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Effects of Shared Reading on the Early Language and Literacy Skills of Children With Autism Spectrum Disorders: A Systematic Review

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Abstract

Children with autism spectrum disorders (ASDs) often demonstrate delays in early language and literacy skills. Shared reading, the practice of adults reading aloud to children while using behaviors (e.g., asking questions) that are meant to promote interaction between the adult and child, is an intervention that has had positive effects on those early skills for typically developing children. A meta-analysis of 11 shared reading interventions with children with ASD was conducted, and positive effects were found for listening comprehension, expressive communication, and other communicative and noncommunicative acts.

Keywords

augmentative and alternative communication, dialogic reading, interactive reading, shared story reading, story-based lessons

Children with autism spectrum disorders (ASDs) typically demonstrate delays in early language and literacy skills as compared with their typically developing peers (Lanter, Watson, Erickson, & Freeman, 2012; Westerveld, Trembath, Shellshear, & Paynter, 2016). Areas of delay may include language comprehension, expressive communication, and awareness of print concepts (Lanter et al., 2012; Westerveld et al., 2016). The acquisition of these early skills predicts the development of conventional literacy skills, and a lack of early language and literacy development is associated with poor literacy outcomes later in life (National Early Literacy Panel [NELP], 2008).

One important support for early language and literacy development is *shared reading*. Shared reading is the practice of adults reading aloud to children while using behaviors (e.g., asking questions, commenting about the story, expanding on the child's utterance) that are meant to promote interaction between the adult and child, as well as support the child's language and literacy development (NELP, 2008). See Figure 1 for defintions and examples of these behaviors. This activity goes by many names, including shared story reading (Spooner, Ahlgrim-Delzell, Kemp-Inman, & Wood, 2014), story-based lessons, interactive reading, and dialogic reading (Mol, Bus, de Jong, & Smeets, 2008).

The use of shared reading activities has been reported to have positive effects on receptive language, expressive communication, and print awareness for young children with typical development (NELP, 2008), with both teachers (Kaderavek, Pentimonti, & Justice, 2014) and parents (Mol et al., 2008) as partners. Building on this research, there has been recent interest in providing shared reading activities for children with severe disabilities, including ASD (Spooner et al., 2014; Spooner, Kemp-Inman, Ahlgrim-Delzell, Wood, & Davis, 2015; Whalon, Martinez, Shannon, Butcher, & Hanline, 2015). For example, a review of shared reading interventions for students with severe disabilities found that shared reading had a moderate level of supporting evidence (Hudson & Test, 2011).

To support the development and delivery of effective literacy interventions for children with ASD, this study provides a meta-analysis of shared reading interventions for children with ASD, with a focus on studies that made use of a single-case research design, as, at present, there are no accepted methods for combining the data from single-case and group design studies in a single meta-analysis (Kent-Walsh, Murza, Malani, & Binger, 2015). Meta-analytic reviews of single-case research studies must be interpreted with caution, as there are concerns about the incorrect inferring of causal relationships, and challenges in estimating effects (Burns, 2012). At the same time, meta-analytic

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Adult Shared Reading Behaviors	Definition	Example
Pause	Adult stops while reading in order to provide the child with an opportunity to "fill-in-the-blank" (provide information)	"When we went into the car, we all put on our (pause) ___"
Ask questions	Adult makes use of a what, where, why, when, who, or how questions to encourage the child to recall and discuss content from the book.	"Why did Peter stay home from school?"
Relate to experiences	Adult prompts the child to relate their personal experience to the content of the book	"Did you ever go to a parade like Susie did?"
Evaluate	Adult provides praise for the child's correct responses and offer alternative labels or answers for incorrect responses.	"You're right, it is a truck."
Expand	Adult repeats and adds information to what the child says.	(After child says "truck") "It is a red truck."

Figure 1. Definitions and examples for frequently investigated adult shared reading behaviors.
Source. Adapted from Zevenbergen and Whitehurst (2003).

reviews that include single-case research designs are recognized as a critical method for identifying evidence-based practices for students with ASD (Cowan, Abel, & Candel, 2017, Odom et al., 2003).

In this meta-analysis, we sought to answer three major questions.

Research Question 1: What are the effects of shared reading interventions for children with ASD on key early language and literacy skills, categorized as listening comprehension, expressive communication, participation (noncommunicative), or combination (i.e., reported behaviors are a mixture of participation, listening comprehension, and expressive communication)?

