

# Caregiver Implemented Dialogic Reading: Impact on Children with and without Autism in Brazil

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## ABSTRACT:

There is evidence about the effectiveness of using caregiver-implemented, shared book reading protocols for mitigating language and literacy deficits in children with autism spectrum disorders (ASD). In Brazil, studies of this nature are scarce but essential for identifying successful early intervention practices for a population that has significantly grown in the last three decades. The aim of this investigation was to evaluate the effects of Reading to Engage Children with Autism in Language and Learning (RECALL), an intervention protocol that employs dialogic reading principles on the language and literacy skills of a 3-year-old child with ASD and a 4-year-old typically developing peer. Using a single-subject A-B research design, the effects of RECALL, employed by mothers, on their children's responses were evaluated. The results revealed that: (a) average effect size for strategy use following caregiver training was large for the mother of the child with ASD (Tau-U = 0,7) and moderate for the mother of the typically developing child (Tau-U = 0,5); (b) both children became more responsive, significantly increasing the frequency of communication interactions following caregiver intervention (Tau-U = 1); (d) the child with typical development showed an increase in the frequency of correct and spontaneous responses, and (c) the intervention was positively evaluated by the caregivers. Adaptations of the protocol, as well as its limitations, are discussed.

**Keywords:** dialogic reading, Autism Spectrum Disorders,  
caregiver-implemented, language, literacy

## INTRODUCTION

The literature has shown that interactive shared storybook reading is an evidence-based practice that enhances the language and literacy skills of typically developing children (National Early Literacy Panel [NELP], 2009) (Lonigan et al., 2009) as well as those with developmental disabilities, such as autism spectrum disorder (ASD) (Whalon et al., 2015). These investigations have further highlighted the benefits of conducting intervention in the natural setting, involving parents as readers (Whitehurst et al., 1988; Westerveld et al., 2021; Walter, 2017; Whalon et al., 2016; Lo & Shum, 2021). The home environment, for instance, provides various opportunities for children to learn in meaningful contexts. Additionally, parent-implemented intervention is regarded as an evidence-based practice for children with ASD (Oliveira et al., 2020; Rahn et al., 2015)

Although most of these findings derive from participants living in developed countries, there are reasons to believe that these interventions may benefit children from low-and middle-income countries (LMICs), like Brazil (Mendelsohn et al., 2020), for various reasons. First, in LMIC, more than 40% of children under the age of 5 are at risk of fully reaching their developmental milestones (Black et al., 2017). Language and literacy deficits may be attributed to limited access to linguistically stimulating home environments, as well as poor parental reading engagements (Knauer et al., 2020). In this sense, early literacy intervention programs have proven to enhance cognitive and language skills in various cultures involving youngsters with typical development (Knauer et al., 2020; Weisleder et al., 2018), and their peers with ASD (Lo & Shum, 2020; Mucchetti, 2013; Whalon et al., 2015; Whalon et al., 2016; Fleury et al., 2014; Fleury & Schwartz, 2017; Hudson et al., 2017). In a study conducted by Nunes and collaborators (2021), for instance, two distinct protocols of Dialogic Reading were proven effective for enhancing the vocabulary development of 4 preschoolers with ASD and 4 typically developing peers.

A second point to highlight is that parents with limited literacy skills – regarded as common in LMIC (Odunuga, 1984) - are less keen on reading books to their children compared to literate caregivers (Mendelsohn et al., 2020; Niklas et al., 2020). Several studies show that the family is an important factor in the development of children's literacy (Parry et al., 2014; Daniel, 2015; Puglisi et al., 2017; Sénéchal & Lefevre, 2002). It is, therefore, essential to provide parent literacy training programs to this population. Studies have revealed the ef-

fectiveness of teaching caregivers who are literate or have limited literacy skills to engage in reading routines with their youngsters (Knauer, et al., 2020; Mendelsohn et al., 2020; Aram et al. 2013; Arnold et al., 1994; Dale et al., 1996; Faria & Flores, 2018).

At last, with regard to children with disabilities, it is important to mention that the inclusion of parents, as intervention agents, is a rare practice in LMIC. In Brazil, for instance, public health intervention policies for ASD are mostly child-centered, with limited family involvement. Additionally, there seems to be a prioritization of clinical settings - as opposed to the natural setting - for early intervention ASD programs to take place (Fiorre-Correia, 2005; Nunes & Araújo, 2014). In a country with approximately 2 million individuals with ASD and restricted educational and health services to offer, it is paramount to expand intervention possibilities, going beyond clinical settings and solely involving therapists as intervention agents. In fact, studies show that approximately 37% of people with ASD in Latin America fail to receive any type of intervention services (Montiel-Nava et al., 2020).

