People with autism spectrum disorder (ASD) commonly experience difficulties with social participation, play, and leisure along with restricted and repetitive behaviors that can interfere with occupational performance. The objective of this systematic review was to evaluate current evidence for interventions within the occupational therapy scope of practice that address these difficulties. Strong evidence was found that social skills groups, the Picture Exchange Communication System, joint attention interventions, and parent-mediated strategies can improve social participation. The findings were less conclusive for interventions to improve play and leisure performance and to decrease restricted and repetitive behaviors, but several strategies showed promise with moderately strong supporting evidence. Occupational therapists should be guided by evidence when considering interventions to improve social participation, play, leisure, and restricted and repetitive behaviors in people with ASD. Additional research using more robust scientific methods is needed for many of the currently available strategies.
disability, and speech–language impairment. Level of social participation was mediated in this study by social communication and functional cognitive skills (Shattuck et al., 2011).

Family and caregiver stress associated with ASD is higher than that experienced by families of children with other disabilities (Kuhaneck & Briner, 2010). Many studies have documented the additional risks for financial stress, poorer mental health, and social isolation for families of people with ASD (Kuhaneck & Briner, 2010). Care recipients’ challenging behavior, often in the form of restricted and repetitive behaviors, has been identified as a primary stressor for caregivers (Bishop, Richler, Cain, & Lord, 2007). Khanna et al. (2011) reported that the extent of behavioral problems in the child with ASD has a direct impact on family functioning, caregiver physical well-being, and level of social support available to families. This finding underscores the importance of addressing challenging behaviors in people with ASD to promote caregiver coping and, subsequently, opportunities for full participation in occupation.

Objectives

Interventions addressing social participation, restricted and repetitive behaviors, play, and leisure are likely to enhance the quality of occupational engagement for people with ASD, improve health and well-being, and reduce caregiver burden. The purpose of this study was to review interventions within the scope of occupational therapy to improve social participation, restricted and repetitive behaviors, play, and leisure. The findings will guide occupational therapists working in school, community, and clinic settings in selecting evidence-based approaches to treat the social, behavioral, play, and leisure limitations of people with ASD across the lifespan.

The focused question for this review was “What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice to improve social interaction, restricted and repetitive behaviors, play performance, and leisure participation for people with autism spectrum disorders?” The question was developed by the authors, an advisory group of experts in the field, AOTA staff, and the consultant to the AOTA Evidence-Based Practice (EBP) Project. The question is one of four developed by the AOTA EBP Project to update knowledge in the area of occupational therapy practice and ASD.

Method

This systematic review was supported by AOTA as part of the EBP Project. In 1998, AOTA instituted a series of EBP projects to assist members with meeting the challenge of finding and reviewing the literature to identify evidence and, in turn, use this evidence to inform practice (Lieberman & Scheer, 2002). Following the evidence-based philosophy of Sackett, Rosenberg, Muir Gray, Haynes, and Richardson (1996), AOTA’s projects are based on the principle that the EBP of occupational therapy relies on the integration of information from three sources: (1) clinical experience and reasoning, (2) preferences of clients and their families, and (3) findings from the best available research.

A major focus of AOTA’s EBP Project is an ongoing program of systematic reviews of the multidisciplinary scientific literature, using focused questions and standardized procedures to identify practice-relevant evidence and discuss its implications for practice, education, and research. An evidence-based perspective is founded on the assumption that scientific evidence of the effectiveness of occupational therapy interventions can be judged to be more or less strong and valid according to a hierarchy of research designs, an assessment of the quality of the research, or both. AOTA uses standards of evidence modeled on those developed in evidence-based medicine. This model standardizes and ranks the value of scientific evidence for biomedical practice using a grading system. In this system, the highest level of evidence, Level I, includes systematic reviews of the literature, meta-analyses, and randomized controlled trials (RCTs). In RCTs, participants are randomly allocated to either an intervention or a control group, and the outcomes of both groups are compared. Other levels of evidence include Level II studies, in which assignment to a treatment or a control group is not randomized (cohort study); Level III studies, which do not have a control group; Level IV studies, which use a single-case experimental design, sometimes reported over several participants; and Level V studies, which are case reports and expert opinion that include narrative literature reviews and consensus statements.