Research Question 2: What is the relationship, if any, between characteristics of the interventions and the reported outcomes?

Research Question 3: What is the quality of the available research on shared reading interventions for children with ASD?

Method

Search Procedures

The first step in the search procedures was a review of electronic databases for studies appearing in the literature from 2004 to 2017. This time frame was chosen to include all studies published after the current definition for educational determination of autism was established in the 2004 reauthorization of Individuals with Disabilities Education Act (IDEA, 2004). The following databases were included: ERIC, Proquest Education Journals, Proquest Dissertations & Theses A & I, and PsychINFO. The following search terms were used: (*autis**) and (*reading** OR *literacy**) and (*child** OR *student**). For all databases, this set of terms was searched in the title and abstract fields. The search was restricted to English language peer-reviewed studies and dissertations. Dissertations were included to reduce publication bias, as recommended by Higgins and Green (2011).

In addition, a hand search was conducted using the 2004 to 2017 issues of *Education and Training in Autism and Developmental Disabilities, Focus on Autism and Other Developmental Disabilities, Journal of Autism and Developmental Disorders, Research in Autism Spectrum Disorders*, and *Research and Practice With Persons With Severe Disabilities*. A total of 735 citations were identified using the database and hand search procedures. All citations were reviewed in two stages: first, at the title and abstract stage, and then, if specific criteria were met, at the full review stage.

Criteria for inclusion and exclusion

Title and abstract stage. First, all citations were reviewed for inclusion of the specified participants and the target activity—that is, an adult reading a text and interacting with a child (an individual whose age is below 18) with ASD. Because interaction with an adult is a key component of shared reading, interventions that solely involved a peer, technology, or the participant reading the text were not included. For any abstracts that did not contain enough information to determine whether these criteria were met, the full text was reviewed to determine eligibility. If studies incorporated participants with other diagnoses, only the data for children with ASD were considered for this investigation. The first and third authors used the title and abstract stage criteria to independently review a total of 735 citations from the database search ($n = 721$) and the hand search ($n = 14$) and identify articles to proceed to the full-

text stage of the search procedures. Reliability calculations were completed for 15% of both the database and hand search citations, with 100% agreement.

Full-text review. The 25 studies meeting the title and abstract-level criteria were reviewed at the full-text level using four additional criteria. First, the study must have indicated that participants had either an educational determination of autism (IDEA, 2004) or fulfilled diagnostic criteria for ASD by use of a psychometric instrument or by report of a psychologist or other diagnostician (American Psychiatric Association [APA], 1994, 2013). Although educational definitions and diagnostic criteria of ASD may sometimes have differences, there is agreement that the disorder presents with significant challenges in communication (Volkmar & McPartland, 2014). As this meta-analysis focuses on the impact of shared reading on early language and literacy skills, a decision was made to include participants who were reported to meet either educational or diagnostic criteria to consider a comprehensive set of interventions.

Next, the study must have employed a single-case experimental research design that allowed for direct visual analysis of the effect of the intervention on the participant behavior (Kratochwill et al., 2010). The study must also have established experimental control by documenting three demonstrations of an experimental effect at three different points in time as suggested in the What Works Clearinghouse (WWC) standards (Kratochwill et al., 2010). Finally, the study must have met the criteria for the National Autism Center (NAC, 2015) Scientific Merit Rating Scale (SMRS) score of 3 or above, denoting that sufficient scientific rigor has been applied. Reliability calculations were completed for 100% of the previously identified studies, using full-text inclusionary criteria, and yielded 97% agreement between the first and third authors.

Coding procedures

Descriptive data. A coding manual was developed (based on Kent-Walsh et al., 2015) and is available as supplemental material.[1] All included articles ($n = 11$) were coded independently by the first and third authors for the following categories: participant demographics, results, intervention design, independent variable, dependent variable, effect sizes, and research quality. The child behaviors reported by the authors coded as one of four dependent variables: *listening comprehension*, defined as communicative acts by the child (e.g., use of speech or signs) in response to adult questions; *expressive communication*, defined as communicative acts by the child, which were initiations by the child (i.e., not in response to adult questions); *participation (noncommunicative)*, defined as noncommunicative acts by the child (e.g., attending to the book, turning a page); and *combination*, defined as behaviors by the child that could include communicative acts and noncommunicative acts (e.g., the researchers combined a variety of child behaviors into a single category). The mean for interrater agreement across all categories was 97% (range = 93%–100%). Differences typically arose in the coding of research quality indicators (agreement = 93%). Disagreements were resolved by discussion between the first and third authors, resulting in consensus.

