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LITERATURE REVIEW

Teaching play skills to young children with autism

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Abstract

Background   Play is critical for the development of young children and is an important part of their daily routine. However, children with autism often exhibit deficits in play skills and engage in stereotypic behaviour. We reviewed studies to identify effective instructional strategies for teaching play skills to young children with autism.

Method   Empirical studies on teaching play skills to young children with autism published from 1990 to 2011 were located. These studies included single subject and group designs.

Results   Twenty-six studies were reviewed. The majority of studies on teaching play skills used combined interventions. Children with autism improved their play skills, with direct intervention embedding their interests during play. Improvements in play skills increased positive social interactions and decreased inappropriate behaviour as collateral effects.

Conclusions   Further research is needed to develop more effective play skill interventions that assess the functional use of play and are implemented in the natural environment.

Keywords: *autism, play skills, instructional strategies*

Introduction

Most young children naturally engage in play following a typical developmental sequence and acquire critical developmental skills while interacting with play materials and peers (Boucher & Wolfberg, 2003; Boutot, Guenther, & Crozier, 2005; Pierce-Jordan & Lifter, 2005; Stahmer, 1999; Thomas & Smith, 2004). However, the play of children with autism may be often skewed by restricted interests and stereotypic or repetitive patterns of behaviour (Blanc, Adrien, Roux, & Barthélémy, 2005; Boutot et al., 2005; Holmes & Willoughby, 2005; Libby, Powell, Messer, & Jordan, 1998; Lydon, Healy, & Leader, 2011; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Machalicek et al., 2009; Stahmer, 1999; Thomas & Smith, 2004). As a result, children with autism may have limited opportunities for peer interaction, the acquisition of appropriate play, and other critical developmental skills.

Engaging appropriately with play materials and peers in classrooms allows young children with autism to acquire critical developmental skills via naturally occurring learning opportunities. This may facilitate social and communicative interactions with their peers (McConnell, 2002) and encourage engagement in appropriate behaviour and cooperative play while decreasing inappropriate behaviour (Baker, 2000; Koegel, Koegel, Hurley, & Frea, 1992; MacDonald et al., 2009; Machalicek et al., 2009; Stahmer & Schreibman, 1992). These skills may also help children with autism to be viewed as members of their class and to build friendships with their peers (Jordan, 2003).

Since deficits in social and communicative behaviour are two of the defining characteristics of autism (American Psychiatric Association, 2000), play is often used as the context to improve these behaviours. The literature is replete with intervention studies designed to improve and enhance children's social and communicative behaviour; however, there are fewer studies focusing on directly teaching and assessing play skills. Several researchers reporting outcomes of play skill intervention studies classified targeted play skills as functional, symbolic, or sociodramatic play, while others have focused on appropriate play with the chosen materials without

specification of type of play (e.g., Barry & Burlew, 2004; Morrison, Sainato, Benchaaban, & Endo, 2002). More attention has been paid to teaching symbolic play, although there are inconsistencies across studies in the classification of types of play targeted. Research focusing on functional play (i.e., functionally using an object such as pushing a toy car; Libby, Powell, Messer, & Jordan, 1997) suggests that children with autism exhibit no significant differences in functional play when compared to developmentally matched children with other disabilities and typically developing children (Blanc et al., 2005; Holmes & Willoughby, 2005; Libby et al., 1998; Williams, Reddy, & Costall, 2001).

However, other researchers note that while children with autism may not demonstrate deficits in functional play, this play is qualitatively different (Williams et al., 2001). They suggest that the functional play of children with autism is often relatively simple and less elaborate than that of developmentally matched children. While some intervention studies focusing on play may not identify targeted skills as functional play, other studies subsume functional and symbolic play under pretend play (Colozzi, Ward, & Crotty, 2008; Lydon et al., 2011; MacDonald, Clark, Garrigan, & Vangala, 2005; MacDonald et al., 2009; Palechka & MacDonald, 2010; Sancho, Sidener, Reeve, & Sidener, 2010) or the appropriate or functional use of toys or play with materials (Barry & Burlew, 2004; D'Ateno, Mangiapanello, & Taylor, 2003; Hine & Wolery, 2006; Jahr, Eldevik, & Eikeseth, 2000; Morrison et al., 2002; Paterson & Arco, 2007). Increases in the appropriate and functional use of toys, engagement with play materials, and amount of time spent in play after conducting play interventions are reported outcomes of these investigations.

Symbolic play is defined as a child's ability to act on an object as if it is something else. This type of play involves three forms: object substitution (e.g., using a brick as some soap), the attribution of false properties (e.g., pretending a doll is ill), and the attribution of presence to imaginary objects (e.g., driving a truck over an invisible bridge; Leslie, 1987). Research reports that children with autism have significant deficits in symbolic play when compared to typically developing children at the same developmental age (Blanc et al., 2005; Holmes & Willoughby, 2005; Libby et al., 1998; Rutherford, Young, Hepburn, & Rogers, 2007). Results from these studies also suggest symbolic play deficits in children with autism appear to be highly associated with their limited language skills. In particular, Stanley and Konstantareas (2007) examined the assessment files of 101 children with autism spectrum disorders and found that nonverbal cognitive ability and expressive language are significantly related to symbolic play. Since children with autism show deficits in symbolic play and the development of social interactions (Stahmer, 1995), studies have focused on explicitly teaching symbolic play skills (Colozzi et al., 2008; Hine & Wolery, 2006; Kasari, Freeman, & Paparella, 2006; MacDonald et al., 2005, 2009; Palechka & MacDonald, 2010; Stahmer, 1995; Wong, Kasari, Freeman, & Paparella, 2007; Zercher, Hunt, Schuler, & Webster, 2001). Results of these studies suggest that children with autism were able to produce symbolic play with appropriate intervention.

Sociodramatic play is defined as an advanced form of symbolic play involving engagement in role-playing and cooperative dramatisations around a particular theme (Goldstein & Cisar, 1992; Stahmer, 1999; Thorp, Stahmer, & Schreibman, 1995). Studies suggest that children with autism were able to engage in sociodramatic play and demonstrate positive collateral changes in their social and communicative interactions after intervention (Dauphin, Kinney, & Stromer, 2004; Goldstein & Cisar, 1992; Thorp et al., 1995). However, Thorp and colleagues (1995) noted that although children with autism learned to engage in sociodramatic play with intervention, the quality of their play may be different from that of children with other developmental disabilities.