Studies Included

The review was limited to peer-reviewed scientific literature published in English. The studies included were judged by the authors to be within the scope of practice of occupational therapy. Studies that examined interventions that were occupation based or focused on occupational outcomes were included. The intervention described in the study had to be deliverable by an occupational therapist alone and not reliant on a multidisciplinary team or classroom milieu approach. The literature included in the review was published between 2006 and 2013 and included study participants with ASD. The review excluded data from presentations, conference proceedings, non-peer-reviewed research literature, dissertations, and theses.
in the review provide Level I, II, and III evidence, but systematic reviews of lower level studies were also included.

Search Strategy

Search terms for the reviews were developed by the methodology consultant to the AOTA EBP Project and AOTA staff, in consultation with the authors, and by the advisory group. The search terms were developed not only to capture pertinent articles but also to make sure that the terms relevant to the specific thesaurus of each database were included. A medical research librarian with experience in completing systematic review searches conducted all searches and confirmed and improved the search strategies.

Databases and sites searched included MEDLINE, PsycINFO, CINAHL, ERIC, and OTseeker. In addition, consolidated information sources, such as the Cochrane Database of Systematic Reviews, were included in the search. Moreover, reference lists from articles included in the systematic reviews were examined for potential articles, and selected journals were hand searched to ensure that all appropriate articles were included. A total of 10,129 citations and abstracts were included in this review.

Analysis

The consultant to the EBP Project completed the first step of determining which articles were relevant to the review question. The titles and abstracts of these articles were then reviewed by the first and last authors to determine their suitability for full review. An article was included in the final review when both of these authors agreed on its suitability. Final articles were divided among the authorship team on the basis of a broad category. A single author reviewed each article, and the findings were abstracted to an evidence table (see Supplemental Tables 1–5, available online at http://otjournal.net; navigate to this article, and click on “Supplemental”). AOTA staff and the EBP Project consultant reviewed the evidence tables to ensure quality control. The authors discussed the findings of articles when clarification was required. The risk-of-bias framework recommended by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to rate study quality (Liberati et al., 2009).

Results

After the review process outlined, 66 articles were included in the final review (48 Level I, 6 Level II, and 12 Level III). The final set of articles was grouped into four broad categories: studies examining the effectiveness of interventions addressing (1) social skills, (2) social communication, (3) play and leisure, and (4) restricted and repetitive behaviors. A summary of the findings in each of these categories follows, and effect sizes are reported when possible.

Risk of Bias

Overall, few studies included in this review used a randomized design. Although 48 Level I articles were included, most of these articles were either systematic reviews or meta-analyses of lower level evidence such as single-subject-design studies. In cases in which random assignment to groups occurred, participants (and their families) were rarely blinded to their group allocation. Moreover, there was a strong reliance on parent-report measures to assess the outcomes of the intervention. There was minimal reporting of the use of fidelity measures in the implementation of interventions, which decreases the internal validity of the studies. Small sample sizes prevented meaningful subgroup analyses, which limits the conclusions that can be drawn about the benefit of the interventions for specific subsets of people with ASD. Most studies, however, reported high participant retention rates. For a risk-of-bias analysis for each article included in this review, see Supplemental Table 6.

Effectiveness of Interventions for Social Skills

Twenty-four Level I articles, 4 Level II articles, and 7 Level III articles examined interventions to improve social skills. Themes included group-based social skills training programs, peer-mediated interventions, activity-based interventions, computer-based interventions, and Social Stories™ (Supplemental Table 1).

