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Joint Attention and Occupations for Children and Families Living with Autism Spectrum Disorder: A Scoping Review

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Joint Attention and Occupations for Children and Families Living with Autism Spectrum Disorder: A Scoping Review

Abstract

Background: Research reports that children living with autism spectrum disorder (ASD) may demonstrate deficits in social, emotional, behavioral, and communication skills, which adversely affect social participation and occupational engagement. Joint attention skills constitute any nonverbal communication that captures the attention of another to create a shared interactional experience. The components of joint attention can be targeted through intervention to promote occupational engagement in childhood co-occupations.

Methods: A scoping review process was applied in the current study. Nineteen studies met the inclusion criteria to be analyzed through critical appraisal of topics and use of a matrix.

Results: Evidence indicates that joint attention skills can be developed in children living with ASD through targeted teaching interventions. Analysis of the data elucidated emergent themes in the form of commonly used strategies to develop joint attention skills in children living with ASD.

Conclusion: Joint attention teaching strategies can be implemented to develop social interaction performance skills in children living with ASD. The benefits of developing joint attention skills in this population directly relate to improved occupational and co-occupational engagement. Joint attention teaching strategies naturally align with occupational therapy techniques and approaches and should be considered as an enhancement to occupational therapy intervention.

Keywords

co-occupation, occupational engagement, occupational therapy, social participation

Cover Page Footnote

The authors would like to acknowledge the student investigators who served as data collectors and participated in establishing the first round of elimination criteria.

Credentials Display

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Autism spectrum disorder (ASD) refers to a range of complex neurodevelopmental disorders that have been historically diagnosed separately in early childhood but are now encompassed under the umbrella term ASD (American Psychiatric Association [APA], 2013; Centers for Disease Control and Prevention [CDC], 2016). The previous diagnoses of autistic disorder, pervasive developmental disorder not otherwise specified, and Asperger's syndrome are currently diagnosed as ASD (CDC, 2016). According to the CDC (2016), ASD occurs across all racial, ethnic, and socioeconomic groups, with a higher prevalence in males than in females. Traditionally, children were not diagnosed with ASD until they reached school age. At present, early indicators of ASD can be detected in children at 18 months old, and an experienced physician can diagnose ASD in children as young as 2 years of age with high reliability (CDC, 2016). The high prevalence of this condition warrants controlled, rigorous research on the needs and interventions that best serve this population.

To meet the diagnostic criteria for ASD, a child must exhibit persistent social communication and interaction deficits along with repetitive and/or restrictive behaviors (APA, 2013; CDC, 2016). ASD is associated with impaired social, emotional, behavioral, and communication skills that delay achievement of developmental milestones and affect social and occupational functioning. According to the CDC (2016), children with ASD may have difficulty relating and responding to others, maintaining eye contact, demonstrating social reciprocity, showing mutual interest through

verbal and nonverbal communication, and initiating social interaction. These social and interactive skills serve as the precursors and components of joint attention (JA) processes, and extensive research has been conducted to support these deficits in children living with ASD (Clifford & Dissanayake, 2008; Hobson & Hobson, 2007; Leekam & Ramsden, 2006; Naber et al., 2007; Scambler, Hepburn, Rutherford, Wehner, & Rogers, 2007; Schietecatte, Roeyers, & Warreyn, 2012; Sullivan et al., 2007; Watson, Crais, Baranek, Dykstra, & Wilson, 2013; Wong & Kasari, 2012).

Despite extensive research on the topic of JA for children living with ASD, it remains a rather elusive construct that is difficult to define. Thus, it becomes important to operationally define and describe what is meant by JA and the different types of JA. For this study, JA is defined as any nonverbal communication (i.e., gazes, gestures, exaggerated responses, sounds) to capture the attention of another individual to create a shared interactional experience. Social experiences can be classified as either dyadic, in which there is a shared focus between two individuals, or triadic, in which there is a shared attentional focus between oneself, a social partner, and a common object or event (Chiang, Chu, & Lee, 2016). Dyadic behaviors are typically thought of as precursor behaviors to JA that emerge in the first year of life and include eye contact and affect, while triadic behaviors constitute a higher-level skill set of JA, such as gaze switching, pointing, giving, and initiating requests (Clifford & Dissanayake, 2008; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010). Both dyadic and

triadic behaviors are thought to contribute to the development of JA skills.

There are two common types of JA involved in social experiences that are reported and differentiated in the literature: Responding to JA (RJA) and initiating JA (IJA). In children, RJA is considered a more fundamental skill, incorporating monitoring and following the gaze of a social partner; conversely, IJA in children is more complex, as it involves pointing, showing, giving, requesting, and alternating eye contact to capture the attention of another individual and create a shared social experience (Chiang et al., 2016; Hobson & Hobson, 2007; Kasari et al., 2010). The development of JA is thought to be closely related to the ability to relate to the mental state of others in the form of feelings, intentions, and experiences (Schietecatte et al., 2012). Considering the aforementioned social deficits associated with children living with ASD and prior research conducted on JA, it becomes clear that JA skills are an important area to target in the context of intervention.

