
Pragmatic Language Outcomes of Children With Attention Deficit Hyperactivity Disorder After Therapist- and Parent-Delivered Play-Based Interventions: Two One-Group Pretest–Posttest Studies With a Longitudinal Component

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OBJECTIVE. The pragmatic language outcomes of children with attention deficit hyperactivity disorder (ADHD) were explored across two feasibility studies.

METHOD. Five children with ADHD (ages 6–11 yr), their parents, and 5 typically developing peers completed an assessment 18 mo after a therapist-delivered intervention (Study 1). Participants then completed a parent-delivered intervention (Study 2). Blinded ratings of peer-to-peer play interactions documented changes in children's pragmatic language 18 mo after the Study 1 intervention and before, immediately after, and 1 mo after the Study 2 intervention. Nonparametric statistics and Cohen's *d* were used to measure change.

RESULTS. Children's pragmatic language outcomes were maintained 18 mo after the therapist-delivered intervention and significantly improved from before to 1 mo after the parent-delivered intervention.

CONCLUSION. Interventions involving occupational therapist and speech–language pathologist collaboration, play, and parent and peer involvement may facilitate children's pragmatic language skills.

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Attention deficit hyperactivity disorder (ADHD) is a pervasive neurodevelopmental disorder (American Psychiatric Association, 2013). Approximately 50% of children with ADHD experience language difficulties (Cohen et al., 2000; Tirosh & Cohen, 1998), and social problems are reported in as many as 82% (Landau, Milich, & Diener, 1998). The language difficulties of children with ADHD have commonly been described as pervasive and long-term pragmatic language difficulties that affect their peer relationships and therefore their engagement and participation in key childhood occupations such as play and social interactions (Bignell & Cain, 2007; Cordier, Bundy, Hocking, & Einfeld, 2010).

Performance skills underlie one's ability to participate in desired occupations and activities. *Pragmatic language*, a complex skill that involves social, emotional, and communicative aspects of language in social contexts (Adams, Baxendale, Lloyd, & Aldred, 2005), is a foundational performance skill that underlies children's play and social interaction skills. *Social interaction skills*

include one's ability to approach and initiate interactions with another, use speech and gestures to communicate during interactions, use questions and replies to support the continuation of the interaction, and regulate one's emotions and behaviors appropriately during interactions (American Occupational Therapy Association, 2014). Pragmatic language skills promote social participation in childhood and include verbal and nonverbal language skills needed during peer-to-peer interactions. Appropriate pragmatic language skills are core to successful peer-to-peer interactions and social-emotional development (Hart, Fujiki, Brinton, & Hart, 2004).

Parent-rated pragmatic language skills of children with ADHD have been found to mediate children's social skills, with pragmatic language partially accounting for high rates of social impairment (Staikova, Gomes, Tarter, McCabe, & Halperin, 2013). Children with ADHD who experience pragmatic language deficits are at risk of developing long-term social and emotional difficulties. These difficulties affect their participation in childhood occupations such as playing, joining in class activities with peers, and engaging in other social activities, and they have an impact on these children's overall health and well-being (Brinton & Fujiki, 2006; Hart et al., 2004). These findings suggest that developing children's pragmatic language skills may in turn enhance their occupational outcomes in the area of social participation. Effective interventions targeting social interaction skills will likely need to include improving pragmatic language skills.

Play is an important childhood occupation that provides children with opportunities to develop the prosocial and emotional regulation skills needed for social participation in home, school, and community settings. It is also the most natural context for learning language. Children with ADHD have difficulty with cooperative play, perspective taking, responding to social cues, and self-regulation. These difficulties contribute to a lower quality of peer-to-peer play interactions. In combination, poor play and pragmatic language ability can contribute to negative social outcomes such as peer rejection and fewer meaningful friendships (Cordier et al., 2010). Developing the pragmatic language skills of children within the context of peer play is therefore an important clinical goal for occupational therapists seeking to enhance children's social participation.

Occupational therapists assist children with self-regulation, social, and play skills, and speech-language pathologists assist children with language development (Adams et al., 2005). However, current interventions are limited in their capacity to effectively target the pragmatic language skills of children with ADHD using peer-to-peer

play interactions. Most current interventions select participants on the basis of pragmatic language difficulties, but participant diagnoses vary, making it difficult to ascertain which children benefit from various intervention approaches (Hyter, Rogers-Adkinson, Self, Simmons, & Jantz, 2001).