With regard to another type of play, games may provide a unique context for the remediation of various skills for young children with autism. In two studies, children with autism were able to play games with their typically developing peers or siblings after being taught games in which their obsessive interests were embedded (Baker, 2000; Baker, Koegel, & Koegel, 1998). Teaching modified games using the children's interests increased reciprocal play and social interactions among children with and without autism.

Research on directly teaching play skills demonstrates that young children with autism can acquire appropriate play behaviours. These children respond well to the play skill interventions that include modelling, prompting with contingent reinforcement, and naturalistic instruction (Lang et al., 2009). Acquisition of play skills helps children with autism interact positively with their typically developing peers (Goldstein & Cisar, 1992; Stahmer, 1995; Thomas & Smith, 2004), and may reduce children's engagement in inappropriate behaviour as a collateral effect (Baker, 2000; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002; Stahmer & Schreibman, 1992).

Play skills may be the critical tools in a child's repertoire needed to engage with peers in early childhood settings, as well as critical developmental skills in and of themselves. Teaching appropriate play skills to young children with autism at an early age may enhance children's acquisition of age-appropriate developmental skills, build positive relationships with peers, and enable children to demonstrate desirable behaviours (van Berckelaer-Onnes, 2003).

Given the importance of play, practitioners in early childhood/early childhood special education should pay more attention to play skills and incorporate play skills instruction effectively into young children's daily activities and individualised education programs (Malone & Langone, 1999; Mastrangelo, 2009). Identifying effective instructional approaches for young children with autism is a vital step toward promoting play skills within the context of natural play environments. The purpose of this review is to identify effective instructional procedures for teaching play skills and to discuss the implications for practice and for future research.

Method

Search process and selection criteria

In order to review the research on teaching play skills to young children with autism, a literature search using PsycINFO and ERIC (1990 to 2011) was conducted. The search was limited to English-language publications, peer-reviewed journals, and empirical studies. The studies were located using the following search terms: *autism* and *teaching play skills, autism* and *play intervention, autism* and *play,* and *autistic* and *play.* The first search using the terms *autism* and *teaching play skills,* and *autism* and *play intervention* identified 24 studies. The search was then expanded using the broader terms *autism* and *play* and *autistic* and *play.* In the initial search, 292 articles related to play skills and autism were identified. After examining the titles and abstracts of these articles, 49 studies teaching play skills to children with autism were identified.

The criteria for selecting studies after the search were as follows: (a) experimental studies demonstrating functional relationships between the independent and dependent variables; (b) studies including at least one participant with autism aged from 0 to 8 years old; (c) studies including at least one participant who was identified as having autism, autism spectrum disorder, or pervasive developmental disorder not otherwise specified;

and (d) studies directly focusing on teaching and measuring play skills. Studies targeting other skills (e.g., social interactions, communication) taught through play or using play as a context to improve other skills were excluded.

According to the criteria of this review, 26 studies were included for review while 23 studies were excluded. The 26 included studies used both group and single subject designs, with 23 of these studies employing single subject research designs and three studies employing group designs. In their review of single subject design studies, Odom et al. (2003) suggest the multiple-baseline experimental design most often yields a demonstration of effectiveness through multiple replications of treatment effects. Of the 23 single subject studies reviewed, 21 studies implemented a multiple-baseline/multiple-probe design and two studies used other single subject experimental designs such as a reversal or alternating treatment design.

Categorisation of studies

Play skill studies were categorised by the primary intervention as defined by the author of the study in their title, review of literature, and method. Many studies employed prompting strategies; however, some studies were categorised under systematic prompting strategies, whereas other studies were listed under other primary intervention categories (e.g., script training, Social Stories) based on the researchers' specifications and our own analysis. That is, if a study's use of prompting procedures was systematically planned and implemented as a primary intervention (e.g., a least to most, most to least, simultaneous prompting, time delay), the study was categorised under "Systematic prompting strategy." If the prompting procedure was implemented to scaffold students' responses after the primary intervention strategy was employed, the study was categorised under the researchers' identified intervention strategy. Interrater agreement on the categorisation of intervention strategies was assessed by the second author. Both authors independently categorised the intervention strategies of all 26 articles. There was 100% agreement on the categorisation of the intervention strategies.

Interventions reviewed included video and live modelling, the use of systematic prompting strategies, and pivotal response training. In addition, studies using children's restricted interests, activity schedules with correspondence training, the integrated playgroup model, script training, and Social Stories are included in this review.

Results

Researchers have employed a variety of instructional strategies to teach play skills to young children with autism. Table 1 summarises the features of the 26 included studies.

Video and live modelling

Strategies emphasising observation and imitation of a model have been used to facilitate the learning of a variety of skills by children with autism (Ledford, Gast, Luscre, & Ayres, 2008; McDuffie et al., 2007). Video modelling (VM) encourages children to acquire targeted skills through observational learning. In this strategy children are shown a videotaped demonstration of the desired play actions and asked to imitate the model's behaviour in the video. Video models can be provided by adults, peers, self, "point-of-view" (i.e., showing only the viewpoint of the target behaviour without showing the entire person), or by using a combined approach (McCoy & Hermansen, 2007). This intervention uses the visual strengths and interests of children with autism. It is also an efficient strategy for offering repeated practise of targeted skills and for providing multiple exemplars (Hine & Wolery, 2006; McCoy & Hermansen, 2007).

Eight studies implementing VM or VM combined with other strategies indicate that VM is an effective tool for teaching play skills. For example, in D'Ateno et al.'s study (2003) employing a multiple-baseline design across response categories, a girl with autism of 3 years 8 months was asked to watch videotaped play sequences of the selected play actions as modelled by adults (i.e., tea party, shopping, and baking). She was given the same play materials that were shown in the videotaped demonstration. Following the intervention, the child was able to engage in appropriate play with the selected toys without reinforcement or prompting. Other studies using VM to teach play skills report that children learned the sequences of scripted verbalisations and play actions quickly, without reinforcement and adult prompts, and maintained them over time (MacDonald et al., 2005; MacDonald et al., 2009; Palechka & MacDonald, 2010).