JA intervention (JAI) is defined as the teaching of JA skills, and this approach to intervention has been researched extensively in the past decade (Chiang et al., 2016; Franco, Davis, & Davis, 2013; Gulsrud, Kasari, Freeman, & Paparella, 2007; Ingersoll, 2012; Jones, Carr, & Feeley, 2006; Kaale, Smith, & Sponheim, 2012; Kasari, Freeman, & Paparella, 2006; Kasari et al., 2010; Kim, Wigram, & Gold, 2008, 2009; Lawton & Kasari, 2012a, 2012b; Martins & Harris, 2006; Rocha, Schreibman, & Stahmer, 2007; Schertz,

2007; Wong, 2013; Wong, Kasari, Freeman, & Paparella, 2007; Yoder & Stone, 2006). JA teaching strategies tend to incorporate principles from applied behavior analysis in the context of a table-top play routine or a naturalistic play setting (Kasari et al., 2010). JAI has been used to develop skills to promote social interaction, joint engagement, expressive and receptive language skills, play, parent-child relationships, social motivation, and quality of friendships (Franco et al., 2013; Freeman, Gulsrud, & Kasari, 2015).

According to the *Occupational Therapy Practice Framework: Domain and Process* (American Occupational Therapy Association [AOTA], 2014a), occupations are central to an individual's identity and constitute any daily activities in which people engage. Case-Smith (2015) indicates that young children spend a considerable amount of time engaged in play, thus play is a child's main occupation. Play is important to consider as an intervention tool to improve specific developmental skills and as an intervention goal to improve the occupation itself. Children with ASD typically show different play patterns and have difficulty with reciprocal interactions, which can have an adverse effect on occupational engagement and family relationships (Case-Smith, 2015). The concept of co-occupation is important to consider in childhood because of the dependent nature of young children on adults, particularly their parents. Co-occupation can be defined as any occupation in which two or more people share engagement physically, emotionally, and intentionally (Dooley, 2014). Essentially, most childhood occupations, including activities of daily

living routines, sleep preparation, education, play, and social participation, can be thought of as co-occupations (AOTA, 2014a, 2014b). JA skills are strongly correlated with appropriate social interactions, and it becomes clear that impaired JA skills in this population can adversely affect the interactive nature of occupational engagement in co-occupations.

Method

To address the evidence supporting JA and JAI, and to link this evidence to occupation-based outcomes, the researchers chose to approach the current study through the application of a scoping review process. Scoping reviews are appropriate when researchers seek to collect and organize existing empirical evidence related to an intervention strategy and apply that evidence to a new area of practice where gaps in the literature may exist (Armstrong, Hall, Doyle, & Waters, 2011). A scoping review was chosen over a systematic review for the current study to enable the researchers to start with a broad research question to be refined as the study progressed. Another key rationale for the use of a scoping review process is that the researchers' exclusion criteria evolved systematically over the course of this study. The steps in the process followed those of Arksey and O'Malley (2005) and included:

1. Identifying and refining the research question.
2. Identifying relevant studies by following a structured search strategy.
3. Selecting studies using a multi-stage iterative team approach to refine exclusion criteria.

4. Obtaining results by charting the data through critical appraisal of the studies and analysis using a matrix to categorize data and elicit themes.
5. Synthesizing and summarizing findings as related to occupational therapy practice.

The initial research focus was to determine the effects of JA on social participation for children living with ASD, and over the course of the study this evolved into a more occupation-based focus. The resulting research question for the current study emerged as follows: Does teaching JA strategies improve engagement in occupations and co-occupations for children and families living with ASD?

The initial research team was made up of nine student investigators who assisted with the initial article search and with the first round of article elimination as part of an evidence-based research project in the students' occupational therapy curriculum. The research team began this study with a search of seven databases—CINAHL, ERIC (EBSCO), ProQuest Nursing and Allied Health Source, PsycINFO (EBSCO), PubMed, Taylor & Francis Online, and Google Scholar—using the following key words: Joint Attention; JA; Joint Attention Skills; Joint Attention Intervention; JAI; Joint Attention Training; Teaching Joint Attention; Joint Attention and Neurodevelopmental Disorders; Joint Attention and ASD; Joint Attention and Autism; Social Skills Training and ASD; Social Participation and Joint Attention; Social Participation and ASD; Joint Attention and Play; Joint Attention and Education; Joint Attention and

Sleep Routines; Joint Attention and Activities of Daily Living; and Joint Attention and Co-occupation. The following inclusion criteria guided the initial search of the databases: Studies had to be peer-reviewed, written in the English language, study JA in some way, and include participants from birth to 18 years of age living with a neurodevelopmental disorder affecting social participation. The initial inclusion criteria yielded 198 peer-reviewed articles to be considered in this study.

After the initial yield of studies, the articles were assessed through critical appraisal of topics and analysis using a matrix. The matrix format allowed individual articles to be considered in an organized table based on the level of evidence, study design, number of subjects and demographics, interventions, measured outcomes and assessments used, and findings and results. The purpose of this analysis was to elicit themes in the data to further develop exclusion criteria. Once the initial matrix was developed by the research team, the two co-investigators independently reviewed the data for themes to refine the matrix and research question. The matrix findings were used in the context of a multi-stage iterative group process resulting in three levels of exclusion criteria to reach the final item pool of 19 articles to be considered in this study (see Figure 1). As the exclusion process progressed, the co-investigators collaboratively decided to focus on studies that aimed to teach or develop JA skills in children living with ASD based on trends in the data. The final exclusion criteria used for the current study were refined to exclude:

children younger than 18 months old or older than 8 years of age, children with diagnoses other than ASD, studies published more than 10 years ago, studies that relied solely on technology as the method of delivery, studies lacking occupation-based interventions or outcomes, studies that did not focus on developing or teaching JA skills, and studies below Level III evidence according to the AOTA evidence guidelines (AOTA, 2012).