Group-based social skills training programs are those in which a therapist leads a group of people with ASD through a curriculum or training program to improve social skills. Because of the importance of context for generalization of these skills, we further categorized these interventions according to whether they took place in a clinic or in the child’s natural context (e.g., school or camp). Six Level I (DeRosier, Swick, Davis, McMillen, & Matthews, 2011; Flynn & Healy, 2012; Gantman, Kapp, Orenski, & Laugeson, 2012; Koenig et al., 2010; Lopata et al., 2010; Reichow, Steiner, & Volkmar, 2013), 1 Level II (Castorina & Negri, 2011), and 5 Level III (de Bruin & Verheij, 2012; Herbrecht et al., 2009; Hillier, Fish, Siegel, & Beversdorf, 2011; Stichter, O’Connor, Herzog, Lierheimer, & McGhee, 2012; White, Koenig, & Scahill, 2010) studies on group-based social skills training programs that were administered in a clinical setting were reviewed. Overall, increased social skills, increased social communication, decreased autistic mannerisms, increased positive interactions, and decreased negative interactions were reported as outcomes of these interventions.
Three Level I (Bellini, Peters, Benner, & Hopf, 2007; Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012; Lerner & Mikami, 2012), 1 Level II (Cotugno, 2009), and 1 Level III (Walker, Barry, & Bader, 2010) studies on group-based social skills training programs administered in a school or summer camp context were included in the review. Increased social skills, less solitary play, and more joint engagement on the playground were reported as outcomes of these interventions. When reported, effect sizes were medium to large; Kasari et al. (2012) reported Cohen’s $d$ values ranging from 0.44 to 0.97, and Lerner and Mikami (2012) reported $d$ values ranging from $-1.8$ to $-0.98$.

Three systematic reviews (Level I) reported on the findings of studies of both clinic-based and contextual group-based social skills training programs (Rao, Beidel, & Murray, 2008; Schreiber, 2011; White, Koenig, & Scallill, 2007). These reviews noted improved social competency and friendships as well as increased self-esteem and social participation. Strong evidence supported the use of group-based social skills training programs in both clinic-based and contextual settings to improve social skills in people with ASD.

Peer-mediated interventions were defined as those that included a peer as the therapeutic agent for either all or part of the intervention. Six Level I studies of interventions that used peers for all or part of the program indicated gains in social skills (Chan et al., 2009; Flynn & Healy, 2012; Schreiber, 2011; Wang & Spillane, 2009; Wang, Cui, & Parrila, 2011; Zhang & Wheeler, 2011). Although most studies did not report effect sizes, Wang and Spillane (2009) did report medium to large effect sizes for studies on peer-mediated interventions included in their review ($d_s = 0.71–1.64$). However, other articles reported that gains achieved in the studies were not generalized to other contexts. The overall strength of evidence for peer-mediated interventions was mixed.

Activity-based interventions included those in which the therapeutic modality was engagement in group tasks (either collaborative tasks or exercise) with the goal of increasing social skills. One Level I systematic review and 1 Level II study were conducted on interventions that used collaborative tasks to improve social skills. The systematic review (Schreiber, 2011) noted gains (specific effect sizes not provided) in social interaction and social competency with a LEGO® intervention and an increase in appropriate social interactions with collaborative computer work. A Level II study of Topobo, a construction activity, observed increased parallel play and decreased solitary play as compared with participants in a LEGO intervention (Farr, Yuill, & Raffle, 2010). One Level I study, a review of the effectiveness of exercise programs for people with ASD, found an improvement in social skills (Sowa & Meulenbroek, 2012). Across all studies, people who participated in group programs showed more improvement than people who participated in individual programs. The overall strength of evidence for activity-based interventions was moderate.