Dialogic Reading (DR) is a commonly cited interactive shared storybook reading program developed by Whitehurst with coauthors (1988). The DR protocol includes five types of question prompts and four scaffolding techniques that are delivered by the adult while reading to the child. The questions compose the acronym CROWD, which refers to (1) Completion – asking the child to verbally complete the missing word at the end of a sentence; (2) Recall – stimulating the child to remember events in the story; (3) Open-ended – based on the pictures, asking the child to describe what is happening in the story; (4) Wh-questions – ask about vocabulary in the plot; (5) Distancing – relating words and images in the book with the child's personal experience (WWC, 2010). The scaffolding techniques are applied in a sequence, identified as PEER, which consists of 4 steps. First, prompt the child to address a CROWD question. Then, evaluate the pertinence of the answer. Next, expand on the child's response. At last, request the child to repeat the adult's expansion.

Studies have shown that adaptations of DR are needed to address the cognitive and social communication needs of preschoolers with ASD. In this sense, adaptations of DR have been frequently used with this population (Fleury et al., 2017; Whalon et al., 2015; 2016; Hudson et al., 2017; Rahn et al., 2016; Nunes et al., 2021). Among these adaptations is RECALL (Reading to Engage Children with Autism in Language and Learning), a program

that uses DR strategies combined with three empirically validated strategies, including secured attention, intentional pauses, and visual aids.

From the six studies that have used the RECALL protocol, published in the research literature (Whalon et al., 2015; Whalon et al., 2016; Walter & Nunes, 2020; Jackson & Hanline, 2020; Lo & Shum, 2020; Nunes et al., 2021), three involved parents as intervention agents (Whalon et al., 2016; Walter & Nunes, 2020; Lo & Shum, 2020). The dependent variables evaluated in these investigations included the child's spontaneous response frequency, the correct response to questions in the story, and turn-taking. Children's receptive vocabulary, identification of emotions, and level of engagement during shared book reading were also measured in the study conducted by Lo and Shum (2020).

One of these studies was conducted in Brazil and involved a mother and a child with ASD. In view of expanding this body of literature, the purpose of the current investigation was to evaluate the effects of RECALL, implemented by caregivers, on the language and literacy skills of a 3-year-old child with ASD and a 4-year-old typically developing peer. When considering the need of applying reading intervention protocols in inclusive settings, it is paramount to evaluate programs that may benefit children with typical and atypical development.

## METHOD

### Participants and Setting

After the study had been approved by the Human Subjects Committee, two children's caregivers were recruited to participate in the study. The dyads included in the study were: (1) Alice (Child 1), a three year old female with ASD and her mother; and (2) João (Child 2), a typically developing white 4-year-old boy and his mother. The studies took place at the children's homes. A Brazilian-validated version of Child Autism Rating Scale (CARS) (Pereira et al., 2008) was used to evaluate Alice's level of ASD symptoms. The literacy profile of both children was assessed using an adapted version of the Home Emergent Literacy Profile for Children with ASD (HELPA) (Lanter, 2008 translated by Walter, 2017). This questionnaire, directed to caregivers, is composed of 44 items that assess the children's literacy skills and interests, as well as the availability of print materials, including books, in the home environment.

#### *Child 1*

Alice scored 32 in the CARS, indicating moderate autism. She had adequate verbal comprehension skills but lim-

ited functional expressive language abilities. She communicated primarily through conventional and unconventional gestures and had difficulties expressing feelings. Adequate functional play skills and restricted behavior patterns were identified. Based on the HELPA data, her home environment was reader-friendly and Alice enjoyed being read to.

#### *Child 2*

João, the typically developing child, had good language, and social communication abilities, as well as adequate functional-play skills. His family kept a regular reading routine at home, where various types of literacy materials were made available. João enjoyed being read to.

### Experimental Design

The present study was aligned in two stages. In the first stage, the caregiver training program was defined as the independent variable, and the caregiver use of the strategies as the dependent variable. In the second stage, the caregiver's use of the strategies was the independent variable, and the children's responses were the dependent variables.