Adams (2008) summarized the main challenges of existing pragmatic language interventions conducted primarily by speech-language pathologists as follows. First, current interventions lack a theoretical framework that supports the choice of intervention components. Second, the assessments used and intervention goals do not align. Third, evidence is lacking to support the effectiveness of pragmatic language interventions and an understanding of which intervention components facilitate change. Last, evidence is needed to help establish the best long-term supports for children with pragmatic language difficulties as they transition through school and different developmental stages. Emerging empirical evidence has suggested that typically developing playmates may be able to assist in the development of both the play and the pragmatic language skills of children with ADHD. These interventions focus on peer-to-peer interactions supported by trained adult facilitators and interprofessional collaboration between occupational therapists and speech-language pathologists (Cordier, Munro, Wilkes-Gillan, Li, et al., 2014; Wilkes, Cordier, Bundy, Docking, & Munro, 2011; Wilkes-Gillan, Bundy, Cordier, & Lincoln, 2014a).

Therapist-Delivered Play-Based Intervention

In an initial therapist-delivered play-based intervention that occurred 18 mo before Study 1, 14 children with ADHD (ages 5–11 yr), their playmates, and parents attended weekly 1-hr clinic sessions for 7 wk (Wilkes et al., 2011). The intervention was based on a theoretical play-based model and aimed to improve children's social play skills in peer-to-peer play interactions. After reviewing the literature on both ADHD and play, Cordier, Bundy, Hocking, and Enfield (2009) developed a theoretical model that postulated how the characteristics of ADHD influence children's play. The model was based on the assumption that play is an important childhood occupation and is the natural context within which a child's physical, cognitive, social, emotional, and language skills develop.

The intervention involved video self-modeling and peer and therapist modeling of prosocial behavior and pragmatic language. A second therapist worked with the

children's parents, providing strategies on how the techniques could be applied at home. Children's social play skills were measured with the Test of Playfulness (Bundy, 2004). Children with ADHD made large, significant improvements in their social play skills from pre- to postintervention that were maintained 18 mo after the intervention (Wilkes et al., 2011; Wilkes-Gillan et al., 2014a). The pragmatic language skills of children with ADHD also improved from pre- to postintervention (Cordier, Munro, Wilkes-Gillan, & Docking, 2013). However, whether children maintained gains in their pragmatic language skills in the long term or whether pragmatic language skills generalized beyond the clinic environment was unknown. Investigating these issues is important because continuing pragmatic language difficulties may impede a child's ability to form and maintain peer relationships, an important factor in predicting adjustment in adolescence (Hart et al., 2004).

Parent-Delivered Play-Based Intervention

After the implementation of the therapist-delivered intervention, we determined that a parent-delivered play-based intervention characterized by a higher level of parent involvement than observed in the clinic-based pilot was needed to maintain and generalize the children's skills. During a 7-wk parent-delivered intervention, parents were required to deliver 12 home modules using a DVD and manual. Each module was designed to address an area of social or communication difficulty experienced by children with ADHD (Wilkes-Gillan, Bundy, Cordier, & Lincoln, 2016). The resource provided parents with specific techniques to help them give their child feedback on social interactions with peers. After watching and discussing a DVD episode with their child, parents facilitated a weekly play date with the playmate involved in the study. During the intervention, parents, children with ADHD, and their playmates attended three clinic sessions. (For more information on the parent-delivered intervention, see Wilkes-Gillan, Bundy, Cordier, and Lincoln, 2014b.) The parent-delivered intervention demonstrated preliminary effectiveness from pre- to postintervention in improving the social play skills of 5 children with ADHD, with skills continuing to improve 1 mo after intervention (Wilkes-Gillan et al., 2014b).

Both the therapist-delivered and the parent-delivered play-based interventions provided promising preliminary evidence regarding the short-term efficacy of the intervention on the social play skills of children with ADHD; the therapist-delivered intervention demonstrated that children improved in their pragmatic language outcomes

from pre- to postintervention. However, children's pragmatic language skills after the parent-delivered intervention required further investigation.