Results

The co-investigators created a subsequent matrix for the purpose of charting the data based on the 19 studies that were retained after application of the refined exclusion criteria. It was determined that all of the remaining studies in this analysis are classified as Level I, II, or III based on the AOTA evidence standards (AOTA, 2012). Of the 19 included studies, a majority ($n = 13$) featured randomized controlled trial (RCT) designs with subject numbers ranging from 10 to 61, with an average of 37 participants across all RCTs (Gulsrud et al., 2007; Ingersoll, 2012; Kaale et al., 2012; Kasari et al., 2006, 2010; Kim et al., 2008, 2009; Lawton & Kasari, 2012a, 2012b; Schertz et al., 2013; Wong, 2013; Wong et al., 2007; Yoder & Stone, 2006). One study featured a non-randomized controlled trial design, with an equivalent sample size of 34 participants (Chiang et al., 2016). Five studies featured multiple baseline single-group design, with a fewer number of participants ranging from two to six per study (Franco et al., 2013; Jones et al., 2006; Martins & Harris, 2006; Rocha et al., 2007; Vismara & Lyons, 2007).

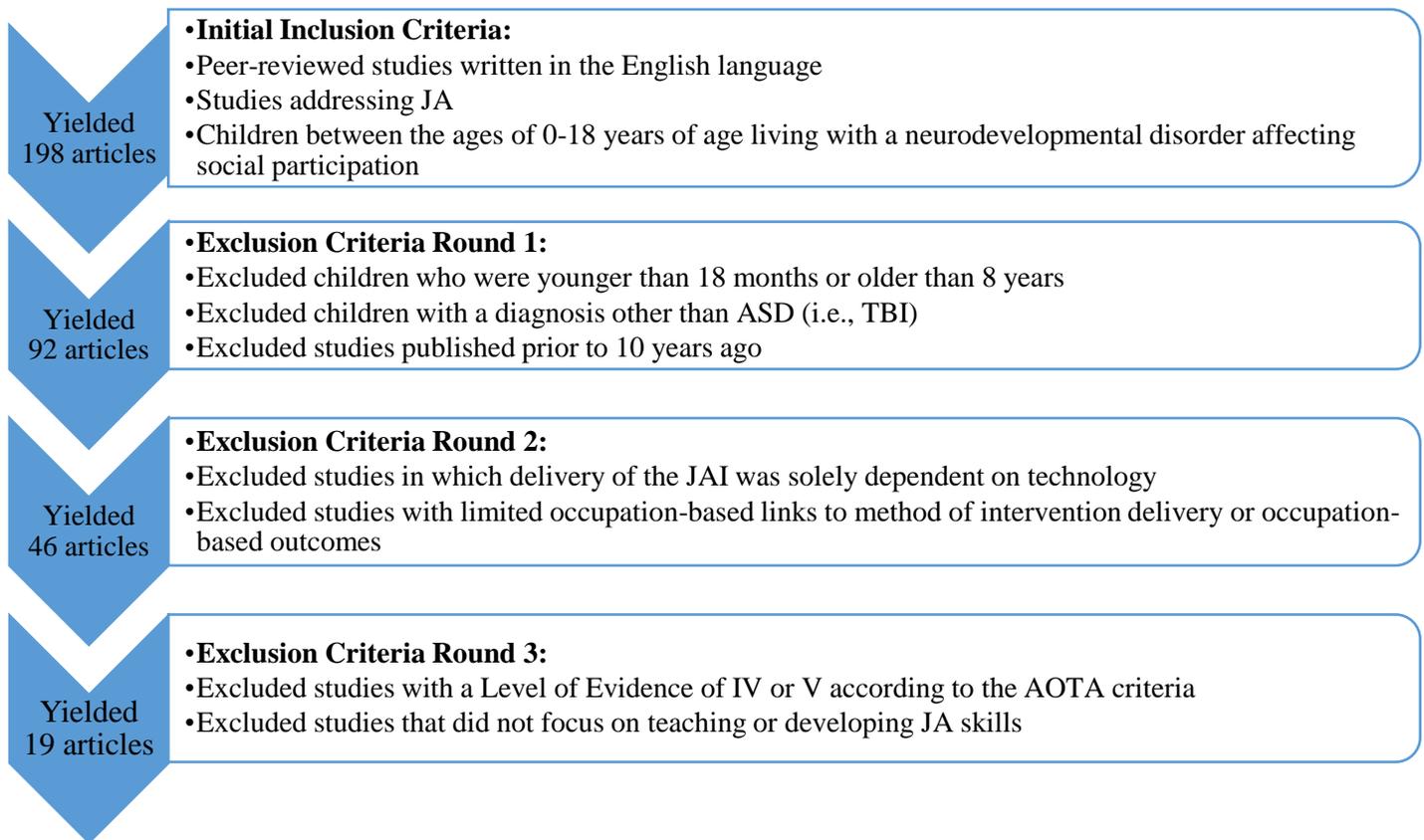


Figure 1. Visual illustration of multi-stage exclusion process.

The studies analyzed in the matrix yielded overwhelmingly positive results and indicate that various strategies may be effective for developing specific aspects of JA in children living with ASD. Only two studies did not find significant positive results in regard to the overall development of JA skills (Chiang et al., 2016; Martins & Harris, 2006). Although significance was not found in the form of an increase in or development of JA skills, both studies indicate that intervention techniques were effective for developing foundational skills considered to be precursors to JA, including social motivation to participate in interactions and joint engagement (Chiang et al., 2016; Martins & Harris, 2006).