Based on this structure, a single-subject A-B research design was used to evaluate: (1) the effects of caregiver training on caregiver use of RECALL strategies and (2) the effects of caregiver use of RECALL on the frequency of communicative child utterances and correct responding to storybook questions.

### Independent Variables

#### *Caregiver Training Program*

The caregiver training was individually provided to each mother after the baseline phase had resumed. Initially, the first author explained the rationale of each intervention strategy and practiced its implementation with the caregiver through roleplays in two 45-minute sessions. Then, the caregivers were given the RECALL materials and asked to video record their weekly reading sessions with their children. Every two sessions, segments of the recordings were conjointly analyzed by the first author and the mothers. In these 45-minute meetings, autoscopy procedures, based on a protocol developed by Muller and Schmidt (2021), were used. It consisted of the mothers' self-analysis of their reading performance and their children's response, the provision of researcher guidelines for improving the dyad interactions, and, collaborative contributions between the mother and researcher to improve the intervention (Schmidt et al, 2019).

#### *Recall Protocol*

The RECALL protocol was comprised of five strategies: (1) CROWD questions (Completion, Recall,

Open-ended, Wh, and Distancing) delivered using PEER scaffolding techniques, which were previously described; (2) Secure attention, which consisted of pointing to a picture in the book and making an interjection (e.g. "Look!") with the purpose of increasing child joint attention; (3) Intentional pause, characterized by interrupting the reading and expectantly looking at the child with the intent of increasing initiations; and (4) Visual support system using a least-to-most prompting hierarchy protocol, known as PEEP (prompt, evaluate, expand and praise).

The PEEP protocol followed a sequence that varied according to the child's response. The intervention started with a question prompt formulated by the caregiver. Next, the caregiver evaluated the response. If a correct answer was given by the child, the caregiver provided verbal praise and expanded on the child's response. If the child failed to respond or responded incorrectly, the caregiver provided a hierarchy of visual cues, which consisted of booklets with three visual aids (one of which was the correct answer). If the child responded correctly, the caregiver expanded the response and praised the child. If the child answered incorrectly or did not respond within 5 seconds, the caregiver physically covered the incorrect figure, indicated by the child, and presented two visual responses (one of which was the correct one and one incorrect). If the child responded incorrectly or did not respond, the caregiver provided the correct model and asked the child to repeat it. If the child repeated, the caregiver expanded the response and praised the child. In case the child did not repeat the model, the caregiver provided physical help, taking the child's hand to the image with the correct answer.

### Dependent Variables

Caregivers' dependent variables included the frequency use of (1) CROWD questions (with and without visual support); (2) Secure attention and (3) Intentional pause. Children's dependent variables were: (1) frequency of communicative child utterances (initiations or responses to caregiver prompt) and (2) frequency of correct responding to storybook questions with and without visual support. The first consisted of spontaneous or prompted utterances emitted by the child in verbal, vocal, pictographic (using the visual prompts), or gestural modes, during baseline and intervention conditions. These excluded utterances that were echolalic or not accompanied by eye contact. The second entailed child responses to storybook questions coded as (1) correct response with

no visual support; (2) correct response with visual support (three options or binary choices).

### Procedural Fidelity

All sessions were videotaped and coded using the RECALL checklist, indicating either if the protocol was adequately followed or not. The coder, an undergraduate student in Special Education, coded a randomly selected 30% of videos per participant. The coder was previously trained on treatment fidelity from a past RECALL study conducted by the second author. A percentage of agreement was calculated by dividing the number of agreements for each item by the number of agreements plus the number of disagreements and multiplying by 100. Procedural fidelity for the RECALL condition was 100% for both participants.

### Materials

Materials included five storybooks for João and 7 storybooks for Alice. The books were of similar length (approximately 32 pages), contained colorful/engaging pictures, and were of interest to 3-5-year-old children. For each book, two distinct groups of CROWD questions, arranged in small booklets, were used. Each set contained from 12 to 15 questions. Scripted questions were paired with three visual response options (i.e., Google images) that were placed in a visual support binder.

### Procedures

Following dyad recruitment and assessment, the study was developed in four stages: (1) Baseline; (2) Training; (3) Intervention; and (4) Social Validation. During baseline, the researcher distributed 2 books to the dyads. The mothers were asked to read each book twice to their children and video-record the sessions. This phase was resumed when identified, through visual inspection, stability or decrease in the frequency of, at least, one of three RECALL strategies, including any of the CROWD questions (Completion, Open-ended, Recall, Wh, and Distancing), secure attention and/or intentional pause. The purpose was to identify if the caregiver had any of the strategies in her repertoire.

