Level 1 (“Requiring support”) severity classifications proposed by the DSM-5 autism spectrum criteria. 	<p>that they have accepted the child and leads the child to a two-person play</p> <p>2nd Intervention Group: Floor Time is child-led, on the floor, and performed by the therapist and mothers in two areas of play and ADLs. The level of activity and period of attention of the child determines the direction of play or conversation instead of the predetermined educational structure</p> <p>Control Group: these participants received routine OT services/ classroom training.</p>		<p>and Floor Time interventions were also found to yield statistically significant results.</p> <p>However, the difference between the post-test and follow up in both interventions were not significant which indicates stability of treatment over time.</p>
<p>Helena I. S. Reis, Ana P. S. Pereira (2018)</p>	<p>Level of Evidence: 3 Study Design: Single-group N= 25 %Female: 17 %Male: 8 Intervention Group, n= 25 Control Group, n=0</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • The children were under 18 • Diagnosed with ASD • Attended to by interdisciplinary 	<p>Intervention Group: Caregivers were encouraged to observe their child’s cues, follow the child’s lead, and implement the Floortime™ principles where appropriate for their child’s current level of functional development to achieve the identified goals.</p> <p>Control Group: N/A</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Assessment Scale of Children with ASD 	<p>Results: In general, the SC dimension scores were higher. Before the intervention, the parents scored their children with a mean value of 49.9, and after the intervention, the values increased to a mean of 56.4 points. The results obtained in the SC dimension show that the intervention based on the principles of the DIR model have improved the quality of this area of development in these children. The same is true for the SP dimension post intervention. There were no statistically</p>

	team of (OT, SLP, psychologist)			significant changes in the RBRI dimension after intervention.
Park, H. I., Park, H. Y., Yoo, E., & Han, A. (2020)	<p>Level of Evidence: 3</p> <p>Study Design: Single-group</p> <p>N= 3</p> <p>%Female: 0</p> <p>%Male: 3</p> <p>Intervention Group, n=3</p> <p>Control Group, n=0</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Infants with a score of ≥ 8 in the Modified Checklist for Autism in Toddlers, Revised, with Follow-Up (M-CHAT-R/F) [19] • Aged between 24 and 36 months • Not diagnosed with disorders other than ASD • Caregivers agreed to participate in the study 	<p>Intervention Group: Family- centered early intervention on the social interaction of infants with suspected ASD, follow-up tests were performed 4 weeks after the end of baseline phase.</p> <p>Control Group: N/A</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • Evaluation of Social Interaction 2nd edition 	<p>Results: After applying the family-centered early intervention program, all participants significantly improved during the intervention phase and continuously improved after the intervention. In particular, participants 2 and 3 had little interaction with the caregiver before the intervention, but they used and learned to use social response, social smile, and gestures in the free play situation during the intervention. In participant 1, produced speech was significantly improved from the early stage of intervention. Participant 3 was only able to speak the word mother during baseline phase A, but the infant began to speak in sentences during intervention. In the present study, family-centered early intervention appeared to be effective in enhancing social interactions and communication functions of participants with ASD.</p>
Kasari, C., Dean, M., Kretzmann, M., et al. (2016)	<p>Level of Evidence: 1</p> <p>Study Design: RCT</p> <p>N= 148</p> <p>%Female: 20</p>	<p>Intervention Group: ENGAGE condition: each ENGAGE group meeting consisted of collectively establishing a daily schedule</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • The Friendship survey • Playground Observation of Peer 	<p>Results: Contrary to expectations, results yielded more consistent support for a skills-based, social skills group</p>

	<p>%Male: 128 Intervention Group, n= 80 2nd Intervention Group, n= 57</p> <p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Diagnosed with ASD • An IQ greater than or equal to 65, between ages of 6-11 years old • In grades 1-5 • More than half from ethnic/ racial minority backgrounds 	<p>in order to encourage cohesiveness among group members. Activities included conversational exercises, structured games, free play, improvised storytelling, and music. Peers were encouraged to take leadership of their own groups with supervision from adults as needed.</p> <p>2nd Intervention Group: SKILLS condition: Each session began with children checking in for the day and reviewing the lesson and homework from the week before. Next, they participated in an interactive lesson during which the topic of the day was introduced, and an activity was completed to practice that skill</p> <p>Control Group: N/A</p>	<p>Engagement (POPE)</p>	<p>consisting of all children with social challenges than a mixed (typical and ASD) social skills group. Social networks were significantly improved for children in the SKILLS group who entered the study with high conflict and low closeness with their teachers, or if children received high teacher closeness scores and they received the ENGAGE group. They may be among the first data suggesting that children with different quality caregivers–child relationships benefit more from specific types of social skills interventions.</p>
<p>Liao, ST., et al. (2014)</p>	<p>Level of Evidence: Level III Study Design: Single group design, pre-/post-test N= 11 %Female: 0% %Male: 100% Intervention Group, n= 11</p> <p>Inclusion criteria: Between the ages of 45-69 months. All children had to</p>	<p>Intervention Group: The intervention was based on the principles of the DIR/Floortime. Before the intervention each mother attended a 3-week one-on-one training course to learn/practice DIR/ Floortime. The mothers then set individualized goals for their children. For the intervention program, each family received a manual to</p>	<p>Outcome Measures:</p> <ul style="list-style-type: none"> • FEAS (functional emotional assessment scale) • VABS-II (vineland adaptive behavior scales) 	<p>Results:</p> <ul style="list-style-type: none"> • The mean scores for the overall FEAS and the six domains increased and were significant with medium to large effect size. • The engagement and relating, two-way purposeful interaction, and social problem solving

	have a diagnosis of an autistic disorder by a mental health professional and a nonverbal intelligence quotient of 67 to 122.	facilitate the application of play of play strategies to daily activities. They had to conduct the intervention 10hr per week for 10 weeks.		domain showed showed significant improvement <ul style="list-style-type: none">• Significant improvement in the total VABS-II score and domains of communication, daily living skills, and social.• Overall, the results show that DIR/Floortime interventions increase social interaction and adaptive behaviors of children in ASD
--	--	---	--	--