Computer-based interventions were defined as programs in which participants learn social skills via computer-based social skills training programs, virtual reality training programs, or video modeling. Two Level I (Hopkins et al., 2011; Ramdoss et al., 2012) and 1 Level II (Turner-Brown, Perry, Dichter, Bodfish, & Penn, 2008) studies noted increased social skills and increased social cognition for those who participated in a computer-based social skills training program. Results were mixed, however, for improvements in emotion recognition (Hopkins et al., 2011; Ramdoss et al., 2012). One Level III study indicated increased social perception skills and increased performance on a theory-of-mind task after virtual reality training. Participants’ conversation skills also increased from pretest to posttest, although the difference was not statistically significant (Kandalaft, Didehbani, Krawczyk, Allen, & Chapman, 2013). Four Level I studies of video modeling reported increased social skills and decreased challenging behaviors (Flynn & Healy, 2012; Shukla-Mehta, Miller, & Callahan, 2010; Wang & Spillane, 2009; Wang et al., 2011). The overall strength of evidence for computer-based interventions was moderate.

Social Stories (Gray, 2000) are an intervention in which short narratives of a social situation are written and read to or by a child to increase positive social behaviors or decrease challenging behaviors. Six Level I studies on Social Stories were included in the review. Half of the studies noted increased positive social behaviors and decreased challenging behaviors (Karkhaneh et al., 2010; Schreiber, 2011; Test, Richter, Knight, & Spooner, 2011). However, the remaining studies found low or highly variable levels of effectiveness that call into question the effectiveness of this intervention (Kokina & Kern, 2010; Reynhout & Carter, 2011; Wang & Spillane, 2009). The overall strength of evidence for Social Stories was mixed.

Effectiveness of Interventions for Social Communication

Seventeen Level I, 1 Level II, and 1 Level III articles that examined interventions to improve social communication were included in this review (Supplemental Table 2). Interventions studied included the Picture Exchange Communication System (PECS) and naturalistic behavioral, developmental, classroom-based, parent-mediated, sensory-motor, imitation, and joint attention interventions.
PECS (Bondy & Frost, 1998) allows for functional communication through the exchange of pictures or icons. Two Level I systematic reviews of single-participant studies (Flippin, Reszka, & Watson, 2010; Ganz, Davis, Lund, Goodwyn, & Simpson, 2012) showed improvements in social communication and socialization, with the best effects in younger children and children with comorbid intellectual disability. Three Level I studies noted improvements in rate of initiation of communication and use of PECS (d = 0.81; Gordon et al., 2011; Howlin, Gordon, Pasco, Wade, & Charman, 2007; Yoder & Lieberman, 2010). However, 1 Level I study reported that effects were not maintained at 10 mo (Howlin et al., 2007). One Level II study indicated that PECS was more effective than conventional language therapy in improving social behaviors, cooperative play, joint attention, requests, and initiations (Lerna, Esposito, Conson, Russo, & Massagli, 2012). The overall strength of evidence for PECS was strong, although it is important to note that the 2 Level I systematic reviews (Flippin et al., 2010; Ganz et al., 2012) included studies with low-level designs.

Naturalistic behavioral interventions include those that are behavioral in nature but take place in the person’s natural setting (e.g., milieu therapy, functional communication training, and pivotal response training; Brunner & Seung, 2009). Three Level I studies (all of which were systematic reviews) supported improvements in joint attention, communication initiations, requesting, and spontaneous verb use (Brunner & Seung, 2009; Ospina et al., 2008; Seida et al., 2009). The overall strength of evidence for naturalistic behavioral interventions was moderate.

Developmental interventions are based on child development theory (e.g., Developmental, Individual-differences, Relationship-based [DIR] or floor time; Brunner & Seung, 2009). Two Level I systematic reviews reported small, positive gains in spontaneous communication and parent–child interactions. Results were, however, mixed, with some studies showing no effect (Brunner & Seung, 2009; Ospina et al., 2008). One Level III study resulted in increased spontaneous verbalizations and imitation (Vismara, Colombi, & Rogers, 2009). The overall strength of evidence for developmental interventions was moderate.

Classroom-based interventions are developed for use in the classroom setting and may be used by many professionals including occupational therapy practitioners (e.g., Treatment and Education of Autistic and related Communication Handicapped Children [TEACCH]; Brunner & Seung, 2009). One Level I systematic review indicated that most studies were of low quality and findings were mixed (Brunner & Seung, 2009). The strength of evidence for classroom-based interventions was insufficient.