In the training phase, caregivers were separately taught to use the RECALL protocol using the procedures previously described above (Caregiver training program). In the intervention phase, the researcher gave 3 books and their corresponding booklets and visual support binders to João's mother and 5 books and their corresponding booklets and visual support binders to Alice's mother. The caregivers were instructed to read the same books

twice a week, using the two sets of questions available in the booklets and visual support binders. At last, a social validity questionnaire was applied to evaluate the caregivers' perception of the program.

**Data Analysis**

For child data, the frequency of communicative utterances and correct responses to storybook questions were assessed. For caregiver data, coders calculated the frequency with which the mothers used CROWD questions (with or without visual support). For secure attention and intentional pause, a different tally system was used. The coders indicated if the strategies were used or not in the entire reading sessions.

After caregiver and child data had been plotted in graphs, visual inspection was used to evaluate the effects of the caregiver training program on mothers' use of the RECALL strategies and the effects of caregiver-implemented RECALL on children's responses. Tau-U, an effect size measure of data nonoverlap across phases (baseline and intervention) was additionally used (Vannest, & Ninci, 2015).

**RESULTS**

Figures 1 and 2 present the frequency of caregiver use of CROWD questions. In Figure 1, Alice's caregiver did not ask any of the CROWD questions to her daughter during baseline. She also failed to use intentional pauses. Secured attention, on the other hand, was identified in

some sessions prior to treatment. In these episodes, the mother would typically point to a picture in the book and wait for Alice to respond

After the intervention, she began using the scripted questions associated with the visual support system available in the binders. Data also indicated that she continued using secured attention at similar rates. The use of intentional pauses was observed only once, in the second intervention session.

A large effect size was identified for the use of Wh-questions (Tau-U=1); moderate for Complete (0.4), Distancing (0.5), and Open Ended (0.5); and a small effect size for the use of Recall (0.1). The average Tau-U score for the five strategies was .70 (range 0.1 – 1), evidence of a large effect size (Vannest & Ninci, 2015).

Figure 2 indicates that: (1) Intentional pauses and secured attention were part João's mother repertoire, for they were detected in the baseline and maintained after treatment; (2) She used two of the CROWD questions (wh-questions and distancing) during baseline; and (3) Following caregiver training, she began using the scripted questions, with and without the visual support system.

Tau-U revealed a large effect size for the use of Wh-questions (Tau-U=0.9); moderate for Complete (0.5) and Recall (0.5); and a small effect size for the use of Open Ended (0.3) and Distancing (0.3). The average Tau-U score for the five strategies was .50 (range 0.1 – 1), indicating moderate effect size (Vannest & Ninci, 2015).

Figures 3 and 4 present the frequency of communicative child utterances during baseline and intervention