Findings from several studies indicate that JA skills can be developed in children living with ASD through targeted training. Specifically, results from studies focused on developing JA skills in this population indicate that targeted interventions can have a positive effect on social communication and interaction skills (Franco et al., 2013; Gulsrud et al., 2007; Jones et al., 2006; Kim et al., 2008, 2009; Lawton & Kasari, 2012a, 2012b; Martins & Harris, 2006; Schertz et al., 2013; Vismara & Lyons, 2007; Wong, 2013); response to JA and overall JA behaviors (Kasari et al., 2010; Kim et al., 2008; Rocha et al., 2007; Schertz et al., 2013; Wong, 2013); and initiating JA skills (Franco et al., 2013; Ingersoll, 2012; Jones et al., 2006; Kaale et al., 2012; Kasari et al., 2006; Kim et al., 2009; Lawton

& Kasari, 2012b; Rocha et al., 2007; Schertz et al., 2013; Vismara & Lyons, 2007; Yoder & Stone, 2006).

Several studies in this investigation went beyond basic interventionist-implemented JA teaching techniques by incorporating children's parents and teachers in naturalistic contexts. Multiple studies indicate that parents can effectively develop JA skills in children living with ASD to various degrees following education by trained interventionists (Chiang et al., 2016; Jones et al., 2006; Kasari et al., 2010; Rocha et al., 2007; Vismara & Lyons, 2007). Similar findings indicate that teachers of children living with ASD can effectively elicit JA skills in classroom settings following targeted intervention training from interventionists (Kaale et al., 2012; Lawton & Kasari, 2012b; Wong, 2013).

In addition to positive findings on the overall effectiveness of JA teaching strategies immediately post-intervention, a large number of studies have found that significant improvements in various aspects of JA skills maintain at follow-up assessments after 4 to 6 weeks (Franco et al., 2013), 2 to 3 months (Chiang et al., 2016; Ingersoll, 2012; Rocha et al., 2007), 6 months (Lawton & Kasari, 2012a), and 1 year postintervention (Kasari et al., 2010; Lawton & Kasari, 2012a). Furthermore, findings indicate that JA skills developed through targeted teaching interventions may be generalizable to novel adults, settings, and play routines (Jones et al., 2006; Kaale et al., 2012; Kasari et al., 2006; Rocha et al., 2007; Wong et al., 2007).

The studies included in this analysis were determined to be high-quality, rigorous research experiments through critical appraisal of topics. Fourteen studies used structured or standardized assessments, contributing to the strength of the research findings (Chiang et al., 2016; Franco et al., 2013; Ingersoll, 2012; Kaale et al., 2012; Kasari et al., 2006, 2010; Kim et al., 2008; Lawton & Kasari, 2012a, 2012b; Rocha et al., 2007; Schertz et al., 2013; Wong, 2013; Wong et al., 2007; Yoder & Stone, 2006). Of the studies that incorporated video recording for the purpose of analyzing observational data, nearly all of them used some combination of blinded, independent assessors to code data with documentation of acceptable levels of inter-observer agreement, thus contributing to the strength of the experimental design (Chiang et al., 2016; Franco et al., 2013; Gulrud et al., 2007; Jones et al., 2006; Kaale et al., 2012; Kasari et al., 2010; Kim et al., 2009; Lawton & Kasari, 2012b; Schertz et al., 2013; Vismara & Lyons, 2007; Wong, 2013; Yoder & Stone, 2006). All included studies incorporated measures to control for bias and contribute to the quality of the research in the current investigation.

Despite significant methodological strengths, there are some limitations to the studies included in this analysis. As mentioned, six of the 19 studies had a relatively small sample size of 10 or fewer participants, which is a common feature of clinical research. This makes certain results difficult to generalize to the entire population of children living with ASD, and as such, findings should be interpreted with caution. Although not a methodological flaw, the fact that some studies did

not incorporate naturalistic contexts poses a limitation in the application of these findings in the present study. Therefore, it may be difficult to say with confidence that all results can be linked to naturalistic, context-based benefits in children living with ASD.

Both coinvestigators independently reviewed the matrix prior to collaboration; this review elucidated emergent themes related to the role of JA in childhood occupations. Many studies included multi-faceted primary and secondary outcomes. Examples of primary outcomes included joint engagement quality and duration, communication, expressive language, IJA, RJA, and JA quality (Chiang et al., 2016; Franco et al., 2013; Ingersoll, 2012; Kasari et al., 2010; Lawton & Kasari, 2012a, 2012b); secondary outcomes included vocalizations, eye gazes, gestures,

imitation, and caregiver quality of involvement (Franco et al., 2013; Ingersoll, 2012; Kasari et al., 2010; Martins & Harris, 2006). For the purposes of the current investigation, the four primary outcome categorizations are included as: (a) JA behaviors and RJA, (b) IJA, (c) Joint Engagement, and (d) Social Interaction and Communication. All primary outcome categories used in this study relate to benefits in children's occupational engagement as a result of JA teaching strategies.

Joint Attention Behaviors and Responding to Joint Attention

There are various approaches used to elicit JA behaviors and develop RJA in children living with ASD that may be effective. For a summary of commonly used strategies to achieve this primary outcome, see Table 1.

Table 1

Common Strategies Used to Develop JA Behaviors and RJA

-
- Child-directed play followed by more structured, directed play to allow the child time to respond or demonstrate the target behavior
 - The use of motivating objects to maintain child interest
 - Hierarchical prompting, if necessary (verbal, physical, hand-over-hand assist)
 - Incorporating social praise and corrective feedback
-

Kim, Wigram, and Gold (2008) used an intervention that involved non-verbal improvisational music that was attentive and aligned with the children's musical and non-musical expression to elicit musical attunement. Musical attunement attempts to establish and promote a child's ability to relate to the music, with the goal that there will be a resulting interaction between the therapist and child (Kim et al., 2008). Intervention

involved 30-min sessions that began with 15 min of undirected, child-led play supported by the therapist, and followed with 15 min of more directed play with the therapist. In the therapist-directed portion of the intervention, the therapist introduced strategies, such as modeling and turn-taking in the child's range of interests (Kim et al., 2008).