Parent-mediated interventions engage the client’s parent or parents as the primary therapeutic agent (e.g., parent-mediated communication-focused treatment [PACT], Autism 1-2-3). Two Level I RCTs noted improvements in initiation, joint attention, reciprocal social interaction, vocalizations, and pointing (d = 0.33–1.22; Green et al., 2010; Wong & Kwan, 2010). One Level I RCT did not observe any significant effects of a parent-focused training program but noted a trend for improvements in compliance and a decrease in avoidance in children with developmental quotients ≥ 50 (Oosterling et al., 2010). One Level I systematic review indicated improvements in parent–child interactions and communication behavior (Seida et al., 2009). The overall strength of evidence for parent-mediated interventions was moderate.

Sensory–motor interventions use movement and sensory input to improve social communication skills. Two Level I studies, both of which were systematic reviews, noted that a variety of interventions have had mixed results on social outcomes (Ospina et al., 2008; Seida et al., 2009). In general, studies included in these reviews were of low quality. The strength of evidence for sensory–motor interventions to improve social communication was insufficient.

Imitation training includes interventions that are focused on improving imitation skills for social communication. Two Level I RCTs showed moderate to large improvements in elicited and spontaneous imitation, joint attention, and social–emotional skills, particularly for participants with higher pretreatment play skills (ηp² = .13–.38; Ingersoll, 2010, 2012). Both studies involved small sample sizes. The strength of evidence for imitation training was moderate.

Joint attention training interventions aim to improve the client’s ability to engage in joint attention, which is an important early form of social communication. Three Level I RCTs noted improvements in joint attention, initiation, and responding in intervention groups after interventions for joint attention (Kaale, Smith, & Sponheim, 2012; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010; Kasari, Paparella, Freeman, & Jahromi, 2008). Effect sizes for these studies were moderate to large (d = 0.44–1.35). One Level I RCT of a social curriculum focused on joint attention showed improvements in socially engaged imitation (d = 0.86), but not in joint attention or shared positive affect (Landa, Holman, O’Neill, & Stuart, 2011). Gains were maintained at 6 mo. The strength of evidence for joint attention interventions was strong.

Effectiveness of Interventions for Play and Leisure

Three Level I, 1 Level II, and 4 Level III articles examining play performance or leisure participation were included in this review (Supplemental Tables 3 and 4).
Interventions to improve play skills included an adult modeling and prompting intervention, an intervention for social–pragmatic skills, DIR–floortime, and a pretend play intervention. A Level I systematic review on interventions incorporating adult modeling and prompting found that these interventions resulted in improved pretend play behaviors (Barton & Wolery, 2008). A one-group pre–post study (Level III) found limited support for a social–pragmatic intervention significantly affecting communication and symbolic behaviors in children with ASD (Keen, Rodger, Doussin, & Braithwaite, 2007). However, parent-reported improvements were seen in children with lower levels of adaptive functioning before intervention. A Level III (one-group pre–post) study using a parent-delivered DIR–floortime intervention showed improvements in children’s functional developmental levels (Solomon, Necheles, Ferch, & Bruckman, 2007). Moreover, evidence from a Level III (one-group pre–post) study using a child-led play-based intervention supported improvement in social interaction and language skills and decreased social disconnection in children with developmental disabilities, including ASD (Stagnitti, O’Connor, & Sheppard, 2012). The evidence to support interventions to improve play performance in children with ASD was limited. Interventions to improve pretend play may be beneficial, but available programs require further research to determine their efficacy.