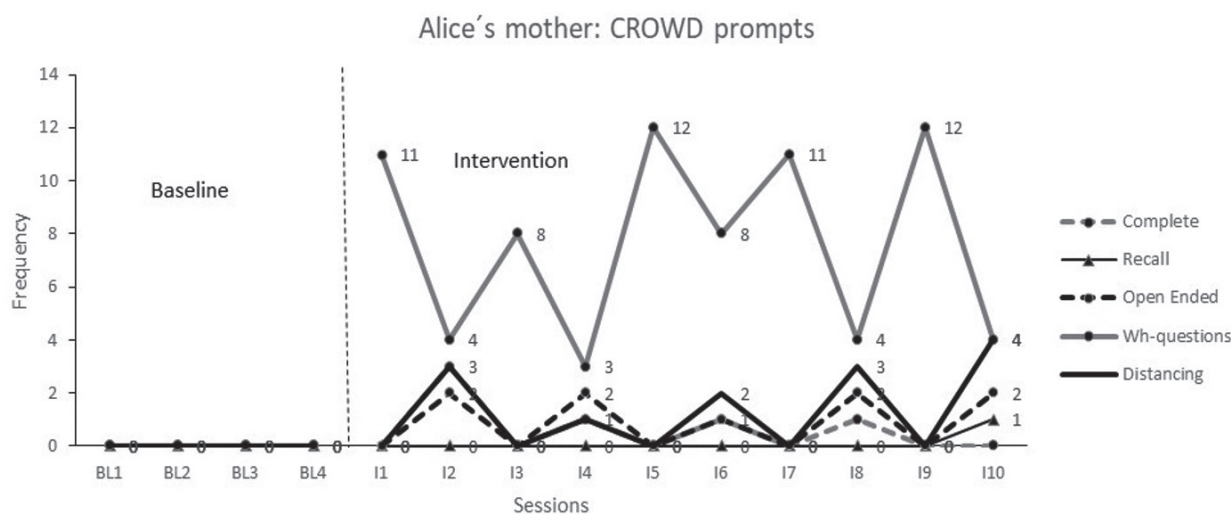


Fig. 1. Caregiver 1- Alice's mother

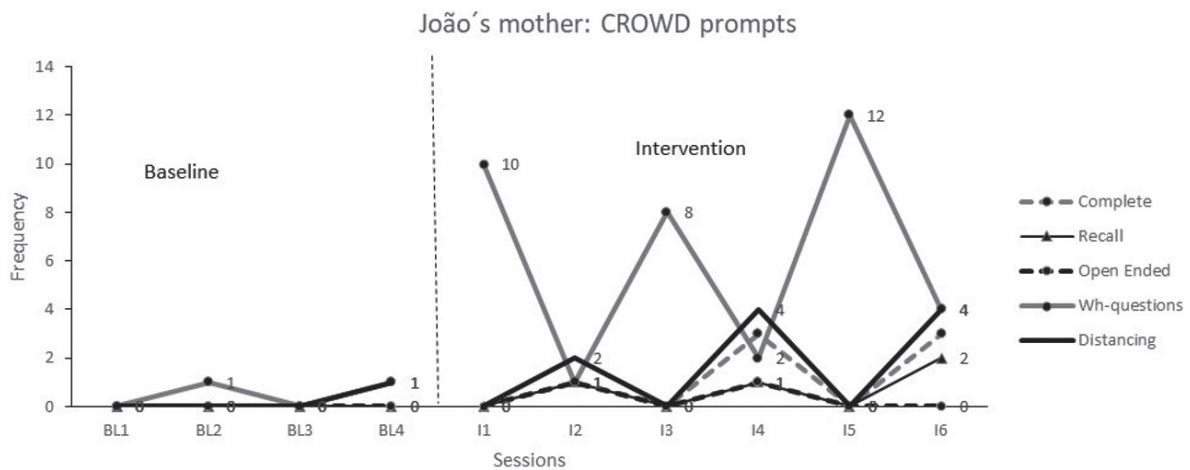


Fig. 2. Caregiver2- João's mother

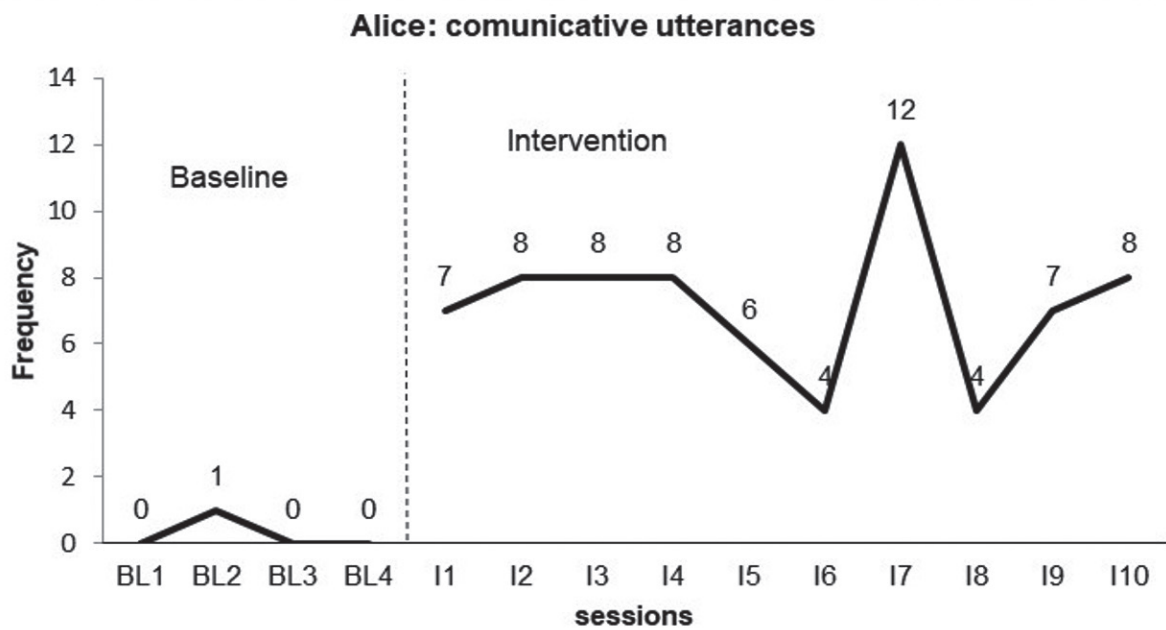


Fig. 3. Frequency of Alice's communicative utterances

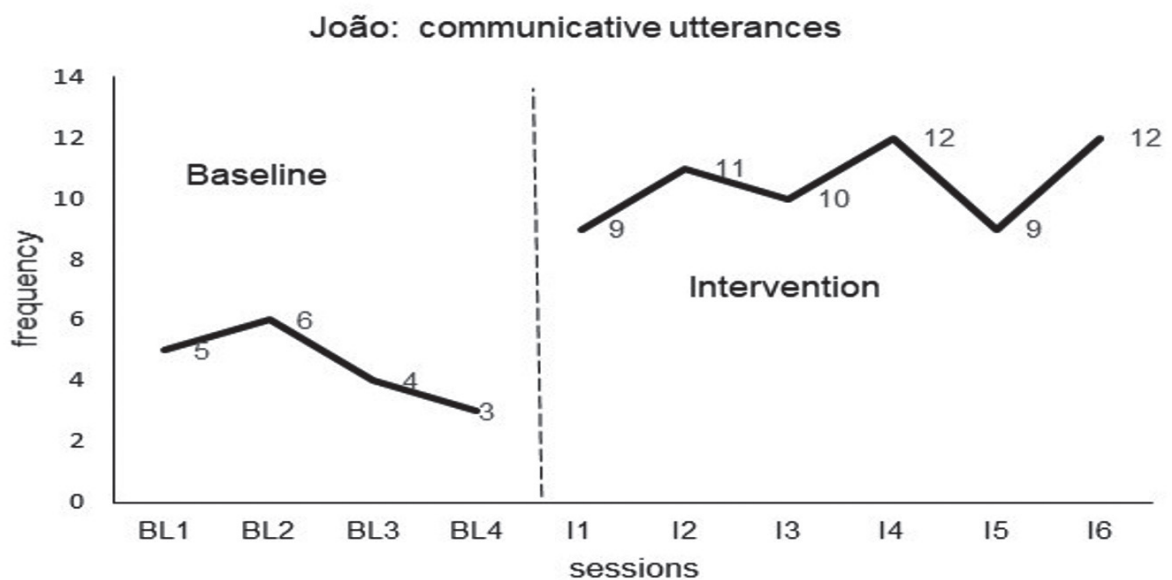


Fig. 4. Frequency of João's communicative utterances

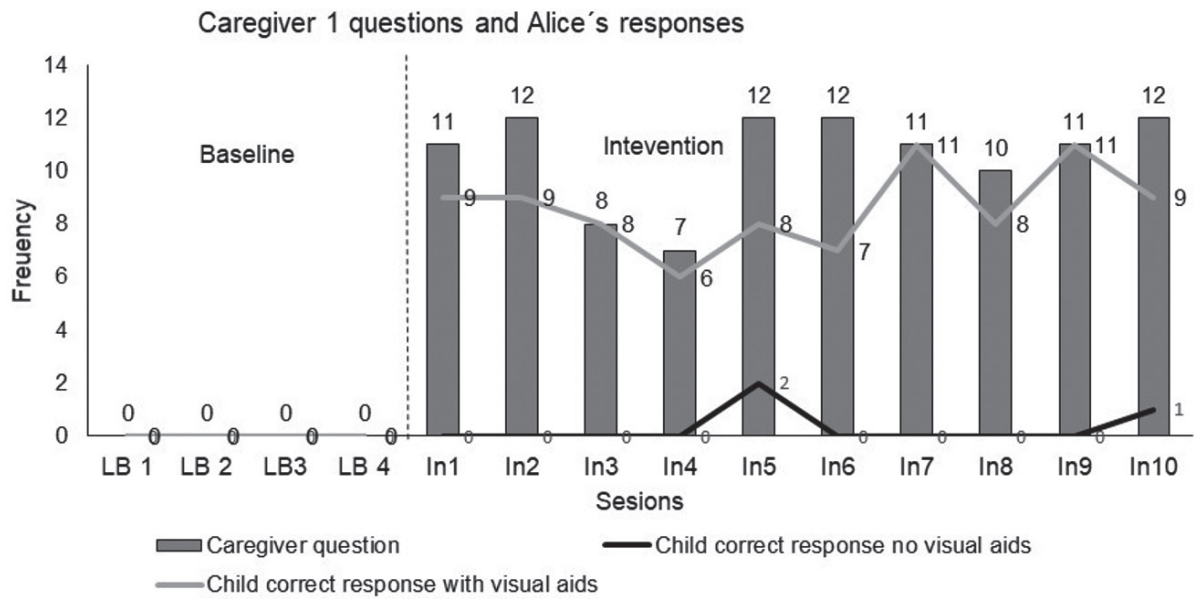


Fig. 5. Frequency of Caregiver 1 CROWD questions and Alice's correct response with and without visual aids