Effect sizes. A variety of measures have been proposed for the calculation of effect sizes for single-case designs (SCDs), including percentage of nonoverlapping data (PND), improvement rate difference (IRD), and percentage of data exceeding the median (PEM) or trend (PEM-T) (Rakap, 2015). At present there is no single, universally accepted method of meta-analysis for SCDs—each approach has its own particular strengths and weaknesses (see Burns, 2012; Manolov & Moeyaert, 2017). The use of IRD, however, provides several advantages in comparison with other options, including accessible interpretation, compatibility with visual analysis, generalizable use with a variety of single-subject research designs, and known sampling distributions for the calculation of p values and confidence intervals (Ganz, 2015; Parker, Vannest, & Brown, 2009; Rakap, 2015). IRD is also resistant to compromise by outliers in the baseline phase and has resulted in acceptable levels of discriminability and sensitivity in recently published reviews of interventions for children with ASD (e.g., Cowan et al., 2017). For those reasons, effect sizes were calculated using IRD to provide comparison of data across studies in this review. IRD scores can vary from 0 to 1.0, with scores less than .50 being interpreted as small effect sizes, scores between .51 and .70 indicating moderate effect sizes, scores between .71 and .75 indicating large effect sizes, and scores greater than .75 indicating very large effect sizes (Parker et al., 2009).

For this study, the first author used the online calculator developed by Vannest, Parker, and Groen (2011) to determine IRD scores for child outcome measures. The third author independently calculated IRD scores for 100% of child outcome measures. IRD scores within .05 were considered to agree, and an agreement score of 95% was obtained. Differences arose from difficulties in interpreting values shown on some graphs and were resolved by the first and third authors reexamining those graphs to agree on values. The agreed-upon values were then used to calculate IRD scores using the online calculator. To calculate effect sizes for participant, intervention, and outcome characteristics, all means were calculated using the individual IRD score for each case (e.g., the individual IRD scores calculated for listening comprehension were added together and then divided by the total number of scores).

Table 1. Information on Participant Characteristics, Intervention Procedures, Sessions, AAC, Dependent Measures, Mean IRDs, and Research Quality From Included Studies.

Citation	Study design	Participants with ASD[a]	Intervention procedure	Sessions[b]	AAC	Dependent measures	*M* IRD	SMRS score
Browder, Trela, and Jimenez (2007)	MP	2; 12, 13 years	Pause, ask quest, eval, expand	7–9 sessions; NR	Response boards, SGDs, PiB	Comb	0.96	3
Fleury, Miramontez, Hudson, and Schwartz (2014)	MB	2; 4, 5 years	Pause, ask quest, rel exper, eval, expand	4–6 sessions; 2.8–6.7 min	None	Part Comb	0.68 1.00	3
Fleury and Schwartz (2017)	MB	9; 3, 4, 3, 5, 5, 3, 4, 5, 5 years	Pause, ask quest, rel exper, eval, expand	20 sessions; NR	Pointing in book	List comp Exp comm	0.86 0.14	4
Mims, Hudson, and Browder (2012)	MP	4; 12, 13, 14, 14 years	Pause, ask quest, eval	18 sessions; NR	Response boards, pointing in book	List comp	0.82	3
Mucchetti (2013)	MB	4; 6, 7, 7, 8 years	Pause, ask quest, eval	4–6 sessions; NR	Response boards, pointing in book	Comb List comp	0.95 1.00	3
Spooner, Ahlgrim-Delzell, Kemp-Inman, and Wood (2014)	MB	4; 8, 8, 11, 12 years	Pause, ask quest, eval	9–13 sessions; NR	Response options on iPad	Comb List comp	0.90 0.14	3
Spooner, Kemp-Inman, Ahlgrim-Delzell, Wood, and Davis (2015)	MB	2; 7, 8 years	Pause, ask quest, eval	6-8 sessions; NR	Response options on iPad	Comb List comp	1.00 1.00	3
Volger-Elias (2009)	MB	4; 3, 4, 4, 5 years	Pause, ask quest, eval, expand	7 sessions; NR	None	Exp comm	0.43	5
Whalon, Martinez, Shannon, Butcher, and Hanline (2015)	MB	3; 4, 4, 4 years	Pause, ask quest, rel exper, eval, expand	19–30 sessions; NR	Question response cards	List comp Exp comm	0.55 0.52	4
Whalon, Hanline, and Davis (2016)	RA	1; 4 years	Pause, ask quest, rel exper, eval, expand	6 sessions; NR	Question response cards	List comp	0.82	4
Zimmer (2013)	MB	4; 2, 2, 2, 3 years	Pause, ask quest, eval, expand	4 sessions; NR	PiB	Comb Exp comm	1.00 N/A	4