In another study, Palechka and MacDonald (2010) attempted to compare the effects of instructor-created video modelling (ICV) versus commercially available video models (CAV) using a multi-element design within participant and across model types and a multiple-probe design across participants. Three young children with autism of 4 to 5 years learned scripted play from watching ICVs. Their newly acquired behaviours were maintained after watching ICV for a play scenario and CAV for a different play scenario. Two participants learned the scripted play sequence rapidly with ICV, and one participant showed similar responses to both video models. The researchers suggest that the differential effects occurred as the ICV provided a more exact and specific model of the play behaviours with the materials and toys that were more similar to those available during free play sessions.

Researchers have also combined VM with other strategies such as reinforcement contingencies, verbal instruction, and matrix training (Dauphin, Kinney, & Stromer, 2004; Hine & Wolery, 2006; Paterson & Arco, 2007). In a multiple-probe design, Hine and Wolery (2006) used a point-of-view VM procedure for playing with gardening and cooking play sets with two preschool children with autism. Children were then asked to play with play sets identical to the models. In addition, verbal instruction to imitate the video and reinforcement for the appropriate play were provided to a child who was not able to learn the play skills by only watching the video. Paterson and Arco (2007) also conducted a study using a multiple-baseline design across play behaviours while implementing VM with verbal prompts and praise. In their study, two boys aged 6 and 7 were asked to watch the videotape demonstrating play with transportation toys. The children's appropriate play with toys increased while repetitive behaviour decreased. In another study, Dauphin et al. (2004) implemented VM embedded in a computer activity schedule, with matrix training and teacher prompting evaluated in a multiple-baseline design across responses. As a result, the 3-year-old participant in their study showed increases in scripted play and untrained play activities.

Sancho et al. (2010), using an adapted alternating treatments design, compared the effectiveness of two types of VM for teaching pretend play skills. That is, VM without prompts or reinforcement versus simultaneous VM with prompts and reinforcement for imitation. Two children with autism aged 5 participated in the study. During the simultaneous VM condition, the participants were shown the videotaped model and physically prompted and reinforced (i.e., with snacks) for prompted and independent imitation of the play actions. In the video priming condition, the participants were shown the video without access to the toys. Reinforcements were delivered for attending to the video. For one participant, both procedures were similarly effective for imitating scripted play actions. However, the second participant showed increases in scripted play actions more quickly in the simultaneous VM than in the video priming.

Table 1. Play skills intervention

Video and live modelling

Authors	Participants	Play skills taught/settings	Instructional strategies/experimental design	Results	Generalisation
D'Ateno et al. (2003)	A child with autism aged 3 years 8 months	Scripted verbal statements and modelled motor responses (tea party, shopping, and baking) A conference room	Video modelling of play sequences Multiple-baseline design across response categories	Modelled verbal and motor play responses increased	Not generalised to novel and not modelled responses
Dauphin et al. (2004)	A child with autism spectrum disorder aged 3 years 1 month	Sociodramatic play Child's home	Video-enhanced activity schedules and matrix training Reversal design	Sociodramatic play activities increased	Generalised to untrained play activities
Hine & Wolery (2006)	2 children with autism, aged 2 years 6 months and 3 years 7 months	Play actions with gardening and cooking toys A preschool therapy room	Video modelling with verbal instructions and positive reinforcements Multiple-probe design across two behaviours	Video-modelled play actions increased	Generalised to untrained materials and the classroom for one toy set
Jahr et al. (2000)	6 children with autism, aged from 4 to 12 years old	Cooperative play (Lego, dolls, wooden blocks, etc.) Residential home or classrooms	Modelling with verbal description Nonconcurrent multiple-baseline design across participants	Targeted play responses increased	Play generalised to novel settings and play partners
MacDonald et al. (2005)	2 children with autism, aged 4 and 7 years old	Pretend play (town, ship, house play set) Preschool classroom	Video modelling of play sequences and verbalisations Multiple-probe design across play sets	Scripted play actions and verbalisations increased	Not generalised
MacDonald et al. (2009)	2 children with autism, aged 5 and 7 years old	Pretend play (airport, zoo, grill play set) A testing room	Video modelling of scripted play interactions Multiple-probe design across play sets	Scripted play behaviour increased	1 child showed increases in unscripted verbalisation
Palechka & MacDonald (2010)	3 children with ASD, aged from 4 to 5 years old	Pretend play (scripted vocalisations, scripted play actions), attending to video, and attending to toys during video viewing Therapy room	Instructor-created video models and commercially available videos Multi-element design within participant and across model types; a multiple-probe design across participants	Scripted play increased in both conditions Differential effects upon the participants in two procedures	Not reported
Paterson & Arco (2007)	2 children with autism, aged 6 and 7 years old	Play with transport toys A play room in the special education centre	Video modelling with prompts, verbal instruction, praise Multiple-baseline design across play behaviours	Appropriate toy play increased and repetitive behaviour decreased	1 child generalised to related toys
Sancho et al. (2010)	2 children with autism, aged 5 years 4 months and 5 years 11 months	Pretend play (a house and a circus play set) 5 different locations	Simultaneous video modelling (prompts and reinforcements) and video priming (with no prompts) Adapted alternating treatments design	Play actions and attending increased similarly in both interventions	Play actions generalised to other play but limited