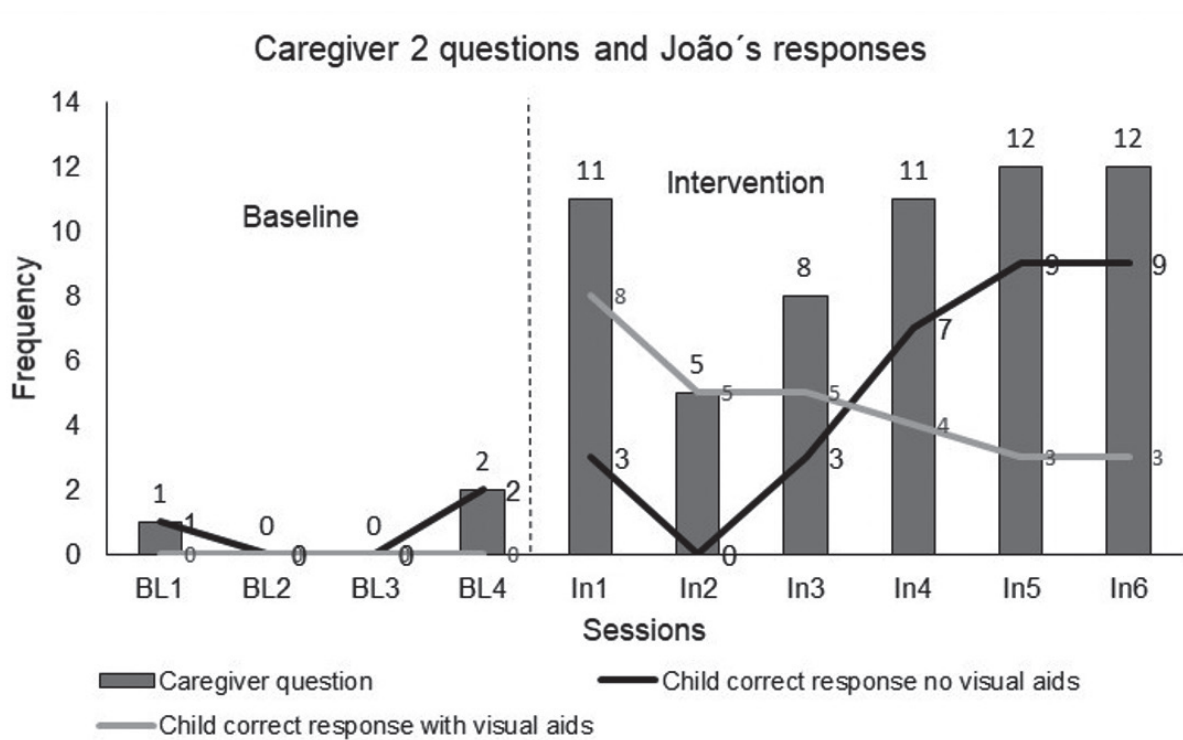


Fig. 6. Frequency of Caregiver 2 questions and João's correct response with and without visual aids

conditions. Figure 3 includes the data for Alice, the child with ASD, and Figure 4, for João, the typically developing peer.

A large effect size ( $\tau-U = 1$ ) for communicative utterances was identified for both participants, revealing that they significantly increased the frequency of communicative utterances after the caregivers began using the RECALL protocol. This tendency can be justified by two aspects. First, both caregivers adopted a monologic read-

ing style, providing fewer opportunities for the children to communicate during baseline. In this sense, they asked fewer questions and failed to provide enough time for the children to initiate interactions during the reading. Second, the lack of visual support may have restricted response alternatives, especially for Alice, who had limited functional communication skills.