Note. AAC = augmentative and alternative communication; IRD = improvement rate difference; ASD = autism spectrum disorder; SMRS = Scientific Merit Rating Scale; MP = multiple probe across participants; NR = not reported; SGD = speech-generating devices; PiB = pointing in book; MB = multiple baseline across participants; quest = questions; rel exper = relate to experiences; eval = evaluate; Comb = combination; Part = participation (noncommunicative); Listen comp = listening comprehension; Exp comm = expressive communication; RA = regression analysis.
[a]Number of participants; age or grade of participants. [b]Number of sessions; length of sessions.

Research quality. The studies in this review were scored using the NAC SMRS to support comparison with identified evidence-based practices for individuals with ASD (NAC, 2015). The SMRS provides quality indicators for research design, measurement of dependent and independent variables, participant ascertainment, and generalization of treatment effects. Each quality indicator is scored on a scale from 0 to 5; the scores are then weighted and averaged to achieve a total SMRS research quality score that also ranges from 0 to 5. A total SMRS research quality score of 3, 4, or 5 indicates that the study has sufficient scientific rigor to suggest that the reported treatment effects were the result of the intervention. A score of 2 indicates only initial evidence of scientific rigor required to suggest that treatment effects were the result of the intervention. Scores of 1 or 0 suggest that insufficient scientific rigor has been applied and there is insufficient evidence to determine whether treatment effects were the result of the intervention (NAC, 2015).

Results

Eleven studies were advanced to the full coding and analysis phase of the investigation. Table 1 provides details for the included studies.

Overall, shared reading interventions were observed to have a moderate positive impact across a wide range of children with ASD on a wide variety of measures (see Table 1). Effect sizes ranging from small to very large were observed with a variety of intervention partners,

Table 2. Findings for Participants by Participant Ages, Communication, Partners, Adult Behaviors, Number of Sessions, and Overall Outcomes.

	Listening comprehension		Expressive communication		Participation		Combination	
Measure	Cases	IRD	Cases	IRD	Cases	IRD	Cases	IRD
Age								
2–5	13	0.79	16	0.28	2	0.62	6	0.98
6–9	8	0.80	0	N/A	0	N/A	8	0.97
10–14	6	0.58	0	N/A	0	N/A	4	0.88
Communication								
Speech	1	0.74	0	N/A	1	0.80	3	0.97
AAC	3	0.57	0	N/A	1	0.55	1	1.00
Low score	19	0.63	6	0.32	0	N/A	13	0.95
Partners								
Parent	1	0.82	4	0.43	0	N/A	4	1.00
Researcher	13	0.56	3	0.52	2	0.62	6	0.93
Teacher	13	0.91	9	0.14	0	N/A	6	0.95
Adult behaviors								
Pause	27	0.75	16	0.28	2	0.62	18	0.95
Ask questions	27	0.75	16	0.28	2	0.62	18	0.95
Relate to experiences	13	0.79	9	0.24	2	0.62	2	0.94
Evaluate	18	0.75	16	0.28	2	0.62	18	0.95
Expand	13	0.80	16	0.28	2	0.62	8	0.98
Number of sessions								
Small	1	1.0	N/A	N/A	1	0.55	7	0.97
Medium	17	0.81	13	0.23	1	0.80	9	0.96
Large	9	0.60	3	0.52	0	N/A	2	0.91
Overall outcomes	26	0.74	16	0.28	2	0.62	17	0.95

Note. IRD = improvement rate difference; AAC = augmentative and alternative communication; small = 5 sessions or less; medium = 6–10 sessions; large = 11 sessions or more.