Systematic prompting strategies

Study	Target and setting	Method and design	Outcome	Generalisation
Coe et al. (1990)	2 children, one with autism, aged 6 years old, and one with Down syndrome, aged 5 years old	Initiating and playing a ball game Contrived play setting	Least-to-most intrusive prompts, reinforcements, and time out Multiple-baseline design across children and behaviours	Learned targeted nonverbal and verbal play responses	Not reported
Colozzi et al. (2008)	3 children with autism and a child with Down syndrome aged from 3 years 7 months to 4 years 4 months	Pretend play expressive vocabulary skills and motor skills A separate preschool classroom	Simultaneous prompting procedure, a multiple-probe design across training responses and students, and a repeated acquisition design across the two experimental conditions of 1:1 versus small group instruction	Learned targeted skills but group instruction required more trials than 1:1 condition	Variable effects in both conditions
Kasari et al. (2006)	58 children with autism, aged from 3 to 4 years old (21 in the playgroup, 20 in the joint attention, and 17 in the control group)	Joint attention and symbolic play One-on-one intervention session	Prompting, reinforcement, and naturalistic instruction F-statistics in the mixed-effect regressions	Intervention groups showed improvements in joint attention and symbolic play	Generalised to untrained caregivers
Liber et al. (2008)	3 children with autism, aged 6, 7, and 9 years old	Appropriate social play with toys (circus train and zoo keeper) Classrooms	Task analysis of play activity and time delay Multiple-baseline design across subjects	Social play activity increased	2 students generalised to different settings and a larger group of peers
Lifter et al. (2005)	3 children with PDD, aged 4 years 10 months, 5 years 2 months, and 6 years 4 months old	Play skills assessed by play assessment for each participant Child's home	Least-to-most prompting followed by the child's lead Modified multiple-baseline design across play activities	Targeted play activities increased	Not reported
Wong et al. (2007)	41 children with autism, aged from 2 years 7 months to 4 years 7 months old	Joint attention and symbolic play One-on-one session	Prompting, reinforcement, and naturalistic instruction Randomised group experimental design	Reached performance mastery criteria in joint attention and symbolic play	Generalised to different settings

Pivotal response training

Lydon et al. (2011)	5 children with autism, aged from 3 years to 6 years old	Pretend play (circus toys, Barney, zoo, etc.) Room in the participants' school	Pivotal response training and video modelling Paired samples t-test	Play actions in both interventions significantly increased but no significant increases in play verbalisations in both interventions	Play actions for PRT generalised to settings but play verbalisations not generalised for both interventions

(*Continued*)

Table 1. (*Continued*)

Authors	Participants	Play skills taught/settings	Instructional strategies/ experimental design	Results	Generalisation
Stahmer (1995)	7 children with autism, aged from 4 years 3 months to 7 years 2 months	Symbolic play (a tea set, male doll, Barbie doll, etc.) Family room, bedroom, or empty classroom	Pivotal response training Multiple-baseline design across subjects	Symbolic play and complexity of play increased	6 children generalised to different toys and different people
Thorp et al. (1995)	3 children with autism, aged 5 years 4 months, 9 years 9 months, and 8 years 2 months	Sociodramatic play (Cabbage-Patch boy doll, toy bottle, toy baby food, etc.) Child's home and a clinic setting	Pivotal response training Multiple-baseline probe design across subjects	Sociodramatic play, language skills, and social behaviour increased	Moderately generalised to different toys, settings, and people
Restricted interests					
Baker (2000)	3 children with autism, aged 5 years 8 months, 5 years 5 months, and 6 years 9 months	Bingo game Playrooms in clinic	Teaching modified game using adult prompts to play with siblings Multiple-baseline design across participants	Increases in social play interactions and continued increases during follow-up phase	Generalised into other games, other settings with peers
Baker et al. (1998)	3 children with autism, aged 7 years 7 months, 5 years 4 months, and 8 years 9 months	Games: tag, follow the leader Recess or lunch at school	Teaching modified game using adult prompts to play with peers Multiple-baseline design across participants	Increased engagement in appropriate social play interactions	Generalised to other games
Activity schedules with correspondence training					
Machalicek et al. (2009)	3 children with autism, aged 6, 7, and 12 years old	Engagement with playground activities (swing, slide, etc.) Playground	Activity schedule and correspondence training Multiple-baseline design across participants	Play activities increased and challenging behaviour decreased	Not reported
Morrison et al. (2002)	4 children with autism, aged from 3 years 6 months to 5 years 10 months	Engagement with play materials Classroom	Activity schedule and correspondence training Multiple-baseline design across participants	Engagement with play materials increased	Generalised to different settings
Integrated playgroup model					
Wolfberg & Schuler (1993)	3 children with autism aged 7 years	Play engagement (manipulation, functional, symbolic play) Special classroom	Integrated playgroup Multiple-probe baseline design across participants	Variable but play engagement improved	Reported by teacher and parent interview
Zercher et al. (2001)	Twins with autism, aged 6 years old	Joint attention, symbolic play, and language Sunday school class	Peer-mediated integrated playgroup Multiple-baseline design across subjects	Joint attention, symbolic play, and verbal utterances increased	Not reported

Script training				
Goldstein & Cisar (1992)	Children with autism and typically developing peers, aged from 3 years 7 months to 5 years	Sociodramatic play Participants' classrooms and an unused classroom	Script training using a least-to-most prompting Multiple-baseline design across scripts	All scripts and the related social behaviour increased	Generalised to other play partners
Social Stories				
Barry & Burlew (2004)	2 students with autism, aged 7 and 8 years	Appropriate play (interacting with the materials/peers) Exceptional student education classroom	Teaching social stories using a prompting hierarchy Multiple-baseline design across participants	Increased independent choices and appropriate play	Not reported but anecdotal note

Among eight studies on VM, only one study targeted sociodramatic play (Dauphin et al., 2004), whereas several studies taught functional and symbolic play skills. Three studies were conducted in the child's natural environment, such as the classroom or home (Dauphin et al., 2004; MacDonald et al., 2005; Sancho et al., 2010), and five studies were conducted in a separate place such as a clinic, play, or therapy room (D'Ateno et al., 2003; Hine & Wolery, 2006; MacDonald et al., 2009; Palechka & MacDonald, 2010; Paterson & Arco, 2007). Of the eight studies on VM, seven studies collected generalisation data. One of them documented generalisation to untrained play activities (Dauphin et al., 2004), and four studies indicated mixed or limited generalisation (Hine & Wolery, 2006; MacDonald et al., 2009; Paterson & Arco, 2007; Sancho et al., 2010). Two studies documented no generalisation effects (D'Ateno et al., 2003; MacDonald et al., 2005). Six studies reported that the effect of the intervention was maintained after removing the VM (Hine & Wolery, 2006; MacDonald et al., 2005; MacDonald et al., 2009; Palechka & MacDonald, 2010; Paterson & Arco, 2007; Sancho et al., 2010). Only two studies reported procedural integrity and social validity data (Hine & Wolery, 2006; Sancho et al., 2010).