In this article, we report on the long-term pragmatic language outcomes of 5 children with ADHD who participated in the therapist-delivered intervention (Study 1) and the short-term pragmatic language outcomes of the same children after they completed the parent-delivered intervention (Study 2). Although our sample was small, data from the 5 children across 18 mo offer a valuable opportunity to report on the longitudinal course of pragmatic language outcomes in children with ADHD. The overarching aim of this study was to continue the evaluation of the play-based intervention, which focuses on promoting children's participation in social contexts in their everyday environments (i.e., home and school).

Specifically, the aims of Study 1 were to (1) examine whether children with ADHD maintained their pragmatic language skills in peer-to-peer play interactions and (2) examine whether children with ADHD experienced greater pragmatic language difficulties in home and school contexts than similar-age peers 18 mo after the therapist-delivered intervention. The aim of Study 2 was to examine whether the pragmatic language skills of the same children improved in peer-to-peer play interactions after a parent-delivered intervention and to examine whether these skills transferred to the home environment 1 mo after intervention. We therefore formulated the following hypotheses:

1. Children with ADHD will maintain gains in their pragmatic language skills in peer-to-peer interactions 18 mo after the therapist-delivered intervention (Study 1).
2. Children with ADHD will present with less pragmatic language skill than similar-age peers 18 mo after the initial intervention (Study 1).
3. Children with ADHD will improve their pragmatic language skills after the pilot parent-delivered intervention (Study 2).

Method

Research Design

A purposive sample was used for the 2 one-group, pretest-posttest feasibility intervention studies containing a longitudinal component. Ethics approval was received from the University of Sydney's Human Research Ethics Committee. Thereafter, all participants gave informed written consent or verbal assent (i.e., children younger than age 7 yr).

Instruments

Pragmatics Observational Measure. The Pragmatics Observational Measure (POM; Cordier, Munro, Wilkes-Gillan, Speyer, & Pearce, 2014) is a 27-item observational measure used to assess the pragmatic language skills of school-age children during a peer play social interaction. It assesses children's pragmatic language abilities in five key areas: Introduction and Responsiveness (introducing communication and being responsive to verbal interactions), Non-Verbal Communication (using and responding to nonverbal communication), Social-Emotional Attunement (using and responding to emotional reactions and intentions of peers), Executive Function (using higher level thinking processes), and Negotiation (using verbal negotiation techniques). The POM items are rated on a 4-point scale (0 is the lowest rating) on the basis of skill and consistency.

The POM has evidence of good internal consistency, with a high Cronbach's α of .99. It also has evidence of good content, construct, and criterion validity. A strong correlation between the overall POM and the Pragmatic Protocol (a comparative observational measure; Prutting & Kirchner, 1987) item measure scores has been reported (Pearson $r = .953$, $p = .005$), suggesting good criterion validity. Moreover, strong associations have been found between similar items (with r s ranging between .550 and .770). The 12 overlapping items demonstrated a strong positive association, demonstrating that the POM and Pragmatic Protocol defined the same target construct (Cordier, Munro, Wilkes-Gillan, Speyer, & Pearce, 2014).

The fifth author (Pearce) was trained in use of the POM by the first author (Wilkes-Gillan) and was blinded to all aspects of Studies 1 and 2 at the time of training. Eight training videos of school-age children (not those in the current study) engaged in peer-to-peer play interactions were observed by both authors, who compared their observations with each POM item descriptor. The authors then independently scored another 10 training videos. The results were compared, and agreement was reached by consensus. Using the same methods, a further 10 training videos were then independently scored. The fifth author then independently scored 20 videos for Studies 1 and 2. Only the children with ADHD were rated. Interrater reliability for this study was calculated with IBM SPSS Statistics (Version 19; IBM Corp., Armonk, NY) and was based on a random selection of 30% of the video-recorded data. Intraclass correlation coefficients (ICCs) were used to determine the agreement between raters (interrater reliability: two-way mixed

model, ICC absolute agreement, single measures). The reliability coefficient was used to detect fair (ICC > .4) to excellent (ICC > .75) levels of reliability. The reliability was found to be excellent (ICC = .83).

The POM was the primary outcome measure used to investigate changes in the pragmatic language skills of children with ADHD. For Study 1, POM data were collected after the therapist-delivered intervention and again 18 mo later. For Study 2, POM data were collected pre- and postintervention and 1 mo after the parent-delivered intervention. Secondary data were collected during the speech-language assessment that occurred 18 mo after children had completed the therapist-delivered intervention.