for a mixture of intervention packages, and with multiple outcome measures. Interventions that evaluated listening comprehension yielded a large level of effect; interventions that investigated expressive communication reported a small level of effect size. Interventions targeting participation (noncommunicative) yielded a moderate level of effect. Finally, interventions examining changes in child behaviors that were a combination of communicative and noncommunicative acts reported a very large level of effect. Table 2 provides details on effect sizes across outcome measures as well as participant, partner, and intervention characteristics. Further information on participants' communication, cognitive, and literacy skills is provided in Table 3, provided as supplemental material.[2]

Maintenance and Generalization

Seven studies (with a total of 21 participants) reported maintenance results across three different outcome measures of listening comprehension, expressive communication, and combination. For these studies, maintenance data were collected from 2 days to 3 weeks after the intervention phase was completed. Gains made in intervention were maintained for 19 participants (90%). Three studies reported generalization results across different books. All participants ($n = 10$) were observed to display similar levels of the targeted skills when presented with varying books. As maintenance and generalization data were provided for only a small number of studies, it was not possible to calculate effect sizes to compare phases across studies.

Research Quality

Total SMRS research quality scores were in the midrange ($M = 3.6$, range = 3–5). Examining the subcomponents of SMRS, studies scored highest in the quality of measuring the independent variable ($M = 4$, range = 1.0–5.0) and the dependent variable ($M = 4.2$, range = 3.0–5.0). The scores for research design quality ($M = 3.6$, range = 3–5) were in the midrange. Eight studies had scores of 4 or higher (indicating that there were at least five data points reported in each phase and a minimum of three comparisons of control and treatment conditions). Three studies had scores of 3 in this area because fewer than five data points were reported in at least one phase. However, researchers in all included studies documented three demonstrations of experimental

effects across time and collected data on at least three points in both baseline and intervention conditions (as suggested for Meeting Standards With Reservations in the WWC framework (Kratochwill et al., 2010)). Scores of quality of participant ascertainment ($M = 1.9$, range = 0–5) and generalization of treatment effects ($M = 1.7$, range = 0–4) were lower, with four studies scoring 0 or 1 in participant ascertainment and seven studies scoring 0 or 1 for information (or rather the lack of information) on generalization.

Using the NAC Standards of Evidence Classification System, which supports consideration of the number of peer-reviewed studies, their SMRS scores, and treatment effects, interventions for individuals with ASD can be categorized as established, emerging, unestablished, or ineffective/harmful (NAC, 2015). Shared reading meets the NAC standards for a designation of an emerging treatment for individuals with ASD (NAC, 2015): All 11 studies had SMRS scores of 3 or above.

Discussion

The results of this meta-analysis provide evidence that shared reading activities can have a positive impact on early language and literacy skills for children with ASD. The overall effect size for shared reading was moderate; however, specific features of the 11 studies were associated with stronger effects on some outcomes. Positive effect sizes were seen with studies that included a variety of adult shared reading behaviors, which provides initial evidence that shared reading is a robust intervention that is resilient to the presence or absence of individual components. The gains in listening comprehension and expressive communication may make shared reading a useful companion to other reading interventions that focus on early language and literacy skills for children with ASD (e.g., Flores et al., 2013), whereas the large effects seen in outcomes that measured a combination of communicative and noncommunicative acts suggest that shared reading can provide a variety of benefits for children with ASD (Figure 1).

Relationship Between Intervention Characteristics and Observed Effects

Characteristics of participants. Positive effects were observed across a variety of ages, indicating the impact of shared reading interventions was similar for participants ranging in age from 2 to 14 years. This finding is consistent with reviews of skill-focused reading interventions for children with ASD (e.g., Spector, 2011).

Participants who were described as using speech as their primary means of communication made larger gains in listening comprehension and participation (noncommunicative) than participants who were described as using augmentative and alternative communication (AAC) as their primary means of communication, or as receiving a low score on a standardized measure that included expressive communication skills. For children with ASD, language skills are a predictor of early literacy skills (Lanter et al., 2012; Westerveld et al., 2016), and it is possible that the children who were described as using AAC as their primary means of communication or as receiving a low score on a standardized measure that included communication skills had lower language comprehension skills. Yet, participants described as using AAC or as receiving a low score on a standardized measure that included communication skills did make moderate gains in listening comprehension and expressive communication, supporting the finding by Flores et al. (2013) that reading comprehension and language interventions can result in gains for children with ASD, although gains are larger for students with more typical language skills. In addition, all participants made large gains in combination of communicative acts and noncommunicative acts. These results indicate that shared reading can have positive effects on children with ASD and varying communication skills. It is also unclear whether the children who used AAC had been provided with optimal levels of AAC support, and it is possible that different AAC systems may have resulted in different results. For example, Therrien and Light (2018) reported that the use of *visual scene displays* (digital images with programmed hotspots that act as communication supports; Light & McNaughton, 2012) resulted in increased interaction between children with characteristics of ASD and their typically developing peers during a story book activity.