In a study conducted by Martins and Harris (2006), adults offered JA initiations in four stages with progressively increased demands on the child in the context of a behavioral intervention. The four stages are as follows:

1. An attention getting phrase (i.e., speaking the child's name), head turn, and pointing toward and touching the object, with an exclamation/vocalization (i.e., "Look!").
2. Identical to stage one, except the pointed finger does not touch the target object.
3. An attention getting phrase, head turn, and vocalized statement.
4. An attention getting phrase and head turn.

Throughout these stages, strategies included the use of motivating objects; physical prompting, if necessary, for the child to respond to JA initiations; allowing time before or after the prompt for the child to respond; and incorporating social praise or tangible reinforcement using a 2-s time delay system between reinforcements as the child demonstrated mastery (Martins & Harris, 2006).

The approach adopted by Rocha, Schreibman, and Stahmer (2007) trained parents in analytic techniques for naturalistic behaviors derived from discrete trial training and Pivotal Response Training protocols. In this intervention, the parents were educated on the benefits of training, the importance of JA, social games, and the optimal JA environment. This education was provided in the form of handouts, demonstrations to ensure comprehension, feedback from the trainer,

techniques with the child. Discrete trial training strategies to elicit JA included: providing appropriate instruction to the child, differentiating appropriate from inappropriate child responses, and providing feedback. Pivotal Response Training techniques included using child-preferred toys and allowing the child approximately 1 min of free access play with the toy for a correct response and following with shorter prompted responses lasting approximately 20 s (Rocha et al., 2007).

The intervention used by Wong, Kasari, Freeman, and Paparella (2007) was broken down into two naturalistic conditions. In the Naturalistic I condition, lasting 5 to 8 min, the child and the investigator were seated at a table for targeted teaching lessons. If necessary, the interventionist used prompts ranging from verbal cues to hand-over-hand assist to help the child complete the target activity. Corrective feedback was provided throughout this condition. In the subsequent Naturalistic II condition, lasting 20 to 25 min, both the interventionist and the child played on the floor with novel and familiar toys. Spontaneous child play was allowed unless the child did not execute the target behavior from the table-top condition. In this case, the strategies used to elicit the target JA behavior included: introducing complementary objects into the child's view, allowing increased time for the child to respond, and hierarchical prompting. Imitation, introduction of stimuli in the play routine, reinforcement, praise, corrective feedback, and natural consequences were incorporated throughout as the child demonstrated target behaviors (Wong et al., 2007).

and observation of the trainer modeling JA

Initiating Joint Attention

Strategies used to teach and develop IJA skills in this population vary across studies; however, an examination of the techniques used to

achieve this primary outcome indicates that certain strategies are commonly used in different IJA approaches (see Table 2).

Table 2

Common Strategies Used to Elicit IJA

-
- Modeling actions and JA behaviors
 - Prompting (verbal, physical, visual)
 - Imitation of verbal and non-verbal behavior, including the child's play actions
 - Following the child's lead
 - Establishing a play routine that incorporates interesting and motivational toys
 - Explaining the child's behaviors and expanding on child utterances
-

In a RCT, Ingersoll (2012) applied Reciprocal Imitation Training as an intervention strategy, incorporating naturalistic techniques to teach imitation during social interactions (i.e., play). During intervention, the therapist modeled an action with an object or gesture, imitated verbal and nonverbal behavior, described the child's actions using simplified and developmentally-appropriate language, and expanded on the child's utterances to elicit child-initiated imitation. If necessary, physical prompting was used to facilitate the target behavior of child imitation. Throughout the intervention, imitation was reinforced with praise (Ingersoll, 2012).

In an oft-cited RCT, Kasari, Freeman, and Paparella (2006) combined developmental and behavioral approaches to establish a protocol for a potentially effective JA teaching intervention. The intervention began with a short, structured table-top activity to target a specific JA skill while engaging in social interaction. During this structured portion of the intervention, strategies included prompting (verbal, modeling, and physical prompts) and

positive reinforcement. This was followed by a child-driven, naturalistic play session on the floor to generalize the previously targeted JA skill. In this generalization portion of the intervention, strategies included: prompting, making eye contact, using expanded toy options that incorporate the child's interests, following the child's lead, talking about the child's behaviors, imitating the child and expanding on verbalizations, and using environmental manipulations to facilitate interaction. This approach to intervention was thought to be beneficial for eliciting the target behavior through repetition and for generalizing the skill through naturalistic play sessions (Kasari et al., 2006).

Kaale, Smith, and Sponheim (2012) expanded on previous research by using a modified JAI protocol established by Kasari et al. (2006). In their RCT, Kaale et al. sought to address the effectiveness of JAI delivered by trained pre-school teachers. Similarly, they used a combined developmental and behavioral approach, and organized the intervention by beginning with

structured table-top training of the desired JA skill followed by child-directed floor play focused on generalization of skills. JA skills targeted during table-top teaching included show, point, and give. In subsequent floor play, pre-school teachers were instructed to use interesting toys, present toys in a hidden or covered manner to provoke interest, model JA, use physical prompting, exaggerate interest and responses, create play routines, follow the child's lead, and talk about what the child was doing. Teachers were supervised weekly by a trained interventionist (Kaale et al., 2012).