Children's Communication Checklist—Second Edition. The Children's Communication Checklist—Second Edition (CCC-2; Bishop, 2003) is a standardized parent-rated communication checklist suitable for use with school-age children. The CCC-2 provides information on a child's structural and pragmatic language skills across contexts. Reliability coefficients range from .86 to .96, and internal consistency ranges from .66 to .80. The CCC-2 has evidence of validity because it can distinguish between children with and without communication difficulties. It also distinguishes whether these difficulties are characterized by pragmatic or more typical speech-language impairments.

Clinical Evaluation of Language Fundamentals (4th Australian Standardized Edition). The Clinical Evaluation of Language Fundamentals (4th Australian Standardized Edition, or CELF-4; Semel, Wiig, & Secord, 2006) examines expressive and receptive language and was administered to all children in the study to identify whether they had a language disorder. The CELF-4 has evidence for test-retest reliability and stability, internal consistency, and interrater reliability. The CELF-4 also has evidence for validity. It has good accuracy in distinguishing between children with and without a language disorder. Sensitivity ranges from 87% to 100%, and specificity ranges from 82% to 96% for core language scores across 1, 1.5, and 2 standard deviations below the mean.

Conners Comprehensive Behavior Rating Scales. The Conners Comprehensive Behavior Rating Scales (CCBRS; Conners, 2008) is a norm-based parent-rated screening measure to identify whether school-age children have symptoms and behaviors consistent with ADHD. The CCBRS is a reliable and valid measure that has been widely used in research. It has evidence of good internal consistency (Cronbach's α s = .69-.97) and temporal stability (r s = .56-.96, p s < .001) and an interrater reliability coefficient of .83. Discriminant validity revealed

a mean overall correct classification rate of 78% across all forms, which indicates that the CCBRS can discriminate between different groups. Multivariate analysis of covariance has indicated that, across scales, the means of clinical groups were significantly higher than the means for the typically developing population.

Participants

Parents of 14 children with ADHD ages 6–11 yr who had participated in the therapist-delivered play-based intervention 18 mo earlier were invited to participate in a follow-up assessment and a parent-delivered intervention. To be included, children with ADHD had to have a formal diagnosis of ADHD. The presence of current symptoms was confirmed with the CCBRS. Children with ADHD were required to have scores above the clinical cutoff for CCBRS subscales (i.e., $t > 70$ for the *Diagnostic and Statistical Manual of Mental Disorders* [4th ed.; *DSM-IV*; American Psychiatric Association, 1994]). Children were excluded if they had another major developmental disorder.

Each child with ADHD invited a typically developing playmate of a similar age. Playmates could include siblings or peers ages 6–11 yr. Children were considered typically developing when they showed no evidence of ADHD or other developmental or behavioral difficulties as described by parents and teachers. The absence of ADHD and behavioral symptoms was confirmed with the CCBRS; all playmates' scores were below the borderline clinical cutoff (i.e., $t < 65$) on the *DSM-IV* scales. One parent of the child with ADHD was required to be available to implement the parent-delivered intervention. Children continued using medication prescribed for ADHD, and parents were asked to maintain consistency of medication during the study.

Study 1 occurred during one school term, and 5 families were available to participate. Participants were 5 boys with ADHD. Four mothers and one father participated. Each child with ADHD invited the same typically developing playmate from Study 1 to attend the intervention with them for Study 2 (see Table 1).

Procedures and Data Collection

Children completed a follow-up assessment 18 mo after their participation in the therapist-delivered play-based intervention (Study 1). One week later, the children returned to the clinic to commence the 7-wk parent-delivered intervention (Study 2).

Study 1: 18-Month Follow-Up of Therapist-Delivered Intervention. The 18-mo follow-up lasted for 1.5 hr and involved both a 20-min video-recorded clinic play