One additional study examined the effects of live modelling on cooperative play using a non-concurrent multiple-baseline design across participants (Jahr et al., 2000). The results indicated that the modelling procedure alone is not sufficient but is more effective when combined with a verbal description. Three children with autism aged 4–7-years-old and three children aged 9–12-years-old observed models engaging in scripted play in two different conditions: observation and imitation of modelled play versus verbal description of modelled play and imitation. The results indicated the children were not able to learn the play skills with observation alone; however, they demonstrated the targeted play skills after a verbal description of the modelled play episode was embedded in the intervention. Jahr et al. (2000) also report that the learned play skills generalised across novel settings and with untrained play partners and were maintained. They reported social validity data but no procedural integrity data.

As indicated, several researchers suggest that video or live modelling alone may not be effective and the intervention may need to be combined with other strategies (Dauphin et al., 2004; Hine & Wolery, 2006; Jahr et al., 2000; Paterson & Arco, 2007). Further, the intervention may have a differential effect on the play behaviour of individual participants (Sancho et al., 2010). Critical prerequisite skills for the use of modelling (e.g., attention and

imitation skills, language, cognitive skills, recalling the auditory and visual stimulus) may be the key to the successful use of these types of interventions (Dauphin et al., 2004).

Use of systematic prompting strategies

Systematic prompting strategies (e.g., least-to-most or most-to-least intrusive prompting procedures) have been widely implemented to teach a variety of skills including play skills. Prompting strategies are often used in conjunction with other intervention tactics and have been successfully incorporated into script training (Goldstein & Cisar, 1992), Social Stories (Barry & Burlew, 2004), games using the children's restricted interests (Baker, 2000; Baker et al., 1998), activity schedules (Machalicek et al., 2009; Morrison et al., 2002), or peer-mediated interventions (Zercher et al., 2001). For the purposes of this paper, studies using systematic prompting as a primary intervention strategy are reviewed under this category.

Six studies primarily implemented a prompting procedure alone or with other instructional strategies, such as certain components of naturalistic instruction or reinforcement (Coe, Matson, Fee, Manikam, & Linarello, 1990; Colozzi et al., 2008; Kasari et al., 2006; Liber, Frea, & Symon, 2008; Lifter, Ellis, Cannon, & Anderson, 2005; Wong et al., 2007). Coe and his colleagues (1990) attempted to teach two 5-year-old children with autism and a 5-year-old child with Down syndrome ball play, including ball contact play initiation, cooperative ball play, and compliments to their play partner. A least-to-most intrusive prompting procedure was used for each target play behaviour followed by reinforcement. Results indicated that each participant acquired the targeted verbal and nonverbal play skills with the intervention. Lifter et al. (2005) also investigated the effects of a least-to-most prompting procedure on targeted play skills in three preschool children with pervasive developmental disorders while employing a modified multiple-baseline design across play activities. The intervention was implemented by following the child's lead. Subsequently, the child's performance of the targeted play skill was socially reinforced. Their findings indicated that all participants learned the targeted play activities. Kasari et al. (2006) and Wong et al. (2007) also used a prompting hierarchy combined with naturalistic instruction. Across two studies, 58 and 41 preschool children with autism, respectively, were randomly assigned to one of two intervention groups, joint attention or play skills, and taught the targeted skills while being prompted.

The children's play was socially reinforced throughout the intervention. The children in the joint attention intervention group demonstrated improvements in responses to joint attention, and the children in the play skill group demonstrated more diverse functional and symbolic types of play. The participants were able to generalise their learned skills from the treatment sessions with the experimenter to play with their caregivers (Kasari et al., 2006; Wong et al., 2007).

In addition, two studies implemented a spontaneous prompting and time delay procedure. Using a multiple-baseline design across training responses and students, Colozzi et al. (2008) investigated the effect of a simultaneous prompting procedure with children in a one-on-one versus small group setting. The pretend play skills of three preschool children with autism and a child with Down syndrome were observed. During the sessions, the toys were presented to the students with physical assistance and a verbal model of play simultaneously. All participants learned and maintained the targeted skills in both conditions. In addition, the participants demonstrated slightly higher generalisation during the small group instruction. In a study using a progressive time delay procedure, Liber et al. (2008) implemented a progressive time delay procedure with task-analysed play activities to improve social play skills (i.e., appropriate play with toys, initiations toward peers, and requesting peer assistance) for three children aged 6, 7, and 9. The study employed a multiple-baseline design across subjects. All participants increased their targeted play skills while decreasing dependence on adult prompts. Two participants also generalised the play skills to different settings, with different materials and play partners.

Six studies evaluated systematic prompting strategies and two of these studies focused on joint attention and symbolic skills (Kasari et al., 2006; Wong et al., 2007). One study taught pretend play skills (Colozzi et al., 2008), and two other studies investigated individual targeted play skills or appropriate play with a ball or toys (Coe et al., 1990; Lifter et al., 2005). Two studies were conducted in the child's classroom (Coe et al., 1990; Liber et al., 2008). One study was implemented in a separate preschool classroom (Colozzi et al., 2008), with an additional study taking place in the child's home (Lifter et al., 2005). Two studies were conducted in one-on-one intervention settings (Kasari et al., 2006; Wong et al., 2007). Four studies (Colozzi et al., 2008; Kasari et al., 2006; Liber et al., 2008; Wong et al., 2007) reported generalisation data indicating the targeted play skills were generalised to other people and different settings (Kasari et al., 2006; Wong et al., 2007) or variables (Colozzi et al.,

2008; Liber et al., 2008). Only one study (Colozzi et al., 2008) documented maintenance effects. Four studies reported the procedural integrity (Colozzi et al., 2008; Kasari et al., 2006; Lifter et al., 2005; Wong et al., 2007), with one study (Colozzi et al., 2008) reporting social validity data.

Pivotal response training

Another strategy documenting effective outcomes for improving the language, social interactions, and play skills of children with autism is that of pivotal response training (PRT). The PRT model is described as a naturalistic instructional strategy incorporating a child's interests into discrete trials in natural environments while following the child's lead (Koegel & Koegel, 2006; Stahmer, Ingersoll, & Carter, 2003). That is, the adult presents the child's favourite toys and models appropriate play. When the child engages in the appropriate play the child's response is reinforced and the adult provides exemplars while taking turns with the child.

