

Research Article

Empowering Language Development: A Comparative Analysis of Parent-Implemented Intervention and Therapist-Implemented Intervention in Preschoolers With Language Delay

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https://doi.org/10.1044/2025_AJSLP-24-00335**ABSTRACT**

Purpose: Evidence supporting parent-implemented intervention (PII) in treating young children with language delays mostly exists in Indo-European languages. Given the linguistic diversity and cultural differences, the purpose of the study is to examine the efficacy of PII compared to therapist-implemented intervention (TII) in treating Hebrew-speaking preschool children with language delay.

Method: In a prospective controlled study using a convenience sample, 40 toddlers with language delays were divided into two intervention groups, PII ($N = 19$) versus TII ($N = 21$). Those in the TII group participated in 12 weekly individual speech and language intervention sessions, each lasting 45 min. Participants in the PII groups were the parents of the children and took part in 12 weekly group training sessions, each lasting 90 min. Children's expressive and receptive language abilities were tested before and after the intervention. The outcome measures included vocabulary (using a parental questionnaire), morphology (mean morpheme per utterance), and syntax (number of one-word utterances, two-word utterances, simple sentences, and complex sentences). Statistical analyses using descriptive statistics and analysis of variance compared both interventions across time.

Results: Both PII and TII groups demonstrated significant improvement after intervention. Differences between the groups were limited to only one measure, simple sentences, with children in the TII group exhibiting a greater increase in the number of simple sentences compared to those in the PII group.

Conclusions: The present study extends knowledge regarding PII in non-Indo-European languages. The results highlight the positive effect of PII on language skills in Hebrew-speaking children with language delay, raising the potential contribution of its implementation in public health centers.

Children in the toddler and preschool period who present with language delay are at increased risk for ongoing language and developmental disorders (Bornstein et al., 2016; Silva, 1980; Zambrana et al., 2014), including developmental

language disorder (DLD), that have been demonstrated to negatively affect later outcome in multiple spheres (Del Tufo & Earle, 2020; Dubois et al., 2020; Elbro et al., 2011; Gough Kenyon et al., 2022; Lewis et al., 2015; Ziegenfusz et al., 2022). This increased risk, as well as high brain plasticity, in early rather than later developmental stages (Bradshaw et al., 2015) mandates the need for the development of effective language interventions for young children presenting in the preschool period with language delay.

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Interventions to address this population have included both therapist-implemented intervention (TII) and parent-implemented intervention (PII), with both demonstrating similar levels of efficacy (Law et al., 2004; Roberts & Kaiser, 2011). However, how each intervention contributes to the attainment of distinct language objectives in the domains of vocabulary, grammar, and syntax remains unclear. Moreover, most research has been conducted in English, which belongs to the Indo-European family (alongside languages such as German and Dutch). This raises questions about whether the advantages of these two intervention types extend to languages that do not belong to this family, such as Hebrew, which belongs to the Semitic branch of the Afro-Asiatic language family (alongside languages such as Arabic and Amharic). Given the structural and typological differences between these language families, it is important to investigate whether interventions designed for Indo-European languages are equally effective for Semitic languages. For more information regarding language typology, please refer to Moravcsik (2013).

TII

Clinician-administered interventions for children with language delay, also referred to as TII (Roberts & Kaiser, 2011), are usually administered by speech-language pathologists (SLPs). This type of therapy varies in duration and intensity depending on the individual needs of the child, the family, and public resources available, as well as the policies of speech and language therapy services (American Speech-Language-Hearing Association, n.d.). TII can be delivered individually or in a group format. The TII can take place in a variety of settings, such as the home, educational setting, community health centers and hospitals, developmental institutes, and private clinics (Law et al., 2017). In all settings, SLPs provide the intervention directly to the client(s) (DeVeney et al., 2017), children in the current context. This intervention is usually delivered once a week in a one-on-one direct therapist-child setting, with each session lasting up to 1 hr (Keilmann et al., 2004; Namasivayam et al., 2019). The minimum duration of the treatment ranges from 3 to 6 months, consistent with the finding that a minimum of 8 weeks of intervention resulted in more positive effects compared with a shorter duration of intervention (Law et al., 2004). There is ground evidence for the effectiveness of TII for children with DLD or late talkers (DeVeney et al., 2017; Lawler et al., 2013).