Table 1. Participant Demographics

Variable	Participants	Playmate
	Parent	
Age, yr, <i>M</i> (<i>SD</i>)	45.4 (7.2)	44.2 (5.0)
Caregiver's qualifications, %		
University degree	60	60
High school	40	40
Primary caregiver's occupation requires tertiary qualifications (%)	20	20
	Child	
Age, yr, <i>M</i> (<i>SD</i>)	8.9 (1.6)	8.7 (1.7)
Male, <i>n</i>	5	4
Sibling as playmate	4	—
ADHD symptomatology, <i>M</i> CCBRS score		
Hyperactivity symptoms	73.2 ^a	54.6
Inattention symptoms	75.8 ^a	56.6
Oppositional behavior	79.8 ^a	65.0
Generalized anxiety disorder	75.4 ^a	58.4
Language problems	64.0	53.0
Social problems	75.0 ^a	74.0 ^b
Subtype presentation of children with ADHD, <i>n</i>		
Predominantly inattentive	1	—
Predominantly hyperactive/impulsive	2	—
Combined subtype	2	—
Medication status of children with ADHD ^c		
No. of children taking medication for ADHD	4	—
Changes in medication 18 mo after therapist intervention	0	—
Changes in medication during parent intervention	0	—
Changes in medication 1 mo after parent intervention	0	—

Note. — = not applicable; ADHD = attention deficit hyperactivity disorder; CCBRS = Conners Comprehensive Behavior Rating Scales; *M* = mean; *SD* = standard deviation.

^aCCBRS mean score is above the clinical cutoff (i.e., subscale scores > 70).

^bPlaymates of children with ADHD scored above the clinic cutoff for social problems (*Diagnostic and Statistical Manual of Mental Disorders* [4th ed.] scale). ^cMedication status was based on parent report and was recorded by researchers at each intervention time point.

session and a 1-hr language assessment. The play session was video recorded without adult interruption using a wall-mounted video camera with a high-definition memory card to ensure high-quality footage of the children. After the follow-up assessment, the occupational therapists (Wilkes-Gillan and Cordier) met with a speech-language pathologist (Munro) to review video footage of the children's pragmatic language use in peer-to-peer interactions and to discuss strategies for improving children's pragmatic language.

For the play session, the children with ADHD and their respective playmates were shown the playroom and the wall-mounted video camera as well as the one-way mirror and observation room where adults would observe their play. The playroom was set up with play materials that were selected to promote social and communicative

interactions between children: a tent, dress-up clothes, play dough, bowling set, sandbox, and ball games. The first or third author instructed the children that they would be video recorded while playing for 20 min without an adult in the room and reminded them to have fun.

During the follow-up visit, all children completed an individual language assessment conducted by a trained and supervised 3rd-yr undergraduate speech pathology student. Speech pathology students were selected to assist in this research to promote collaboration between disciplines and because the study was unfunded. The assessment consisted of four subtests to calculate the Core Language Index Scale of the CELF-4. The occupational therapists observed the assessment from behind the one-way mirror and discussed the children's social use of language while collecting parent-rated questionnaires.

After the follow-up assessment, the occupational therapists and speech-language pathologist discussed the children's language skills and strategies to facilitate the development of communication skills. This included examination of the secondary data and playroom footage and ensured that the therapist adapted her language to match the child's communicative needs.

Study 2: Pilot Parent-Delivered Intervention. One week after the language assessment, children commenced a 7-wk parent-delivered play-based intervention. Outcome measurements were conducted in Weeks 1 and 7 at the clinic. A video-recorded play session in the home of the child with ADHD occurred 1 mo after the intervention.

In Wk 1, parents were trained in how to complete weekly home modules. Home modules were completed during Wks 2-6 and involved parents reading a manual chapter, watching and discussing the content of a pre-taped DVD with their child, and inviting the playmate from the study to their home for a 40-min play date. During Wks 2-6, the therapist supported parents by means of a weekly phone consultation in which the therapist discussed strategies to support children's social and pragmatic language skills during play dates and interactions.

During clinic sessions in Wks 1 and 2, the therapist joined each child with ADHD and his playmate for 20 min in the clinic playroom to model desired social and pragmatic language skills. The therapist engaged the children in cooperative play to support them in engaging in prosocial behaviors such as sharing and problem solving. To support the children's pragmatic language, children were encouraged to (1) explain the rules of the game; (2) negotiate, using words to fix problems; (3) say *pause* during the game if they needed to stop and regulate their emotions; (4) watch their friend's body to see

whether their friend was having fun and to support their friend's emotional state; and (5) listen to their friend's ideas about a game and to respond.