Lawton and Kasari (2012b) also chose a teacher-mediated approach by training teachers in Joint Attention and Symbolic Play/Engagement and Regulation (JASP/ER) intervention strategies. JASP/ER content was presented to teachers in six modules: (a) introducing and defining terms; (b) allowing child-initiated activity; (c) facilitating states through imitating and prompting; (d) playing in established routines with subsequent violation of routine, thus allowing the child to initiate communication; (e) recognizing and responding to child's JA; and (f) facilitating joint engagement and expanding language by encouraging increased eye contact and using contingent language. Teachers were educated in and used JASP/ER intervention strategies, including setting up the environment with developmentally appropriate and motivating toys; following the child's attentional focus and toy choice; imitating play actions; prompting (moving toys closer, verbal prompt, modeling); establishing predictable play routines with one subsequent alteration violation; allowing time for child-initiated communication; using contingent language;

prompting and modeling JA; and encouraging eye contact (Lawton & Kasari, 2012b).

Vismara and Lyons (2007) adopted a different approach in a 12-session intervention aimed at teaching parents how to implement Pivotal Response Training. The approach in this intervention incorporated age-appropriate board games, toys, and activities. Objects of high interest were rotated with objects that were not a perseverative interest for the individual child. Motivational strategies in this intervention included: following the child's lead, combining learned tasks with new learning tasks, varying tasks to maintain the child's interest, reinforcing correct and attempted responses from the child, and providing immediate and contingent rewards (i.e., verbalizations) as well as direct and natural reinforcement. Parents were encouraged to implement Pivotal Response Training on an ongoing basis in the context of all appropriate daily activities (Vismara & Lyons, 2007).

Yoder and Stone (2006) compared the effects of two types of training interventions to develop JA skills: The Picture Exchange Communication System (PECS) and Responsive Education and Prelinguistic Milieu Training. The PECS intervention was developed for children with limited communication skills, and strategies are implemented in six phases ranging from physically prompted exchanges regarding a single picture without distractions to the exchange of a sentence strip in response to an open-ended question. If children master the six phases, they can progress to using the PECS for requesting, giving directions, and asking for non-preferred items (Yoder & Stone,

2006). Alternatively, Responsive Education and Prelinguistic Milieu Training is designed to elicit intentional communication during the prelinguistic period, using strategies, such as establishing one or more enjoyable and motivational play routines; using verbal or visual communication prompts to elicit requests from the child; and modeling communicative behaviors, such as pointing (Yoder & Stone, 2006).

Joint Engagement

Multiple studies aimed to improve joint engagement duration and quality as a way to promote JA skills in children living with ASD. Detailed strategies used to elicit this primary outcome are provided below; for a summary of commonly used strategies, see Table 3.

Table 3

Common Strategies Used to Elicit Joint Engagement

-
- Establishing a play routine
 - Promoting child-initiated activities and communication (sharing, eye contact, pointing)
 - Allowing sufficient time for child-initiated responses
 - Imitating and expanding on child behavior and language
 - Using hierarchical prompting as necessary
 - Incorporating generalization of skills to novel environments, routines, and people
-

In a RCT conducted by Kasari, Gulsrud, Wong, Kwon, and Locke (2010), the interventionists provided and modeled information for the caregivers to implement. The caregivers received written modules with strategies, including setting up the environment; allowing the child to initiate activity and later initiate communication; playing in established routines; facilitating, maintaining, and scaffolding an engaged state and joint engagement; imitating and expanding language; and generalizing skills to other routines, environments, and people (Kasari et al., 2010).

In a more recent experiment, Chiang, Chu, and Lee (2016) used a modified version of the protocol mentioned above from Kasari et al. (2010). Chiang et al. combined the approaches used by Kasari et al. with “creative movement play” to

promote social intersubjectivity (p. 176). The basis for the intervention began by developing affective attunement with the child. Parents were educated in intervention strategies, such as imitating verbal and nonverbal communication; developing a meaningful and flexible play routine; sharing positive affect, expansions, and violations to the play routine; facilitating shared communication through pointing, showing, and giving, followed by allowing time for child-initiated communication; managing the child’s emotional regulation; and generalizing skills to daily life activities by reviewing the program (Chiang et al., 2016).

The intervention conducted by Gulsrud, Kasari, Freeman, and Paparella (2007) consisted of direct table-top teaching of JA skills with subsequent generalization of targeted skills during

free play sessions on the floor. In this intervention, strategies to elicit joint engagement involved encouraging the child to engage in pointing, showing, and using eye contact to share attention. In addition, interventionists remained neutral to novel probes that were introduced and waited for child responses to promote JA initiations and joint engagement (Gulsrud et al., 2007).

Furthermore, a RCT conducted by Wong (2013) studying teacher-implemented JAI was based on the treatment manual developed by Kasari et al. (2006). In the study by Wong, interventionists introduced the importance of JA, provided teaching strategies, and explained definitions and assessments for RJA and IJA to classroom teachers. Similar to the study by Kasari et al., Wong incorporated treatment strategies from a combined behavioral and milieu teaching approach. Strategies for teachers to elicit joint engagement included scaffolding JA through hierarchical prompting (starting with general prompts, then specific

prompts, and progressing to physical prompts); having teachers create both group activities (e.g., show and share) and individual activities (e.g., I spy and you find) under the guidance of the interventionist; setting up opportunities for communication (arranging objects in child's sight but out of reach; introducing objects at child's eye level and close to teacher's face); modeling JA skills during play; allowing time for child-initiated communication; imitating and expanding on the child's language; and responding to the child's JA behaviors by reinforcing any action that resembled sharing, especially eye contact (Wong, 2013).

Social Interaction and Communication

The last primary outcome identified in this analysis is social interaction and communication, which can be elicited through a variety of teaching strategies for children living with ASD. For a summary of common strategies used to promote this outcome, see Table 4.