Characteristics of partners. Shared reading had positive effects when implemented by a variety of partners. For listening comprehension, moderate effects were observed for researchers, and very large effects for parents and teachers. For expressive communication, small effects were observed for parents and teachers, and moderate effects for researchers. For participation (noncommunicative), moderate effects were observed for researchers. Very large effects on child behaviors that were a combination of communicative and noncommunicative acts were observed for parents, researchers, and teachers. The lower effect sizes found for listening comprehension with the researcher group may have been affected by the inclusion of a study in which the researchers used only one question to probe listening comprehension per session (Spooner et al., 2014) and reported a weak effect on listening comprehension. The large level of effect that was observed with parents and teachers as partners for listening comprehension and combination outcomes indicates that shared reading can be a powerful intervention for children with ASD. It is also possible that the relationship between a trusted parent/teacher and the child contributed to the greater effects on listening comprehension. If parents and teachers

were provided with coaching, perhaps there would be larger effects on expressive communication when shared reading is implemented by these adults as well.

Number of sessions. Shared reading had positive effects across interventions that differed in the number of sessions provided. Similar levels of effect were reported for combination outcomes across interventions with small to large number of sessions. These results suggest that a small number of sessions can have positive effects, making shared reading an efficient intervention to implement.

Characteristics of outcome measures. The positive effects for listening comprehension outcomes observed in shared reading interventions is an encouraging finding because children with ASD often present with deficits in language skills, including listening comprehension. These gains were maintained and/or generalized across books for a high percentage of the participants (93%) for whom this information was collected, indicating that shared reading may positively affect listening comprehension postintervention. Such findings are similar to the positive results of reading comprehension interventions reported for students with ASD (Flores et al., 2013), but shared reading has the added advantage of positively affecting important language skills before students are able to read.

The seven studies that targeted listening comprehension allowed participants to use aided techniques (e.g., use of an AAC display with pictures and or symbols) or informal supports (e.g., pointing to pictures in the book), in addition to speech, to participate. These methods and supports would have been of special benefit to the 92% of the participants ($n = 36$) who were described as using AAC to supplement or replace speech, as having limited speech, and/or as having low communication scores on standardized measures. Such access to AAC may help to explain the large IRD observed for listening comprehension scores in this review.

The shared reading interventions that reported outcomes for expressive communication ($n = 3$) reported small effect sizes for this measure. Many of the participants in the studies were described as scoring in the first or second percentile on the Expressive Communication subscale on the *Preschool Language Scales Edition 5* (Volger-Elias, 2009; Whalon et al., 2015). One possible explanation for the limited impact on expressive communication is that many children with ASD have such large deficits in expressive language skills (APA, 2013) that short-term shared reading interventions were not delivered with enough intensity to affect their expressive communication. In addition, the opportunity for children to initiate communication may have been restricted by the structure of the shared reading interventions. It is possible that a change in structure, in which participants were given a broader range of communication supports and parents and teachers were coached to support expressive communication, may result in an increase in expressive communication.

Another possible explanation is that the children did not have access to a means of expressive communication (e.g., AAC) that could be used to compensate for their difficulties with speech. Only one shared reading intervention targeting expressive communication allowed participants to communicate using gestures (Whalon et al., 2015) and none of the interventions provided instructional supports (e.g., modeling use of the AAC system) for participants to communicate expressively using aided AAC. It is of interest to note that in assessing listening comprehension, researchers adapted shared reading activities to allow participants to respond using gestures or aided AAC methods. Although some students had access to book-specific symbols that they could have been used for expressive communication as well as for responding to partner questions, there is no evidence that any participant used these symbols to support these types of interactions. In summary, although shared reading was observed to have only a small impact on expressive communication, this may be because the opportunity for children to participate was restricted by the lack of a means for the children to communicate, and/or a lack of instruction in how to use AAC at these times.