Data Analysis

Because the POM is not a standardized norm-based assessment, raw ordinal scores from Studies 1 and 2 were converted to interval-level measure scores using the Winsteps Rasch analysis program (Version 3.70.1; Linacre, 2013) for analysis. This procedure resulted in an overall measure score for each child for each point in time, specifically: (1) after the therapist-delivered intervention, (2) 18 mo after the therapist-delivered intervention and before the parent-delivered intervention, (3) after the parent-delivered intervention, and (4) 1 mo after the parent-delivered intervention. The resulting interval-level measure scores were then entered into IBM SPSS Statistics and tested for normality. The data were normally distributed, and therefore means were used. Because of the exploratory nature of this research, nonparametric Wilcoxon signed-ranks tests for related samples were used to measure changes in overall POM scores of children with ADHD, and Mann-Whitney *U* tests were used to compare the CCC-2 and CELF-4 scores between children with ADHD and their playmates. All *p* values were set at .05 and were not adjusted for multiple comparisons (Hsu, 1996). Cohen's *d* values were then calculated to examine the effect size of the interventions (Cohen, 1992).

Results

Study 1

18-Month Follow-Up of Therapist-Delivered Intervention. Our first hypothesis was supported. The pragmatic language skills of children with ADHD at the 18-mo follow-up were not significantly different from those immediately after the therapist-delivered intervention, indicating that their skills had been maintained (Table 2).

Pragmatic Language Skills of Participants Compared With Peers. Our second hypothesis was partially supported. Although the structural language abilities of the children with ADHD were lower than those of their playmates, they were within the normal range compared with other children their age as measured by a standardized test (CELF-4) and parent report (CCC-2 nonpragmatic subscales and General Communication composite score). However, 18 mo after the initial intervention, and as suspected, children with ADHD still had lower pragmatic language skills than other children their age, as measured

Table 2. Effect of the Intervention on POM Outcomes of Children With ADHD

Intervention Time Point	<i>M</i> (Range)	<i>SD</i>	<i>Z</i>	<i>p</i>	Cohen's <i>d</i> ^a	ES ^b
Study 1 (18-Mo Follow-Up of Therapist-Delivered Intervention)						
Post-therapist-delivered intervention to 18-mo follow-up		21.5	-0.94	.34	-0.6	Medium
Posttest	86.9 (42.8–109.9)					
18-mo follow-up	72.8 (62.4–97.9)					
Study 2 (Pilot Parent-Delivered Intervention)						
Parent-delivered intervention (pre- to postintervention)		17.4	1.22	.225	0.7	Large
Pretest	72.8 (62.4–97.9)					
Posttest	85.9 (70.7–113.4)					
Parent-delivered intervention (postintervention to 1-mo follow-up)		15.8	1.48	.138	1.4	Large
Posttest	85.9 (70.7–113.4)					
1-mo follow-up	108.1 (92.5–119.3)					
Parent-delivered intervention (preintervention to 1-mo follow-up)		22.4	2.02	.04	1.6	Large
Pretest	72.8 (62.4–97.9)					
1-mo follow-up	108.1 (92.5–119.3)					

Note. Means (*M*s) and standard deviations (*SD*s) were derived from interval-level measure scores. ADHD = attention deficit hyperactivity disorder; ES = effect size; POM = Pragmatics Observational Measure.

^aCohen's *d*s were calculated as follows: Group (mean post – mean pretest)/pooled *SD* for group measure scores. ^bES was interpreted as large (≥ 0.80), medium (≥ 0.50), or small (≥ 0.20) in magnitude (Cohen, 1992).

by the CCC–2 and when compared with their playmates. Parent ratings indicated that children with ADHD scored below average on four of seven CCC–2 subscales that reflect pragmatic language, with children falling –1 standard deviation below the norm on three of the subscales (see Table 2). However, children with ADHD scored

significantly lower than their playmates on the Coherence subscale of the CCC–2 (Table 3).

Study 2: Pilot Parent-Delivered Intervention

Our hypothesis was partially supported. The pragmatic language skills of children with ADHD improved from

Table 3. Language Skills of Children With ADHD and Their Playmates 18 Months After the Therapist-Delivered Intervention (Study 1)