Two studies investigated the effectiveness of pivotal response training using a multiple-baseline probe design across subjects (Stahmer, 1995; Thorp et al., 1995). For the young children aged 4 to 9, there were demonstrated increases in symbolic play (Stahmer, 1995) as well as in sociodramatic play (Thorp et al., 1995). In addition, children's play complexity increased, and they demonstrated improvement in social interactions. The newly acquired play skills also generalised into new settings, with new toys, and with parents. Stahmer (1999) suggests that PRT is more effective for children who show some interest in object manipulation, have some imitation skills, and do not exhibit severe self-stimulatory behaviour.

Lydon and colleagues (2011) attempted to compare the effectiveness of PRT and VM in teaching pretend play skills to five preschoolers with autism. During the VM intervention, the participants were shown a video clip, but prompts or reinforcements were not used. During PRT, the experimenter presented the participant's preferred toy and provided models of symbolic play actions and verbal statements while taking turns with the child. The participants showed significant increases in play actions with both procedures; however, the increases in PRT were higher than in the VM condition. Play actions generalised in PRT but not in the VM intervention. Play verbalisations did not significantly increase in the training and generalisation settings for either intervention. This study also suggests students with sufficient language skills may increase pretend play skills with PRT and VM; implementation of pivotal response training required more time than VM; and

the intensity of the intervention may differentially affect outcomes in terms of generalisation and maintenance of skills.

The studies on pivotal response training focused on symbolic play skills and were conducted in a room in the participants' school, the child's home, and/or a clinic setting. However, children's play skills were evaluated with peer play partners. All three studies (i.e., Lydon et al., 2011; Stahmer, 1995; Thorp et al., 1995) reported generalisation to different toys, settings, and people, and demonstrated that the learned play skills were maintained during follow-up. No studies provided procedural integrity and social validity data.

Use of restricted interests

Researchers have attempted to use the restricted interests of children with autism as an asset. Baker and colleagues (Baker, 2000; Baker et al., 1998) embedded the restricted interests of young children with autism into games (e.g., bingo, tag, follow the leader, etc.). Subsequently, these modified games were taught to children with autism and their typically developing peers or siblings using adult prompting. For example, one child was obsessed with writing consecutive numbers in a line. This behaviour was embedded into a typical bingo game to match the numbers on the play cards (Baker, 2000). Another child was interested in U.S. geography, so he was asked to play a modified tag game using a map of the US on the playground (Baker et al., 1998). The results for these studies, evaluated in a multiple-baseline design across participants suggest that teaching games increased appropriate social play. Further, these interactions were maintained without an adult's cue and generalised to other non-obsession themed games or play activities and to other settings. The researchers concluded that prompting children to engage in play may not be sufficient. However, after incorporating the children's own interests into the games, the children engaged in reciprocal play with their peers or siblings. These two studies were conducted in playrooms in a clinic or at recess time at school. These studies reported social validity data; however, no procedural integrity data were provided.

Activity schedules with correspondence training

Activity schedules are often used for children with autism to facilitate independent engagement in activities and encourage smooth transitions from activity to activity. Two studies using activity schedules with correspondence training focused

on improving engagement with functional and symbolic play (Morrison et al., 2002), and playground activities (Machalicek et al., 2009).

Morrison and her colleagues (2002) implemented activity schedules combined with correspondence training using a multiple-baseline design across participants to increase the independent play of four preschool children with autism in an inclusive classroom. Children with autism and their peers were taught to put photographs of their selected play activities on a clipboard and to forecast their selections. At the end of playtime, the children were asked to report where they played. Verbal feedback was provided after a review of the correspondence between where the children said they were going to play and where they actually played. Results suggest that children's engagement with play materials, on-schedule behaviour, and play correspondence behaviour increased with the intervention and were maintained. The participants' on-task behaviour during play also generalised into an untrained setting.

Machalicek et al. (2009) also conducted a study using photographic activity schedules and task correspondence training with three children with autism 6, 7, and 12 years of age. The intervention was evaluated using a multiple-baseline design across participants. The teacher asked the participants to name what they would like to play and then reviewed the participants' activity schedules with the participants during recess. The researchers indicate that all participants demonstrated increases in play on the playground; however, the teacher's verbal prompts were needed to remind children to check their activity schedules in between planned playground activities. No generalisation data were reported. Both studies were conducted in a natural environment with peers and reported procedural integrity data. Only one study (Morrison et al., 2002) documented social validity data.

Integrated playgroup model

Peer-mediated intervention studies are most often used to improve social interactions of children with autism. In these studies, play served as the context to facilitate social interactions through which typically developing peers are taught and prompted (Odom et al., 1999; Odom & Strain, 1986; Odom & Watts, 1991). Two studies on the peer-mediated integrated playgroup model were conducted with a direct focus on facilitating the play behaviour of children with autism.

Wolfberg and Schuler (1993) investigated the effects of the integrated playgroup on the play of three 7-year-old children with autism using a multiple-probe baseline design across participants. They developed three playgroups consisting of two children with autism and three typically developing children in each group. Children with autism in the integrated playgroup were encouraged to play with the toys by their peers while adult guidance/ scaffolding was provided. Although the results were variable, the participants engaged more in functional, symbolic, and social play with a decrease in nonfunctional object manipulation and isolated play. Maintenance of the improved play engagement was variable during the probe. For the generalisation and social validity measure, this study conducted parent and teacher interviews and individual symbolic play assessment before and after the intervention. Procedural integrity measures were not reported.

Zercher and colleagues (2001) developed a playgroup to increase the joint attention, symbolic play, and language of the children with autism that included two 6-year-old twin brothers with autism and three typically developing children. A multiple-baseline design across subjects was implemented to examine the effects of the intervention. Typically developing children were taught to model targeted play actions and to facilitate the play engagement of the children with autism. The experimenter reviewed each training step with the peers prior to the session. Each participant showed increases in joint attention, symbolic play, and the number of verbal utterances. In addition, the trained peers were able to conduct play sessions without adult prompts during maintenance; however, the play behaviours of the children with autism increased only with the peers' prompts. This study documents data on procedural integrity and social validity; however, generalisation effects were not reported.