During the intervention, Alice would, at times, use the visual support system as a "matching game". In these

moments she would detach the figures from the visual support booklet and pair them with illustrations in the storybook. She would additionally point to the figures in the booklet and expectantly look at her mother as if requesting the caregiver to label the pictures. As soon as the mother replied, Alice would move on to another figure. These interactions were coded as initiations.

For João, who had adequate verbal abilities, the visual support provided seemed to help him learn new vocabulary. The following excerpt is taken from the session where the boy was reading the book “Bagunça e Arrumação” (Mess and organization), a story about two sisters, Mess, a girl with a messy hair and Tidy, her pretty looking sister. Illustrates this fact:

The mother asks João “How is Tidy’s hair?” The boy points to the book page and replies “like this, the way she is brushing”. The mother gets the booklet with the visual support and provides the three options. As soon as João hears them, he replies “braids”. The mother confirms the answer and praises the child (Field notes, 12.12.2019).

The extract above suggests that despite receptively knowing the meaning and function of the word “braid” he did not know how to label it. In this sense, the visual aids enhanced his expressive vocabulary knowledge. This data is consistent with the study conducted by Nunes et al. (2021), which shows the effectiveness of RECALL on vocabulary knowledge for children with ASD as well as for typically developing peers.

Figures 5 and 6 present the frequency of caregiver CROWD questions and child correct responses with and without visual support.

The figures suggest that both caregivers provided limited opportunities for the children to answer questions throughout the baseline sessions. With the use of the RECALL protocol, the frequency of questions increased. Alice was mainly able to correctly answer her mother’s questions when visual support was provided. João, on the other hand, began using the visual support system in the three initial intervention sessions. In the last three readings, he replied without visual support. As previously mentioned, the visual support system was essential for Alice to respond, while for João, it seemed beneficial for vocabulary input.

## DISCUSSION

Using a quasi-experimental research design, this investigation revealed the effectiveness of using RECALL, implemented by caregivers, on the communication and oral reading comprehension skills of two preschoolers, one

with typical development and one diagnosed with ASD. These outcomes are particularly encouraging for three reasons. First, the research literature well documents the language and literacy difficulties children with ASD experience (Lanter et al., 2012; Westerveld et al., 2016), revealing the need for intervention practices of this nature. Second, the program was conducted by caretakers in a natural setting. As previously discussed, this intervention model may be more accessible to families in Brazil, where there are restrictions to educational and clinical health services. Third, the reading protocol favored not only the child with ASD but also the typically developing peer. In this sense, RECALL may be a promising strategy to be implemented in inclusive preschool settings in Brazil.

The results showed variability among caregiver and child participants. The mothers had distinct interaction styles, which probably influenced the way they implemented the reading protocol. This was observed in the different rates of visual support use after the intervention, as well as the inclusion (or not) of intentional pauses. Due to its dialogic nature its dialogic nature, data from the reading routines cannot be analyzed without considering the child variables. In this sense, differences in strategy use are directly associated with child communication abilities. As formerly stated, the visual support system was, at times, used as an expressive communication resource for Alice, who had limited expressive language abilities. For João, on the other hand, it functioned as a vocabulary input resource, helping him retrieve words.

Reading the same book seemed motivating for Alice, but not for João. This was verified in one of his comments when the mother opened the book to do the second reading and he verbalized “[...] are you going to read it all again?” This remark may suggest that, for him, the repetition was not comfortable. Alice, on the other hand, did not evidence any resistance to reading the same books repeatedly.

The study was based on the previous work conducted by Whalon and collaborators (2015) and Nunes with coauthors (2021), with some adaptations. In the original protocol (Whalon, et al., 2015), the reading routine took place 3 times a week. In the present research, there was a shorter time of children’s exposure to books. The reading program scripts were implemented by mothers twice a week, with days and times defined at their discretion.

With the intervention agents being the caregivers instead of the researchers, a new training protocol was warranted. Autocopy procedures, which has proven to be effective in teacher and parental training (Nunes et al., 2020) was successfully used. This model seemed to please



the caregivers, who positively evaluated the treatment protocol in the social validity measures. The reduced number of participants and the use of a research design with limited experimental control impedes generalizing the results described in this manuscript.

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#### DECLARATION OF INTEREST STATEMENT

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