

Preschoolers' Performance on the Brazilian Adaptation of the Preschool Language Assessment Instrument – Second Edition

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Key Words

Assessment · Language · Language tests · Child · Preschool · Speech-language pathology

Abstract

Purpose: The objective was to test whether the Brazilian version of the Preschool Language Assessment Instrument – Second Edition (PLAI-2) has the potential to assess and identify differences in typical language development of Portuguese-speaking preschoolers. **Methods:** The study included 354 children of both genders with typical language development who were between the ages of 3 years and 5 years 11 months. The version of the PLAI-2 previously translated into Brazilian Portuguese was used to assess the communication skills of these preschool-age children. **Results:** Statistically significant differences were found between the age groups, and the raw score tended to increase as a function of age. With nonstandardized assessments, the performances of the younger groups revealed behavioral profiles (e.g., nonresponsive, impulsive behavior) that directly influenced the evaluation. **Conclusions:** The findings of this study show that the PLAI-2 is effective in identifying differences in language development among Brazilian children of preschool age. Future research should include studies validating and standardizing these findings.

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Introduction

Systematic and formal instruments have been widely used to assess different components of language [1, 2] as they are considered important resources to identify and establish prognoses for the language problems during language acquisition [3].

In this regard, language evaluation instruments are important resources for assessing preschool-age children in both clinical and research contexts. Nevertheless, few tools for evaluating children's spoken language are available in Brazil, whether written in (e.g., Teste de Linguagem Infantil) or adapted to (e.g., Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Abilities) Brazil's linguistic culture [4]. As noted by several researchers, this situation can largely be explained by the challenges inherent to the adaptation of an instrument for use in another culture [2, 5, 6] and can in turn explain the restricted number of preschool-specific instruments available for assessing the language skills of Brazilian Portuguese speakers [4].

Among the international tests for evaluating the language skills of preschoolers, the Preschool Language Assessment Instrument – Second Edition (PLAI-2) [7] is an instrument intended to assess the communication skills of preschool-age children regarding the development of

age-appropriate discursive abilities. These skills are measured based on responses on two levels of language: receptive (nonverbal response) and expressive (verbal response) [7]. This approach gives the PLAI-2 a large advantage over other instruments that cover preschool-age children but that only evaluate a specific skill or one level (reception or expression), such as the Peabody Picture Vocabulary Test [8].

International research has been conducted using the PLAI-2, whose application in measuring and distinguishing the performance of individuals with and without language problems can have different purposes yet convergent results [9, 10]. This instrument can also serve as a control for language intervention programs for preschoolers [11–13].

Newell and Graham [11] used the PLAI-2, among other instruments, to follow up on language aspects among preschoolers who showed typical language development. The goal was to help identify factors that affect the capacity of children to learn how to interact socially before entering kindergarten. Another study by Hay et al. [12] compared two groups of preschoolers at risk of learning difficulties and showed that an intervention based on the spoken language skills measured by the PLAI-2 had effects on learning about reading and writing. In contrast, interventions oriented toward aspects of phoneme-grapheme decoding interfere with learning about writing. The study also highlighted the importance of multidimensional intervention programs.

The PLAI-2 has also been used in studies involving children with neurodevelopmental problems. For instance, a study conducted by Neufeld et al. [9] showed that children who undergo arterial intervention to fix transposition of the great arteries show language changes compared with others in their age group, as well as cognitive changes, as reflected by both motor skills and academic and behavioral performances. Boit [13] compared the language performances of preschoolers from a low-income background who were engaged in two different intervention programs for 8 weeks and showed that the intervention results for the dialogical model, namely the PLAI-2, showed significant improvements in language performance.

The PLAI-2 has been translated into Portuguese and adapted to Brazilian culture. One component of the translation and adaptation processes were small semantic and syntactic adjustments that were necessary to ensure that the instrument could be applied in Brazil with the same rigorous methodology as that used for the original instrument [14, 15]. A previous study was conducted containing the first results regarding the use of the procedure adapted

Table 1. Distribution of participants based on age and gender

Group	Age	Total	Males	Females
3 years	3 years to 3 years 11 months	118	59	59
4 years	4 years to 4 years 11 months	118	67	51
5 years	5 years to 5 years 11 months	118	53	65

to Brazilian Portuguese among children with typical spoken language development. The results showed that the Brazilian version of the PLAI-2 was able to differentiate the performance of these children on the receptive and expressive language and discourse ability items [16].