Table 4

Common Strategies Used to Promote Social Interaction and Communication

-
- Encouraging turn-taking and reciprocal interactions
 - Using preferred items to maintain the child's interest
 - Prompting and modeling appropriate social behaviors
 - Imitating
 - Encouraging and leaving sufficient time for child vocalizations
 - Providing positive reinforcement and praise as child shows social reciprocity
-

Franco, Davis, and Davis (2013) incorporated Prelinguistic Milieu Training approaches, with strategies including using verbal recasting, facilitating turn-taking, and placing preferred items in sight but out of the child's reach

to initiate communication. In this investigation, the children were taught to use vocalizations, eye gaze, and gestures to facilitate intentional communication in functional play routines (Franco et al., 2013).

In a study by Jones, Carr, and Feeley (2006), RJA strategies were differentiated from IJA strategies to promote social interaction. Interventionists' strategies used to promote RJA skills involved using an interesting toy or event, turning and pointing at an object, using exclamatory verbalizations, incorporating gaze alteration prompts (e.g., verbal prompt, such as saying the child's name or visual prompt by tracing the visual path with a reinforcer), and subsequent prompt fading. Similarly, strategies used to elicit child IJA still included the use of interesting toys, gaze alteration prompts, and prompt fading, with the addition of pointing prompts in the form of modeling or physical assist. Reinforcement of social responses, smiles, and praise were provided by the interventionist throughout (Jones et al., 2006).

In a RCT, Kim et al. (2009) used a reverse-order intervention design between improvisational music therapy and toy play sessions. In each respective intervention condition, materials included toys in the play groups and musical instruments in the improvisational music group. These sessions began with undirected, child-led play with the therapist supporting and elaborating on child behaviors and expressions; this was followed by more directed, therapist-led play with the therapist introducing modeling and turn-taking in the child's interests, attention, and tolerance (Kim et al., 2009).

Finally, in an investigation by Schertz, Odom, Baggett, and Sideris (2013), the Joint Attention Mediated Learning (JAML) protocol was introduced to parents in home-based intervention

sessions. Traditionally, JAML emphasizes social rather than isolated components of interaction in the JA phase through referential sharing of interest. In this version of the JAML protocol, parents were first introduced to three phases of intervention, teaching principles, and fundamentals of toddler learning. JAML intervention involved three phases—Focusing on Faces, Turn-Taking, and Joint Attention—and incorporated mediated learning principles including focusing, organizing and planning, encouraging, giving meaning, and expanding (Schertz et al., 2013). These principles are applied by parents to promote child learning and by interventionists to support parents in conceptualizing, internalizing, and delivering the intervention. The parents were educated in methods to apply mediated learning principles in the current phase of the JAML intervention through printed materials, verbal explanations, a video example, and a list of specific examples of ideas used by other parents (Schertz et al., 2013).

According to Schertz et al. (2013), specific strategies that can be incorporated in the Focusing on Faces phase include making the parent's face hard to avoid, structuring the routine to emphasize the importance of focusing on faces, pairing looking at the face with affection, and encouraging more frequent looks with generalization to novel adults, if possible. During the Turn-Taking phase, potential strategies include imitating, modeling, waiting for a response, focusing on promoting reciprocity, and turning everyday routines into reciprocal interactions or games. In the JA phase, suggested strategies include having the child focus on both the parent's face and an object, modeling positive social

sharing, showing excitement regarding social sharing, and encouraging verbalizations as JA progresses (Schertz et al., 2013).

Discussion

In synthesizing the findings of this scoping review, it was found that many studies indicate that children living with ASD tend to demonstrate impaired JA skills, and that teaching JA strategies may be effective for improving social awareness, communication, reciprocity, and engagement in social interaction. Engagement in social interaction can be a goal of occupational therapy intervention, but it can also be a target skill to facilitate learning and development, familial bonding, and occupational and co-occupational engagement for young children (Case-Smith, 2015). Teaching and developing JA skills in this population can promote occupational engagement in young children living with ASD by establishing or strengthening precursor, foundational, or complex JA skills. The benefits linked to improved JA skills directly relate to occupational therapy practice; thus, it becomes important to consider the role of the occupational therapist in teaching and developing these skills.

Children learn and develop through exploration of their environment, skill repetition and active practice, and direct participation in context-based occupations (Case-Smith, 2015). Children are often influenced most by their families; interactions during family activities and routines are essential in the development of childhood occupations (Case-Smith, 2015). A child's ability to interact with his or her parents, siblings, and peers is a critical component of

When a child jointly attends and shares an interactional experience with another person, a relationship is established that is critical for success in co-occupation (Case-Smith, 2015). Successful participation in the interactional nature of co-occupation is essential for a child's sense of safety and security, development, and quality of life. Conversely, deficits in social interaction skills may lead to isolated or restrictive experiences in childhood and can pose a significant barrier to occupational engagement.

The parent-child relationship may suffer if children are unable to demonstrate awareness of or interest in social experiences with others, including their parents. This becomes especially problematic if it serves to establish a cycle of limited affective engagement opportunities between the child and caregiver that further undermines the child's social and occupational development (Naber et al., 2007; Scambler et al., 2007). Targeted JAI aimed at developing JA skills in children living with ASD can be beneficial in two ways: it may improve the child's ability to attend to and relate with other individuals in a social-emotional way, and it is likely that it can improve the quality of caregiving, parent enthusiasm, and parent confidence during interactions with the child (Kasari et al., 2010). Occupational therapists are aware of the importance of a strong and supportive connection in the child-parent relationship for facilitating child development and occupational engagement. Developmentally appropriate JA skills may be the link to establishing a connection and enabling child participation in co-occupations.

engagement in occupations and co-occupations.