Language Measures	Index/Composite Description or Item Example From Each Scale	Children With ADHD, <i>M</i> (<i>SD</i>)	Playmates, <i>M</i> (<i>SD</i>)	Between-Groups Difference, <i>Z</i>	<i>p</i>
CELF–4 ^a					
Core Language Index	Core language scale score percentile rank across four subtests. This index score measures general language ability and can be used to identify the presence of a language impairment.	27 (28.8)	55 (28.3)	-0.949	.279
CCC–2 subscales and composite ^a					
Speech	Leaves off beginning or ends of words, i.e., says <i>roe</i> not <i>road</i> .	33 (29.9)	57 (34.1)	-1.08	.28
Syntax	Says things that sound babyish because they are just 1 or 2 words long.	24 (32.2)	56 (33.6)	-1.08	.28
Semantics	Mixes up words of similar meaning, i.e., says <i>dog</i> for <i>fox</i> .	26 (31.2)	22 (13.5)	-0.95	.34
Coherence ^b	Muddles up sequence of events when telling a story or describing event.	10 (12.7) ^{c,d}	67 (34.0)	-2.02	.05 ^c
Inappropriate Initiation ^b	Talks repetitively about things no one else is interested in.	16 (13.5)	56 (32.5)	-1.37	.17
Stereotyped Language ^b	Uses favorite phrases inappropriately; says “all of a sudden” rather than “then.”	31 (36.0)	59 (31.6)	-0.32	.76
Use of Context ^b	Misses the point of jokes or puns (may understand slapstick humor).	7 (8.9) ^{c,e}	32 (26.8)	-1.70	.09
Nonverbal Communication ^b	Fails to recognize when other people are upset or angry.	13 (12.0) ^{c,f}	48 (28.6)	-1.59	.14
Social Relations ^b	Is babied, teased, or bullied by other children.	6 (4.6) ^{c,e}	47 (37.1)	-1.59	.11
Interests ^b	Talks about lists of things she or he has memorized—cities, dinosaurs, etc.	18 (19.0)	55 (41.9)	-1.17	.25
General Communication composite score	This score is based on the first 8 CCC–2 communication subscales listed.	17 (15.2)	48 (27.4)	-1.73	.09

Note. ADHD = attention deficit hyperactivity disorder; CCC–2 = *Children's Communication Checklist—Second Edition*; CELF–4 = *Clinical Evaluation of Language Fundamentals* (4th Australian Standardized Edition); *M* = mean; *SD* = standard deviation.

^aBased on percentile rank score: A percentile rank between 16 and 84 is within the normal range. ^bSubscales that reflect pragmatic language abilities. ^cMean percentile rank is outside the normal range. ^dDifference between the ADHD and playmate was statistically significant. ^eScores are >1 *SD* below norm. ^fScores are ≤1 *SD* below norm.

pre- to postintervention, although not to a degree of statistical significance. The children's skills also improved from postintervention to the 1-mo follow-up in the home environment. However, this increase was not statistically significant. The parent-delivered intervention had a large, significant effect on the pragmatic language skills of children with ADHD from preintervention to 1 mo postintervention (see Table 2).

Discussion

We continued an evaluation of a play-based intervention for children with ADHD, which aims to enhance children's occupational outcomes in the area of social participation and play. The intervention had previously been found to improve children's social play skills (Wilkes-Gillan et al., 2014a) as measured by the Test of Playfulness. In the current study, we set out to examine whether the intervention improved another aspect of social skills: pragmatic language. To do this, we examined the pragmatic language outcomes of children with ADHD across two studies. We found that children with ADHD maintained their pragmatic language skills 18 mo after the therapist-delivered intervention (Study 1) and improved those skills 1 mo after a parent-delivered intervention (Study 2). However, children with ADHD continued to have difficulty with aspects of pragmatic language in home and school contexts 18 mo after the initial intervention compared with a normative sample. However, overall, their skills were not significantly lower than those of their playmates.

The main finding of Study 1 was that the children with ADHD maintained their pragmatic language skills 18 mo after a therapist-delivered intervention. Caution should be applied when interpreting these findings because of the small sample size. It should be noted that overall POM scores did decrease from postintervention to 18 mo later but not to a degree that was statistically significant. These findings are similar to children's social play outcomes over time (Wilkes-Gillan et al., 2014b), highlighting the interconnected nature of children's social and pragmatic language skills (Staikova et al., 2013).