Interventions to improve leisure participation included recess interventions, a leisure group, water exercise, and Social Stories. A Level I systematic review of recess interventions (Lang et al., 2011) found evidence to support strategies involving environmental and social supports to improve social initiation, turn taking, and group play in children with ASD on the playground. Evidence from a two-group nonrandomized pre–post design study (Level II; Palmen, Didden, & Korzilius, 2011) supported the effectiveness of an outpatient leisure group in decreasing the need for leisure support and increasing leisure engagement and satisfaction in high-functioning young adults with ASD, with medium to large effect sizes reported ($d = 0.64–0.83$). A single-group crossover study (Level III) demonstrated that a water exercise intervention improved social skills in children with ASD (Pan, 2010). Results from an RCT (Level I; Quirmbach, Lincoln, Feinberg-Gizzo, Ingersoll, & Andrews, 2009) of a Social Story intervention showed improved game play skills in children with ASD, with $\eta^2$’s ranging from .18 to .669. The evidence for improving leisure participation in people with ASD was moderate, with the strongest evidence for the use of recess interventions and Social Stories.

**Effectiveness of Interventions for Restricted and Repetitive Behaviors**

Four Level I articles on restricted and repetitive behaviors were included in this review (Supplemental Table 5). Interventions within the scope of occupational therapy practice included kata training, school interventions, exercise, and self-management. Evidence from an RCT supported the use of kata training to decrease the mean stereotypy severity in children with ASD (Bahrami, Movahedi, Marandi, & Abedi, 2012). A systematic review of school interventions found positive effects for strategies such as antecedent manipulations, change in context, differential reinforcement, and self-management interventions to decrease challenging behaviors in children with ASD (Machalicek, O’Reilly, Beretvas, Sigafous, & Lancia, 2007). Evidence from a systematic review supported exercise as a method of decreasing self-stimulatory behaviors (Petrus et al., 2008). The results of a systematic review of self-management strategies suggested that these strategies can increase target behaviors of students with ASD (Southall & Gast, 2011). Moderate evidence supported the use of behavioral techniques, such as antecedent manipulation and self-management, to improve restricted and repetitive behaviors in people with ASD. Evidence also indicates that interventions involving physical activity (kata training and exercise) may be beneficial for decreasing restricted and repetitive behaviors in people with ASD.

**Discussion**

The purpose of this systematic review was to establish the evidence for the effectiveness of interventions within the scope of occupational therapy practice to improve social interaction, restricted and repetitive behaviors, and play and leisure participation for people with ASD. It is evident that, since the initial AOTA review in this area (Case-Smith & Arbesman, 2008), occupational therapists now have a broader base of literature from which to draw to inform their practice. The increase in research activity on this topic now allows us to make recommendations for therapy on the basis of specific desired outcomes. High-quality, rigorous study designs, however, are still lacking in some areas. The conclusions of this review are constrained by the variance in outcome measures used among studies, a strong reliance on parent-report measures, a strong risk for bias secondary to nonblinding of participants and assessors, variability in the age of the participants, limited use of randomized study designs, limited use of fidelity measures for interventions used, and a wide variety of intervention contexts and intervention delivery modes. Within the limits of these constraints, we propose the following guidelines for
clinical practice for occupational therapy practitioners working with people with ASD.

**Social Skills**

Strong evidence supported the use of group-based social skills training programs in both clinic-based and contextual settings to improve social skills in people with ASD. Occupational therapy practitioners are well placed to implement such programs. Although time and frequency varied significantly among studies, the most effective groups appeared to meet regularly for ≥60 min at a time for a total of ≥8 hr.

Less evidence was found to support the use of computer-based interventions such as virtual reality, video modeling, and collaborative computer work as well as activity-based interventions. Initial studies, however, showed promising results. Further research is required before these techniques can be used extensively in practice. Studies relating to peer-mediated interventions and Social Stories reported mixed results. Occupational therapy practitioners should proceed with caution when implementing these interventions.

**Social Communication**

Strong evidence supported the use of PECS and joint attention strategies to improve social communication in young children with ASD. Occupational therapy practitioners should consider using these strategies as part of a comprehensive early intervention program to support positive social communication. The use of these techniques in combination may also be indicated. For example, joint attention behavior has been observed to increase after parent- or caregiver-mediated interventions.

Other techniques, including parent-mediated, naturalistic behavioral, developmental, and imitation training, also appear to be effective but require further investigation. These techniques may be indicated in specific, individual circumstances, but more study is required before they are implemented across practice areas. We found insufficient evidence at this time to support the use of classroom-based and sensory–motor strategies to improve social communication. We would not recommend use of these strategies until further research is conducted.