Given the applicability of this tool in the context of preschool language assessment, the aim of the present study was to test whether the Brazilian version of the PLAI-2 has the potential to assess and identify differences in the typical language development of Portuguese-speaking preschoolers.

Materials and Methods

Subjects

The subjects were selected from public kindergartens in Marília, São Paulo State. The kindergartens were located in different regions of the city, ensuring representation of different social classes in the sample. All of the subjects obtained parental consent via signing of a consent form developed for the specific purposes of this research and in accordance with a resolution of the National Health Council (CNS/196 on Regulatory Guidelines and Standards for Research Involving Humans). This study was approved by the Ethics Committee of São Paulo State University.

The study included 354 children of both genders with typical language development who were between the ages of 3 years and 5 years 11 months. The participants were divided into three groups based on age, as shown in table 1 and as performed for the original version of the instrument. Notably, there was symmetry between gender and age.

Data collection was preceded by clinical evaluation of the language used to obtain information about the participants' medical histories. The inclusion criteria for this study were as follows: (a) no history of sensory abnormalities, including visual, auditory, neurological or psychomotor changes, and (b) no language disorders, as confirmed by clinical evaluation of language performance. All subjects were also screened for their minimum level of auditory response using a pediatric audiometer. According to the literature on this age group, the normal level is 20 dB [17].

Procedure

A version of the PLAI-2 previously adapted to Brazilian Portuguese was used in this study [14, 15]. We emphasize that this instrument is composed of 70 stimuli proportionally divided between receptive and expressive language (i.e., standardized evalu-

Table 2. Intragroup performances on skill levels and discourse ability

Item	Variable	3 years (n = 118)			4 years (n = 118)			5 years (n = 118)			p value
		mean	med.	SD	mean	med.	SD	mean	med.	SD	
Matching	raw score	12.49	13.00	2.27	14.89	15.00	1.81	15.81	16.00	1.25	<0.001
Selective analysis	raw score	8.06	8.00	2.29	12.51	13.00	2.26	14.42	14.50	1.84	<0.001
Reordering	raw score	–	–	–	5.53	6.00	2.29	8.52	9.00	2.74	<0.001
Reasoning	raw score	–	–	–	6.81	7.00	2.74	10.13	10.00	2.81	<0.001
Receptive	raw score	14.10	14.00	3.03	19.46	20.00	3.05	23.15	23.50	3.24	<0.001
Expressive	raw score	12.53	13.00	3.76	20.23	20.00	4.40	25.43	26.00	4.31	<0.001
Discourse ability	scaled score	97.88	100.00	10.65	101.68	103.00	11.11	101.84	103.00	12.97	0.011

A p value ≤ 0.05 was considered statistically significant (Jonckheere-Terpstra test).

med. = Median; SD = standard deviation; – = ‘reordering’ and ‘reasoning’ were calculated together in a single analysis (‘reordering and reasoning’) for the 3-year-olds.

ation). These classifications are in turn divided into four levels of discourse ability as follows [7, 18]: (a) matching: object naming, actions and performing imitations (e.g., ‘What is the lady doing?’); (b) selective analysis: appointing or selecting attributes of objects and actions based on their functions or integrating features (e.g., ‘Point to a part on this one and a part on this one that are different from each other.’); (c) reordering: naming or selecting subtle but perceptually significant aspects, objects, or actions (e.g., ‘A lady went into the supermarket and saw something that was not food. What could she have seen?’); and (d) reasoning: naming or selecting objects, features or functions to predict outcomes and justify responses (e.g., ‘This girl is happy and this girl is not. Look at her, and point to what shows she is happy.’).

The instrument also provides data about the profile of responses and behavioral and environmental issues (nonstandard evaluation), yielding a clinical view of a subject during the test, which can be analyzed for each response from standardized evaluation items. The categories evaluated at this stage are ‘underresponsive’ (non-responsive, delayed response, and low volume), ‘overresponsive’ (extra actions, excessive verbalization, and loud volume), and ‘cumulative total of behaviors and adequacy of expressive responses’ (fully adequate, acceptable, and ambiguous) [7].

The children were tested in a quiet room, and the mean time for testing was 40 min per child. We emphasize that the adapted version includes all of the items present in the original version as well as application instructions (orders, scoring, and interpretation). To score items, we assigned 1 point for each item answered correctly and 0 for each item not answered or answered incorrectly according to the scoring criteria established by the examiner’s manual from the original test.