Occupational therapists have a professional responsibility to provide interventions that enable engagement in occupation and daily life activities, as per the *Scope of Practice* set forth by AOTA (2014b). Practitioners achieve this mission through the delivery of individualized, occupation-based, client- and family-centered interventions that target client factors, performance skills, and performance patterns for improved occupational engagement (AOTA, 2014a, 2014b). Occupational therapists routinely work with children in their natural context to promote foundational developmental skills. Several of the commonly used JA strategies introduced above are inherently congruent with the client-based nature of occupational therapy. Many of these strategies can be readily incorporated into practice, if they are not already. The investigators propose that many occupational therapy practitioners may be unconsciously using these intervention strategies, as they are closely aligned with occupational therapy's broad scope of practice,

fundamentally integrated with social activity, and imperative to address for child development.

Occupational therapists consider performance skills in the natural context and environment of an occupation to understand how underlying client factors may support or hinder occupational engagement (AOTA, 2014a). Based on the findings of the current analysis, the benefits of JA skills in children living with ASD can facilitate the development of social interaction performance skills. Childhood co-occupations require active participation from both the caregiver and the child, and social interaction performance skills are a critical component of successful social interactive routines (AOTA, 2014a). Promoting social interaction performance skills can directly benefit any occupation in which the child engages with another individual. The process used in the current study to relate JA teaching strategies to occupation-based benefits for children living with ASD is further depicted in Figure 2.

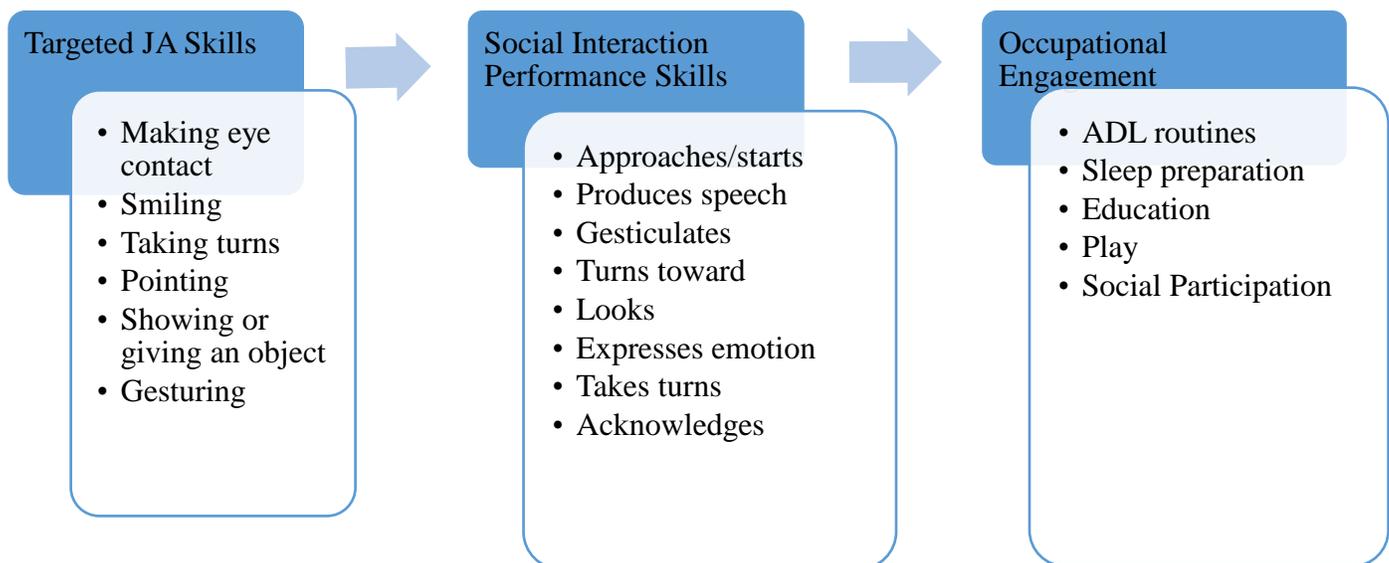


Figure 2. Mapping targeted JA skills to benefits in occupational engagement.

To facilitate the best outcomes for children and families living with ASD, occupational therapists should consider incorporating JA teaching strategies into interventions because of the perceived benefits of JA skills for occupational engagement. Through caregiver education, the therapist can establish a mutual understanding with the caregiver regarding the importance of JA skills for social interaction and occupational engagement. Occupational therapists must actively practice professional reasoning when incorporating parents into JA teaching strategies in unique practice settings. Practitioners can skillfully incorporate these JA teaching strategies as intervention tools into existing occupation-based interventions and emphasize the importance of carryover at home into the child's daily activities.

Conclusion

A scoping review approach was adopted as the design of the current investigation to examine the appropriateness of using JA teaching strategies in pediatric occupational therapy practice. An analysis of the literature reveals that commonly used JA teaching strategies naturally align with the occupational therapy approaches and outcomes set forth in the *Scope of Practice* (AOTA, 2014b). Although these skills can be seamlessly integrated into practice, there is little in the literature that reflects occupational therapists' awareness and use of JA teaching strategies. The potential benefits of JA teaching strategies, such as improved reciprocity, social interaction, and communication skills, are common goals of occupational therapy interventions for children with ASD and their

support their occupations, and this inherently transforms daily activities and routines into co-occupations. Successful engagement in co-occupations requires children to be aware of and to participate in the interactive social and emotional aspect of co-occupations. The inclusion of JA skill teaching may enhance occupational engagement for children living with ASD and should not be overlooked as a possible intervention technique for occupational therapy practitioners who work with this population.

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