One of the main findings of the review was that shared reading interventions produced a very large effect size for combination outcomes for children with ASD across all age groups. Such outcomes included communicative acts and noncommunicative acts that were aggregated and reported as a single measure (e.g., joint attention, task analysis response, verbal participation) by the authors of the studies in the review. Communicative acts included answering questions (e.g., Browder, Trela, & Jimenez, 2007), providing a repeated storyline (e.g., Spooner et al., 2014), and initiating (e.g., Zimmer, 2013). Noncommunicative acts included opening or turning pages in a text (e.g., Browder et al., 2007; Spooner et al., 2014) and directing eye gaze toward the text or a partner (e.g., Zimmer, 2013). These behaviors, particularly the communicative acts, map on to aspects of social communication skills (e.g., engaging in social interactions) that are key areas of concern for children with ASD (APA, 2013).

One study measured participation (noncommunicative; Fleury, Miramontez, Hudson, & Schwartz, 2014). The moderate effects reported indicate that shared reading may help encourage children with ASD to interact with the text (e.g., turning pages) and the reader (e.g., directing eye gaze at the adult).

Research Quality

Shared reading has been shown to produce favorable outcomes for students with ASD and can be designated as an emerging treatment (NAC, 2015). Evidence from studies with experimental control as defined by both NAC and

WWC standards (Kratochwill et al., 2010; NAC, 2015) shows that the use of adult shared reading behaviors has benefits for children with ASD.

Future Research Directions

Future research should investigate how children with ASD can be supported in fully participating in shared reading activities, with special attention to intervention methods and communication supports that will support expressive communication (e.g., AAC) and listening comprehension beyond their narrowly defined uses in the extant literature.

In addition, future research should include interventions designed to tease out the effects of shared reading on the different communicative and noncommunicative acts of children with ASD. The large effect of shared reading on such combined outcomes makes it critical to identify the acts for which shared reading has the largest positive impact. For example, it is possible that increases in noncommunicative acts correlate with increases in communicative acts.

Implications for Practice

Teachers and parents should consider implementing shared reading interventions for children aged 2 to 14 years with ASD to build early language and literacy skills. Such interventions should include pausing while reading to encourage the child to respond, asking questions to the child while reading, relating what is occurring in the text to real-life experiences, and evaluating and expanding on the child's answers. For children with limited speech, the use of AAC should be considered to specifically build expressive communication skills.

Limitations

Only a small number of studies reported maintenance ($n = 7$) and generalization ($n = 3$) data. It therefore was not possible to calculate effect sizes for maintenance and generalization, so it is not clear whether the effects of shared reading interventions children with ASD were maintained across time or generalized to other language-based interactions. Several of the studies also utilized other components in their intervention package (e.g., the use of objects, reinforcement) and it is thus difficult to discern whether shared reading alone was responsible for the effects found. In addition, including participants who met a variety of diagnostic criteria for ASD may limit the generalizability of the results of the systematic review.

Additionally, only studies that reported data in a manner that allowed for calculation of effect sizes using the IRD metric were included. As a result, two studies utilizing single-subject research designs in which the data were reported as means only (Plattos, 2011; Tan, 2014) were not included. The authors of those studies did, however, report positive effects on expressive vocabulary for their participants with ASD. In addition, although only 11 studies met the standard for inclusion in this review, this review meets the 5–3–20 standard suggested by Horner and Krotchwill (2012)—there are at least five SCD studies with experimental control, conducted by at least three different research teams, with a total of at least 20 participants.

Conclusion

This systematic review provides evidence that shared reading interventions can have a positive impact on some early language and literacy skills for children with ASD. These positive effects occurred with children of ages 2 to 14, and with parents, teachers, and researchers as reading partners. The impact of shared reading was most clearly observed on outcome measures of listening comprehension, participation (noncommunicative), and combination outcomes that included communicative and noncommunicative acts; small effect sizes were observed for measures of expressive communication. Future research should investigate how children with ASD can be supported in fully participating in shared reading activities, with special attention to methods that will support expressive communication (e.g., AAC) and listening comprehension beyond their narrowly defined uses in the extant literature.

Declaration of Conflicting Interests

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Notes

1. The coding manual is available at https://drive.google.com/file/d/132CW6j7P21P0ASftVDvZi9FoTetquc-t/
2. Supplemental Table 3 (Information on Participants' Communication, Cognitive, and Literacy Skills) is available at https://drive.google.com/file/d/1DbRqlMelwtTPi8Jq9I8amo9eC5a_KcHF/

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