The results provided by the instrument were based on an overall score and a partial estimate of development regarding receptive and expressive language. To obtain these results, we added the points (raw score) for the ‘receptive’ and ‘expressive’ items and converted them into a scaled score using the normative tables es-

Table 3. Group comparison for variables with statistically significant differences

Item	Variable	Pairs of groups		
		3 × 4	3 × 5	4 × 5
Matching	raw score	<0.001	<0.001	<0.001
Selective analysis	raw score	<0.001	<0.001	<0.001
Receptive	raw score	<0.001	<0.001	<0.001
Expressive	raw score	<0.001	<0.001	<0.001
Discourse ability	scaled score	0.013	0.014	0.899

A p value ≤ 0.05 was considered statistically significant [Mann-Whitney test, adjusted via Bonferroni correction (Bonferroni alpha = 0.016952)].

established by the examiner’s manual from the original test to form a composite overall score, which represented the discourse ability of the child.

The ‘reordering’ and ‘reasoning’ items were calculated together for the 3-year-old subjects, following the examiner’s manual instructions, because children in this age group have limited skills relevant to these items, which test the highest levels of communicative skill [7]. This is not the case for 4- and 5-year-olds; as a result, the two items were calculated separately.

Data Analysis

We used version 21.0 of the Statistical Package for the Social Sciences for our descriptive analysis, for which we adopted a significance level of 5%. The Jonckheere-Terpstra test was used to verify possible differences between the three groups as well as to make comparisons with variables of interest. Additionally, the

Table 4. Intragroup comparisons of categories from the nonstandardized assessment

Category	Subtype	Variable	3 years (n = 118)			4 years (n = 118)			5 years (n = 118)			p value
			mean	med.	SD	mean	med.	SD	mean	med.	SD	
Expressive response adequacy	–	fully adequate	73.36	75.00	13.31	72.50	73.00	10.84	68.95	68.00	13.61	0.005
	–	acceptable	17.74	15.00	10.82	18.58	17.50	9.19	18.57	18.00	9.79	0.450
	–	ambiguous	8.81	8.00	7.57	8.92	7.50	6.99	11.31	10.50	7.07	0.005
Interfering behaviors	UR	nonresponsive	4.79	1.00	6.44	2.02	0.00	3.50	0.90	0.00	1.91	<0.001
		delayed response	0.53	0.00	1.94	0.53	0.00	1.55	0.75	0.00	2.25	0.039
		low volume	1.14	0.00	5.05	2.84	0.00	7.75	2.20	0.00	8.31	0.159
	OR	extra actions	1.32	0.00	5.07	1.55	0.00	7.02	2.06	0.00	7.95	0.228
		excessive verb.	5.65	0.00	13.77	3.92	0.00	9.91	3.55	0.00	8.59	0.512
		loud volume	0.08	0.00	0.83	0.08	0.00	0.92	0.12	0.00	1.20	0.537
		CP	13.42	7.00	18.80	10.92	6.00	15.94	9.49	3.00	15.52	0.007

A p value ≤ 0.05 was considered statistically significant (Jonckheere-Terpstra test). CP = Cumulative percentage; med. = median; OR = overresponsive; SD = standard deviation; UR = underresponsive; verb. = verbalizations.

Table 5. Intragroup comparison of categories from the nonstandardized assessment with statistically significant differences

Category	Variable	Pairs of groups		
		3 × 4	3 × 5	4 × 5
Expressive response adequacy	fully adequate	0.425	0.008	0.030
Expressive response adequacy	ambiguous	0.994	0.007	0.004
Interfering behaviors – underresponsive	nonresponsive	<0.001	<0.001	0.001
Interfering behaviors – underresponsive	delayed response	0.474	0.039	0.188
Cumulative percentage	–	0.267	0.007	0.103

A p value ≤ 0.05 was considered statistically significant [Mann-Whitney test, adjusted via Bonferroni correction (Bonferroni alpha = 0.016952)].

Mann-Whitney test, which was adjusted via Bonferroni correction (Bonferroni alpha = 0.016952), was used to identify groups that differed from the rest when compared pairwise.

Results

Table 2 presents data on the descriptive statistics as well as the raw and scaled scores for the three groups for the following items from standardized evaluation.