Most of the TIIs delivered to children are accompanied by a significant adult (e.g., a parent; Boyle et al., 2009) who accompanies the child and joins the treatment, so that practice can be carried out at home daily. In general, TII does not include clear guidelines for the role and the involvement of parents in treatment. Thus, the extent

of parents' involvement in TII varies depending on the therapists' approach and the desire and ability of the parents, along with various environmental variables. For example, it was reported that only one third of therapists indicated that they always or usually involve parents in intervention sessions (Pappas et al., 2008). Intuitively, the involvement of parents in therapy should be strongly considered since they might enhance continuity for the clinical objectives and generalization.

PII

Several studies have examined the efficacy of PII for children with DLD. One such approach, parent-child interaction therapy, provides *individual* intervention to parents of children with expressive DLD. It uses video-based intervention and an SLP to guide the parent to improve the quality of interaction with the child in spontaneous events and naturally occurring contexts. The authors reported that this form of PII demonstrated a positive effect on the children's expressive language and communication skills (Allen & Marshall, 2011).

Also, PII using a *group* format has been found to be effective for improving children's language in those with DLD. Gibbard (1994) was one of the first investigators to report that language training provided to mothers in a group setting every other week for 6 months was as effective as direct individual speech and language therapy to children with language delay. Moreover, Buschmann et al. (2009), in a randomized controlled trial of German-speaking children aged 2 years with specific expressive language delay, found that applying a short, highly structured PII in a group setting resulted in 75% of these children having age-appropriate expressive language skills at age 3 years as compared to 44% of waitlisted controls. A recent study (Zwitserlood-Nijenhuis et al., 2023) confirmed the positive effect on language and parental measures following a PII (as part of a multicomponent intervention including both individual and group therapy) among Dutch children with DLD over 6 months (including pre-, post-, and follow-up tests), 50-min sessions carried out once every 2 weeks. The positive effect of mothers' intervention, administered in a group setting, on children's literacy development was confirmed also for Spanish-English bilingual children (Ijalba, 2015).

The Effects of TII and PII

Meta-analyses have provided comprehensive evidence for the effectiveness of PII and TII for children with language delay. For instance, in one meta-analysis (Law et al., 2004), the effect of PII did not differ from TII in different language domains such as expressive syntax (e.g.,

mean length of utterance or sentence complexity) and vocabulary (e.g., number of words in language sample). A later meta-analysis (Roberts & Kaiser, 2011) indicated higher results for PII compared to TII for receptive language and expressive morphosyntax, with effect sizes of 0.25 and 0.42, respectively. For other language measures (e.g., expressive language and vocabulary), no significant differences were observed between the two interventions. Other reviews also confirmed that both TII and PII (in home and group-based settings) significantly improved language skills (DeVeney et al., 2017; Fan et al., 2022; Lawler et al., 2013). In the case of late talkers, PII may have a more advantageous effect compared to TII (DeVeney et al., 2017).

However, tempering these findings is a study reporting on a population-based home intervention conducted by language assistants, who were not formally trained therapists. This intervention targeted 4-year-olds with a 1.25 *SD* delay in expressive or receptive language. The study reported more limited results both immediately (Wake et al., 2013) and at the 2-year follow-up (Wake et al., 2015). This evidence raises the question of the extent to which agents other than the SLP can bring about fundamental changes in children's language development.