Another interpretation of the findings is that the children maintained their pragmatic language abilities but only in certain areas of occupational outcomes (i.e., social participation in peer-to-peer play interactions with the playmate involved in the intervention). As demonstrated by the parent-rated CCC-2 data (ratings of children's communication skills across multiple contexts), the children with ADHD did not necessarily generalize these

skills beyond this context with other interactants (i.e., social participation in the classroom setting with their teacher and peers not involved in the study). The data from the parent-rated questionnaire support this tentative conclusion: Parents of children with ADHD rated their children within the clinical range on four of the five CCC-2 subscales that reflect pragmatic language ability (Coherence, Inappropriate Initiation, Use of Context, and Nonverbal Communication). These results suggest that parents of children with ADHD have identified ongoing pragmatic language concerns beyond the occupation of peer-to-peer play interactions to their child's social participation in the school context. It is also unlikely that improvements in pragmatic language targeted in a 7-wk therapist-delivered play-based intervention and tested again 18 mo later would generalize to other everyday communicative contexts and nuanced situations (Abikoff, 2009) and improve the pragmatic language skills of children with ADHD to be on par with their typically developing peers (CCC-2; see Table 2). With these difficulties persisting, it is likely that children with ADHD are at continued risk of decreased engagement in social participation at school and in other social settings compared with their peers.

Study 2 found no significant improvements in POM ratings from preintervention to postintervention or from postintervention to the 1-mo follow-up stage of the parent-delivered play-based intervention. Significant improvements were found in ratings from preintervention to follow-up. However, the trend in the data was upward from pre- and postintervention and follow-up stages, a finding similar to that regarding the children's social play skills (Wilkes-Gillan et al., 2014b). Significant improvements were likely not detected because of the small sample size.

It is important to note that the pre- and postintervention observations were clinic based, and the follow-up observation was home based. Therefore, the postintervention to follow-up POM scores suggest generalization of pragmatic language skills for home play dates. However, the preintervention to follow-up data offer further evidence that some generalization and improvement of peer-to-peer pragmatic language skills from clinic to home occurred for the children with ADHD, specifically within their typically developing playmate dyad. These findings highlight the important role of parents in promoting their child's communication skills and therefore of their child's engagement in occupational roles of player and friend to enhance social participation with peers. Our findings suggest that parents can deliver a play-based intervention at home with therapist support.

The significant improvement in children's pragmatic language outcomes from preintervention to the 1-mo follow-up also suggests that the collaboration between occupational therapists and speech–language pathologists may have contributed to the improvements in the pragmatic language outcomes of children with ADHD after the play-based intervention. This finding supports an interdisciplinary approach to addressing the complex social and communication needs of children with ADHD to enhance the broader goal of enhancing their social participation.

Limitations

This study reported the preliminary results of two pilot studies with small sample sizes. Because we adopted an exploratory approach to the pilot data, *p* values were not adjusted for multiple comparisons. Caution should be applied when interpreting the findings, which cannot be generalized. Children who received the initial intervention became participants in the parent-delivered intervention. Thus, a carry-over effect of skills may be present.

Implications for Occupational Therapy Practice

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

- Enhancing children's pragmatic language skills is essential when seeking to increase their participation in childhood occupations, such as play and social interactions.
- Pragmatic language outcomes may be enhanced by collaboration between occupational therapists and speech–language pathologists.
- Children with ADHD experienced pragmatic difficulties 18 mo after intervention, indicating that further intervention is required.

Conclusions and Future Research

This study demonstrated that the pragmatic language outcomes of children with ADHD were maintained 18 mo after their participation in a 7-wk therapist-delivered play-based intervention. Although initial improvements were maintained, standardized language assessments indicated that children with ADHD still experienced pragmatic language difficulties 18 mo after intervention according to parent report. This finding suggests that children with ADHD have ongoing pragmatic language difficulties beyond the peer-to-peer dyad and home

environment, restricting their ability to engage in the childhood occupations of play and social interactions and participation.

This study further demonstrated that children with ADHD improved their pragmatic language outcomes from before to 1 mo after a parent-delivered intervention, a finding that supports increased levels of parent involvement and collaboration between occupational therapists and speech–language pathologists when aiming to improve the pragmatic language skills of children with ADHD. Further studies are required to examine the impact of the parent-delivered intervention on the pragmatic language outcomes of a larger number of children with ADHD who have not received play-based intervention. Further investigation is also required to examine whether the parent-delivered intervention improves the pragmatic language abilities of the playmates and parent ratings of children's pragmatic language skills in peer-to-peer interactions. Another direction for future research is to investigate how pragmatic language difficulties affect the ability of children with ADHD to engage in other childhood occupations, such as participation in class activities. ▲

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