As previously mentioned, the variables ‘reordering’ and ‘reasoning’ were calculated together in a single analysis (‘reordering and reasoning’) for the 3-year-olds. The two abilities were therefore calculated separately for the groups of 4- and 5-year-olds, which allowed them to be compared (table 2).

Considering the previous analysis, table 3 presents a group comparison for variables with statistically significant differences.

Regarding the nonstandard evaluation, table 4 presents data on the descriptive statistics for the three groups. Considering the previous analysis, table 5 presents an intragroup comparison for the variables with statistically significant differences in table 4.

Discussion

This study sought to describe and compare the performance of preschool children with typical language development using the Brazilian version of the PLAI-2. According to the authors, when the PLAI-2 was translated

into and adapted to Brazilian Portuguese [14, 15], the adjustments made to the test were predominantly grammatical and were made to achieve theoretical, semantic and cultural equivalency. These changes were made for all items from the original version as well as for all application instructions (the beginning of the test, scoring criteria, interpretation of results and feedback forms).

Initiatives of instrument adaptations to evaluate spoken language are a current need in the speech therapy domain in Brazil in order to bridge the existing gap regarding objective evaluation methods [14, 15]. The availability of such instruments makes the accomplishment of comparative and cross-cultural studies possible [6].

The performance of children with typical language development between the ages of 3 and 5 years on the Brazilian version of the PLAI-2 showed that the raw score obtained for the four levels of discourse ability varied between age groups. Specifically, the raw score tended to increase as a function of age (5-year-olds > 4-year-olds > 3-year-olds). One could clearly see that when the groups of 3- and 5-year-olds were compared, all variables were significantly different, which demonstrated that the procedure discriminated between the different performances of these participants for all items in both the receptive and expressive modalities (tables 2, 3). This finding allowed us to show that for lower levels of abstraction (matching and selective analysis) and the closest age groups (i.e., 3- and 4-year-olds and 4- and 5-year-olds), differences in performance could be identified using the adapted version of the test.

The discursive ability item had the lowest *p* value of the items analyzed between age groups (table 2), and this measure was also the only one that did not show statistically significant differences in pairwise comparisons between 4- and 5-year-olds; similar averages were observed for the scaled scores of these groups (table 3). It is noteworthy that the scaled score, and not the raw score (as used for group comparisons for other items), was used for the discursive skill item because discursive ability was measured from the sum of the scaled scores for the expressive and receptive items, meaning that there was no raw score for that item. According to the authors of the original version of the test [7, 18], discursive ability is the most reliable parameter for measuring language skills via the PLAI-2. However, in the present study, this measure was analyzed along with other items only for exploratory purposes because it is a measure of interpretation that refers to the standards of the original test and therefore should be interpreted with caution. Using this measure as a performance parameter for Brazilian Portuguese re-

quires a complete validation process and instrument standardization [19].

As mentioned before, for the group of 3-year-olds, the variables 'reordering' and 'reasoning' were calculated together in a single analysis ('reordering and reasoning'), yielding a mean raw score of 6.14 and a standard deviation of 2.91. The low mean is due to the limited abilities of children at this age, who are still in the process of acquiring these two levels of discourse ability. These two levels were calculated separately for the groups of 4- and 5-year-olds, which allowed us to compare the groups. A significant difference was observed in this comparison ($p < 0.01$), showing that the procedure also allowed for discrimination between 4- and 5-year-olds' performances on these items (table 2).

A high level of reordering requires that a child rejects certain information over other information; in doing so, the child must manipulate such information internally, so that their response meets the linguistic demands of the task and fulfills a given request (e.g., 'Show the part of the egg that we do not eat.') [7, 18]. Therefore, it is necessary for the child to have enough information about the target stimulus ('egg') in child semantic repertoire to know which part is not food, and the child also must be able to understand the command that is indicated by the verb 'show' in a negative sentence construction.

It is also at this age that children become more exposed to social and communicative situations through conversational interactions and develop more extensive vocabularies, which allows them to understand more complex syntactic structures. In addition, as shown by the test, children already have a certain metalinguistic ability to manipulate language, either in production or in understanding, although such manipulation is not consciously performed [20].

This fact may in part explain why the 5-year-olds performed better on the 'reordering' and 'reasoning' items than the 4-year-olds (table 2). For 'reasoning', to understand and execute a task, not only cognitive and language functions but also the ability to perform causal predictions and infer emotional states are necessary.