Script training

Script training has been used to teach children to follow specific sequences of play behaviour. Goldstein and Cisar (1992) used script training to teach sociodramatic play to three preschool children with autism and six typical peers. Each script consisted of the verbal and nonverbal behaviours of three assigned roles for a sociodramatic theme (e.g., a salesperson, an animal caretaker, and a customer in a pet shop). Three triads including a child with autism and two typical peers were taught scripts for their assigned roles using a most-to-least prompting hierarchy. The study was conducted in classrooms and evaluated in a multiple-baseline design across scripts. Their findings indicated all children learned the scripts and exhibited more theme-related social

interactions. In addition, all children maintained and generalised the learned skills to different play partners. This study reported procedural integrity data but no data on social validity. Script training of play behaviour has also been used in conjunction with other intervention techniques such as VM (D'Ateno et al., 2003; MacDonald et al., 2009; Paterson & Arco, 2007).

Social Stories

Studies employing Social Stories include a description of a challenging situation for the child and the expected behaviours for that situation (Gray & Garand, 1993). Barry and Burlew (2004) used Social Stories to teach choice making and appropriate play skills to children with autism. In their study, classroom teachers taught children to use Social Stories with photographs illustrating the components of behaviours and skills. These stories included expectations about choice making and appropriate play with materials and peers. The Social Stories were reviewed on a daily basis, and corrective feedback was provided during activities in a special education classroom. The study, using a multiple-baseline design across participants, demonstrated that the children improved and maintained independent choice making and appropriate play with materials. In addition, the children engaged in appropriate interactive play with peers and independently played with the materials. The findings also suggest that the way in which Social Stories are implemented, as well as their content, are critical components for the effectiveness of the intervention (Lorimer, Simpson, Myles, & Ganz, 2002). That is, Social Stories need to be reviewed with a child on a regular basis prior to the activity in which the child exhibits challenging behaviour. Research suggests corrective feedback and prompts should be provided during and after the activity while providing sufficient opportunities to practise the skills (Barry & Burlew, 2004; Lorimer et al., 2002). No generalisation, procedural integrity, or social validity data were provided for the study.

Discussion

Studies on teaching play skills indicate that children with autism responded well to direct play intervention in the structured environment. Improvements in play skills also increased positive social interactions and decreased inappropriate behaviour as collateral effects. The majority of studies on teaching play skills used combined approaches such as VM with reinforcement contingencies, verbal instruction, or matrix training (Dauphin

et al., 2004; Hine & Wolery, 2006), modelling with verbal description (Jahr et al., 2000), use of restricted interests (Baker, 2000; Baker et al., 1998), script training (Goldstein & Cisar, 1992), and Social Stories (Barry & Burlew, 2004) with prompting strategies. Studies also employed activity schedule and correspondence training procedures (Morrison et al., 2002), peer-mediated integrated playgroup interventions (Wolfberg & Schuler, 1993; Zercher et al., 2001), or components of naturalistic instruction (Kasari et al., 2006; Lifter et al., 2005; Wong et al., 2007).

Although a variety of play skill instructional approaches have been implemented, VM has been most widely implemented. VM utilises the visual strengths of children with autism; however, it shares common components with other play interventions such as task-analysed play actions and statements, and visual presentation of sequenced play actions with or without verbal instruction. The studies investigating play skills instruction indicate that a variety of visual supports are included in the intervention that consider the characteristics of children with autism, such as pictures, icons, photos, video, or other computer-based visual supports. Further, the effective play skill interventions include common features such as motivational strategies (i.e., incorporating the child's interests into the play activity, contingent reinforcement), selection of appropriate targeted play skills (developmentally appropriate), task analysis of play skills, teaching/modelling of each sequence of the skills, and providing systematic prompts.

The review of play skills intervention studies yields some implications for practice and future research. Some studies taught and assessed play skills with peers in natural settings (e.g., Goldstein & Cisar, 1992; Machalicek et al., 2009; Morrison et al., 2002). Children with autism have often been taught play skills and assessed one on one with adults in clinical settings. Young children may play alone or with adults; however, most children interact with their peers in classrooms. Children with autism do not spontaneously participate and take a proactive role in play (Lifter, Mason, & Barton, 2011). They may also have more difficulty interacting with peers versus adults since their peers are less likely to adjust to their atypical play behaviour (Oke & Schreibman, 1990).

Play with peers is closely related to context (Strain & Schwartz, 2001). Young children with autism may have more opportunities to engage in a variety of play contexts with their peers when play skills are taught directly and systematically during daily classroom activities in natural environments. Providing

intervention in the context of ongoing activities and routines facilitates generalisation of the learned skills (Rogers, 2000). Teaching play skills to children with autism in natural environments with peers rather than in one-on-one sessions with adults may enhance children's interactions, as well as promote maintenance and generalisation of play skills (Liber et al., 2008). Practitioners should consider the importance of play skills as one of the critical developmental skill areas rather than view play as merely a context to teach other skills. Intervention should focus on incorporating play skills instruction into classroom activities and individualised education programs (Malone & Langone, 1999; Mastrangelo, 2009). More studies need to be conducted in classrooms focusing on embedding instruction of play skills into daily routines and the impact of such instruction on children's engagement in activities with peers.

Acquisition and generalisation of play skills may be affected not only by how the play skills are taught, but also by which play skills are taught. The careful selection of play activities may further encourage more spontaneous play among children with autism and their peers. Researchers have paid more attention to teaching symbolic play skills since they are one of the reported deficits in children with autism and are highly related to social development (Stanley & Konstantareas, 2007). Research demonstrates that expressive language skills may be a predictor of symbolic play and should be taken into consideration when teaching these skills (Stahmer, 1995; Stanley & Konstantareas, 2007). However, many young children with autism exhibit deficits in language skills, indicating that they may not have the prerequisite skills for learning symbolic play. Developmental readiness is an important consideration for identifying the target play skills to help children with autism learn the skills quickly, engage spontaneously, and generalise these skills to new play materials (Lifter et al., 2005). Essential elements of play also involve pleasurable and enjoyable engagement (Jordan, 2003). Lifter et al. (2011) emphasised that the key components of play involve spontaneous, naturally occurring activities with objects that engage attention and interest. Therefore, play activities need to be chosen that focus on the strengths of children with autism, incorporate their interests, and provide opportunities for experiencing play in the same manner as their typically developing peers in a natural environment.