**Play and Leisure**

Evidence to support interventions to improve play performance in children with ASD is emerging, but the efficacy of the available programs has not been established. Given the importance of play to children’s occupational engagement, this area requires urgent attention in the occupational therapy literature. Occupational therapy practitioners should proceed with caution when implementing these interventions because of the current lack of evidence and should keep systematic data on their effectiveness with clients.

The evidence for interventions aimed at improving leisure participation in people with ASD was moderate. The strongest support was found for strategies implemented in the context of recess time at the child’s school and for Social Stories. More studies are needed before the available leisure interventions should be extensively implemented in practice.

**Restricted and Repetitive Behaviors**

The evidence to support behavioral techniques within the scope of occupational therapy, such as antecedent manipulation and self-management, to improve restricted and repetitive behaviors in people with ASD was moderate. Occupational therapists should consider implementing these strategies as part of a comprehensive, interdisciplinary intervention to decrease restricted and repetitive behaviors that interfere with a client’s ability to participate in meaningful occupations. Other strategies such as kata training and exercise may also be beneficial, but replication of the initial promising results is needed before broad-based use in practice.

**Strengths and Limitations**

This review was strengthened by the extensive range of literature considered for inclusion and its examination of a range of social participation factors (e.g., social skills, social communication, imitation, gestures, joint attention). It reached across disciplinary boundaries to ensure that all relevant literature was included to inform occupational therapy practice.

The review was limited by its inclusion of studies judged to be within the scope of occupational therapy practice. In particular, the review did not include interventions using a multidisciplinary or milieu approach. Interventions of this type are obviously an essential component of a comprehensive service delivery strategy for people with ASD. The purpose of this review, however, was to focus more narrowly on those strategies that can readily be implemented by occupational therapists working independently. Similarly, this review did not include interventions based purely in behavioral theory or medication management. Although occupational therapists in specialist practices may be involved in intensive behavioral therapies, this type of practice was not considered representative of the majority of occupational therapy practice in the field of ASD. When using the results of this review to inform practice, therefore, we encourage occupational therapists to consider the role of multidisciplinary, milieu, and intensive behavioral therapies in their specific practice context.
Future Directions

Further research is indicated to replicate promising results in newer interventions; refine and manualize intervention protocols for greater adoption in practice; increase the number of true experimental, randomized study designs; and examine which interventions are most beneficial for subgroups of people with ASD.

Implications for Occupational Therapy Practice

The results of this study have the following implications for occupational therapy practice:

• Occupational therapy practitioners should consider using group-based social skills training programs to address limitations in social skills in children with ASD. Other interventions may also be effective, but additional research is needed.

• Occupational therapy practitioners should consider using PECS, joint attention, and parent-mediated strategies to improve social communication in individuals with ASD. Other interventions may also be effective, but additional research is needed.

• Although limitations in play and leisure should be addressed in individuals with ASD, limited evidence currently exists for specific interventions to improve these areas of occupation.

• Occupational therapy practitioners should consider the use of behavioral techniques such as antecedent manipulation and self-management to manage restricted and repetitive behaviors that interfere with occupational performance in individuals with ASD.

Conclusion

Occupational therapists working with people with ASD to improve social participation, play, leisure, and restricted and repetitive behaviors now have a broad base of research to inform their practice. The findings of this review of the literature suggest that several well-supported intervention techniques to improve social communication and social skills are within the scope of occupational therapy. The evidence supporting interventions for play, leisure, and restricted and repetitive behaviors is mixed, although several interventions show promise. Further research is required in this area to increase the rigor of study designs, manualize intervention protocols, and determine which interventions should be applied to which subgroups of people with ASD. Occupational therapists should carefully consider the current research evidence supporting treatment techniques before determining individual plans of care. ▲

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*Indicates studies that were systematically reviewed for this article.