Regarding the 'receptive language' and 'expressive language' categories, the values were different yet close, demonstrating equivalent performances among typically developing children [21, 22]. The findings of this study are in accordance with those in the literature regarding different age groups. As has been previously mentioned, international studies using the PLAI-2 have demonstrated that the test is sensitive and has a positive predictive value for identifying changes in spoken language [9, 10, 12].

An interesting feature of the PLAI-2, which also held true for the Brazilian version, involves two additional qualitative analyses of information about the adequacy of responses and interfering behaviors that may occur during the response to an item. From the descriptions and comparisons of the performances of the age groups in this study, it was possible to identify interesting features that contributed to a better understanding of the quantitative data presented.

The results showed that differences in the adequacy of the responses were more evident between the groups that were the farthest apart in age (i.e., between the 3- and 5-year-olds), wherein, in general, the performances of the younger groups consistently revealed behavioral profiles that directly influenced the evaluation (e.g., nonresponsive, impulsive behavior) which was expected in developmental terms. Among the pairs of closest age groups, this difference was only found when comparing the groups of 4- and 5-year-olds. Surprisingly, the group of 5-year-olds had fewer 'fully adequate' responses and more 'ambiguous' responses than the groups of 3- and 4-year-olds (tables 4, 5). This fact could be explained during the evaluation because 5-year-olds inserted other information, such as a description of an object's attributes, into their responses, which ultimately led to higher rates of ambiguities, even though the target stimulus had been addressed. In contrast, younger children tended to respond more succinctly to what was requested, which is not to say that the answer was necessarily correct, but this does explain the lower average raw score for the group of 3-year-olds.

At preschool age, children are still developing mental schemes that support the ability to represent events. At approximately 4 and 5 years of age, children are able to describe a sequence of temporally organized actions with figures of support and present a semantic repertoire and grammar domain that give them a greater ability to describe the graphical elements that make up a scene [23]. As a result, it has been speculated that the response characteristic shown by 5-year-olds may be related to their language development phase. In particular, dialogic experiences at this stage require complementary information, and narratives are still built into descriptions in a guided way.

Notably, the 3-year-olds had higher nonresponse rates and shorter answers than the older children (tables 4, 5); in other words, the 3-year-olds were more impulsive when meeting requests. Thus, in addition to differences in language development, there are also issues related to the development of inhibitory control. The capabilities of reflection and self-control are still underdeveloped in

preschool-age children [24], which means that younger children are more susceptible to failing complex tasks that require the activation of inhibitory control systems, which develop significantly between 3 and 6 years of age [25].

Although the 5-year-olds presented a complement to the answers, children in this age group do not necessarily score higher because of 'excessive verbalization'. This phenomenon can be explained by the fact that scores for this behavior do not take into account the context of the information; that is, if an individual completes a response with information relevant to the context, the behavior is still not counted. Extrapolated target responses, without which the response would have been considered as 'excessive verbalization', explain the 5-year-olds' scores.

The results of this study show that the Brazilian version of the PLAI-2 discriminates between the performances of children with typical language development. Specifically, the statistically significant differences observed in the intragroup comparisons revealed that these children are different from one another and that the largest part of the raw scores tend to increase with age.

Nonetheless, as was said before, the outcomes of this study must be discussed with caution, taking into account that the version of the instrument used is not validated for Brazilian Portuguese. As a result, future studies in Brazil (including, for example, validating procedures) may be performed to determine whether this instrument can be used as an assessment procedure in speech therapy clinics to study spoken language disorders in preschoolers.

However, in Brazil, the sociocultural and educational heterogeneity combined with the geographic extent of the country are adverse factors in the procedures for validation, which are in progress. At this point, this paper complies with the aim of providing to the scientific community the information that there is a Brazilian version of the test; future research should include validating procedures.

Conclusions

The results show that children's performances on the adapted version can be described even at the lowest levels of abstraction and in age groups that are close together. These findings provide important evidence that the Brazilian version of the PLAI-2 has the potential to identify differences in typical language development among children aged 3–5 years and justifies investment in validation and standardization studies.

Acknowledgments

Our thanks go to Dr. Marion Blank for providing information about the PLAI-2, to Denise Giacheti for her assistance and coop-

eration in checking the reference list, to the families that participated in the study, as well as to the support agencies FAPESP (process #2012/19808-5), CNPq (#308540-2012-3) and INCT (CNPq #573972/2008-7, FAPESP #2008/57705-8).

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