Although just a few experimental studies investigating games have been reported in the literature, teaching games to children with autism may be an excellent tool to improve the play repertoire of these children and facilitate their engagement with materials and peers in appropriate ways. Children with autism can learn more complex and varied play within a structured context (Blanc et al., 2005). Games have rules, provide structure and are predictable, thus facilitating learning for children with autism. With appropriate modifications, children with autism may be able to learn games more effectively and maintain and generalise game playing better than other play skills. Play or games that both children with and without autism enjoy can be modified so that children with autism who have limited language skills and their typically developing peers engage in play together. Baker and colleagues (1998) state that children can maintain social play without adult prompts when both children with and without autism have reciprocal relationships and can participate in play as comparable partners rather than in a helper–helpee role. Play skills instruction may motivate children with autism by using the behavioural characteristics of these children and incorporating their idiosyncratic and restricted interests into social play activities (e.g., popular games/play among typically developing children). As a result, children with autism may be more likely to engage spontaneously with play and peers and become comparable play partners, facilitating the play of both children with and without autism without depending on an adult's prompts.

Studies on play skills instruction often specify types of play skills (e.g., functional, symbolic, sociodramatic play) or provide general descriptions of the targeted play skills with information about the play materials (e.g., tea party, cooking toys, dolls, blocks, cars) without specifying the type of play. Among the studies, there seems to be inconsistencies in categorising the types of play skills (e.g., the same play behaviours are often categorised under different types of play skills such as pretend, functional, or symbolic play). Future studies should attempt to provide clear definitions and measurements of target play skills to better understand the play characteristics of children with autism and their responses to play skills instruction. There may need to be more consistent definition and classification of play behaviours (see Barton & Wolery, 2008; Lifter et al., 2011).

Future studies should investigate the differential effects of play skills instruction by focusing on specific play skills, as well as outcomes for individual children to enhance the effectiveness and efficiency of interventions (Kasari et al., 2006). That is, researchers should examine what play skills should be effectively and efficiently taught by which instructional strategies. In addition, research should identify what prerequisite skills are required to teach

certain play skills and implement specific instructional strategies. Further, how the intensity of the play skills instruction can affect the pace of acquisition and maintenance and generalisation should be examined. For instance, a certain level of expressive language skill is a prerequisite for engaging in symbolic play (Stahmer, 1995; Stanley & Konstantareas, 2007). PRT may also be more effective with children who have some imitation skills, who have an interest in object play, and who do not show severe self-stimulatory behaviour (Stahmer, 1999). In addition, some instructional strategies (i.e., VM, live modelling) were found to be effective for some children with autism (D'Ateno et al., 2003; MacDonald et al., 2005; MacDonald et al., 2009) but had to be combined with additional strategies for other children with autism (Dauphin et al., 2004; Hine & Wolery, 2006; Jahr et al., 2000; Paterson & Arco, 2007). For example, in Sancho et al.'s study (2010), two participants responded differentially to two procedures, VM only and video modelling with prompts and instructions. Lydon and colleagues (2011) also indicate that both PRT and VM were similarly effective in increasing play actions in the training environment, but PRT resulted in greater increases in behaviour. However, there were no significant increases in play verbalisation in either intervention. The play actions were generalised only with PRT. According to the results of these studies, it is necessary to examine how the duration and intensity of the intervention affect acquisition, maintenance, and generalisation of the specific play skills.

Promoting the generalisation of learned play skills with materials and peers is critical to enhance the spontaneous play of children with autism. Few studies have demonstrated the generalised effects of play skills across different settings, with different materials, or different people following intervention (Baker, 2000; Baker et al., 1998; Dauphin et al., 2004; Goldstein & Cisar, 1992; Jahr et al., 2000; Kasari et al., 2006; Liber et al., 2008; Morrison et al., 2002; Stahmer, 1995; Thorp et al., 1995; Wong et al., 2007). Some studies have documented only modest or variable generalisation effects (Colozzi et al., 2008; Hine & Wolery, 2006; Liber et al., 2008; Lydon et al., 2011; MacDonald et al., 2009; Paterson & Arco, 2007; Sancho et al., 2010, Stahmer, 1995; Thorp et al., 1995). In addition, several studies report the maintenance of play skills after withdrawing intervention (Baker, 2000; Baker et al., 1998; Colozzi et al., 2008; Hine & Wolery, 2006; Goldstein & Cisar, 1992; Jahr et al., 2000; Lydon et al., 2011; MacDonald et al., 2005; MacDonald et al., 2009; Morrison et al., 2002; Paterson & Arco, 2007; Sancho et al., 2010; Zercher et al., 2001). More

studies should strive to measure the functional use of play with peers and its maintenance. Future studies should attend to the development of effective programs to facilitate maintenance and generalisation of play skills (Barton & Wolery, 2008).

To interpret the effectiveness of the intervention and replicate the intervention, measurement of social validity and procedural integrity are critical. The social validity assessment of the intervention such as the feasibility, acceptability, and effectiveness should be measured as important factors to design more effective and innovative instructional procedures that can be incorporated into typical classroom activities (McConnell, 2002; Strain & Schwartz, 2001). However, few studies report the social validity measures of teaching play skills (Baker, 2000; Colozzi et al., 2008; Hine & Wolery, 2006; Jahr et al., 2000; Morrison et al., 2002; Sancho et al., 2010; Wolfberg & Schuler, 1993; Zercher et al., 2001). In addition, few studies have reported the measurement of procedural integrity (Colozzi et al., 2008; Goldstein & Cisar, 1992; Hine & Wolery, 2006; Kasari et al., 2006; Lifter et al., 2005; Machalicek et al., 2009; Sancho et al., 2010; Wong et al., 2007; Zercher et al., 2001). Future studies should assess the social validity and procedural integrity of play skills interventions.

Research demonstrates that improvements in play can facilitate social interaction, language skills, and decrease the self-stimulatory behaviour of children with autism (Baker, 2000; Stahmer, 1995; Thorp et al., 1995). Longitudinal studies investigated the relationship between not only preschool pretend play behaviour and the early adolescent creativity of typically developing children (Mullineaux & Dilalla, 2009) but also the play and adaptive behaviour of children with developmental disability (Sigafoos, Roberts-Pennell, & Graves, 1999). Although it is suggested that play is critical for children's development, there are few studies on the long-term effects of play on the development of children with autism. Future studies are needed to investigate the long-term effects of developmentally appropriate play skills on the development of academic, social, communication, or functional skills in children with autism.

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