The Hebrew Language and the Israeli Context

Modern Hebrew is the official language in Israel, with about 7 million people for whom this language is either the first language or one of the most frequently used languages in daily life (Uziel-Karl et al., 2014). As a Semitic language, Hebrew is characterized by a wealth of morphological structures (Levin et al., 2001). This implies the critical role of morphology as the main organizing principle of the lexicon in Hebrew (Uziel-Karl et al., 2014). The tri- or quadriconsonantal roots are embedded within vocalic phonological patterns constructed in most nouns, verbs, and adjectives (Maital et al., 2000). The root carries the core meaning of the word, and the vocalic patterns (*binyanim* in the verb system and *mifkalim* in the names and adjectives system) give the specific semantic features of the word. For instance, when the root *s.h.k* that carries the core meaning of playing is entwined within the nominal pattern *miccac*, the resulted word is *mishak*, “a play,” but when entwined within the verbal pattern *CuCaC*, the resulted word will be *suhak*, “was played.” The verb inflections agree with the subject of the sentence with number, gender, and person.

The richness of the morphological structures in Hebrew affects the language acquisition process in pre-school as well as in school years. The morphological properties of Hebrew differ from Indo-European languages. While in English, morphology is characterized by a linear

concatenation of prefixes or suffixes to the base words; in Hebrew, the concatenation process is mostly nonlinear, and the root morpheme is abstract and can be pronounced only within lexical items. The morphological structural differences across the languages are associated with cross-linguistic differences in the adults' brain (using functional magnetic resonance imaging) when morphology is processed (Bick et al., 2011). In addition, Hebrew-speaking children with DLD deal with remarkable difficulties in the inflection of past tense due to fusional inflectional morphology that requires a combination of four categories (tense, number, gender, and person), unlike Romance languages such as Italian (Leonard & Schroeder, 2024). The structural linguistic differences between Hebrew and other languages warrant those studies demonstrating findings in one language, especially in the areas of intervention, undergo testing in other languages, especially in those from different language families.

In addition to the language properties of Hebrew, various cultural and demographic distinctions between Israel and other countries may influence the efficacy of PII. One notable difference is the family size, a factor linked to parents' referrals and their capacity to allocate sufficient time to the treated child. The average number of children per Israeli family is 3.1, one of the highest within the Organization for Economic Cooperation and Development (OECD) countries, in contrast to the average American family with 2.5 children (OECD, 2015).

The rationale for the current study is based on the integration of the following considerations. (a) Effectiveness of PIIs: Compelling evidence supports the effectiveness of PII in promoting language skills. However, most of this research has focused on English, a language with distinct structural characteristics compared to Hebrew. (b) Unique characteristics of Hebrew morphology: Hebrew features a rich and complex morphological system, including a fusional verb inflectional system and a nonlinear concatenation process. These morphological complexities may pose additional challenges for children with DLD, potentially hindering their acquisition of linguistic milestones and limiting the effectiveness of PII in this context. (c) Demographic context: The relatively high number of children per family in the population under study introduces two contrasting possibilities. On one hand, PII could benefit multiple children in the family, as quality interactions with parents may be generalized across siblings. On the other hand, families with more children may face challenges in allocating the time and energy required for a long-term mentoring process.

Together, these considerations highlight the need to investigate the applicability and effectiveness of PII within the unique linguistic and demographic context of Hebrew-

speaking families in Israel, contributing to the formulation of evidence-based treatment protocols specific to the given culture and language. To our knowledge, no interventional study has assessed the contribution of parents' active role as developmental agents to language skills of Hebrew-speaking children with language delay.

Objective

This study aims to examine the efficacy of the group PII for Israeli Hebrew-speaking children with language delay attending a community clinic, as compared to TII. The main questions of the study are as follows:

1. Does PII significantly affect language outcomes from pre- to post-intervention?
2. Is there a significant difference in language outcome measures between the PII and TII groups from pre- to post-intervention?

Method

Study Design

Prospectively Quasi-Experimental Intervention Design

Ethics. Ethical approval for conducting the study was provided by the Meuhedet Institutional Review Board

(01-26-06-17). The parents of the participants confirmed their consent to participate in the study by signing an informed consent form.

Participants

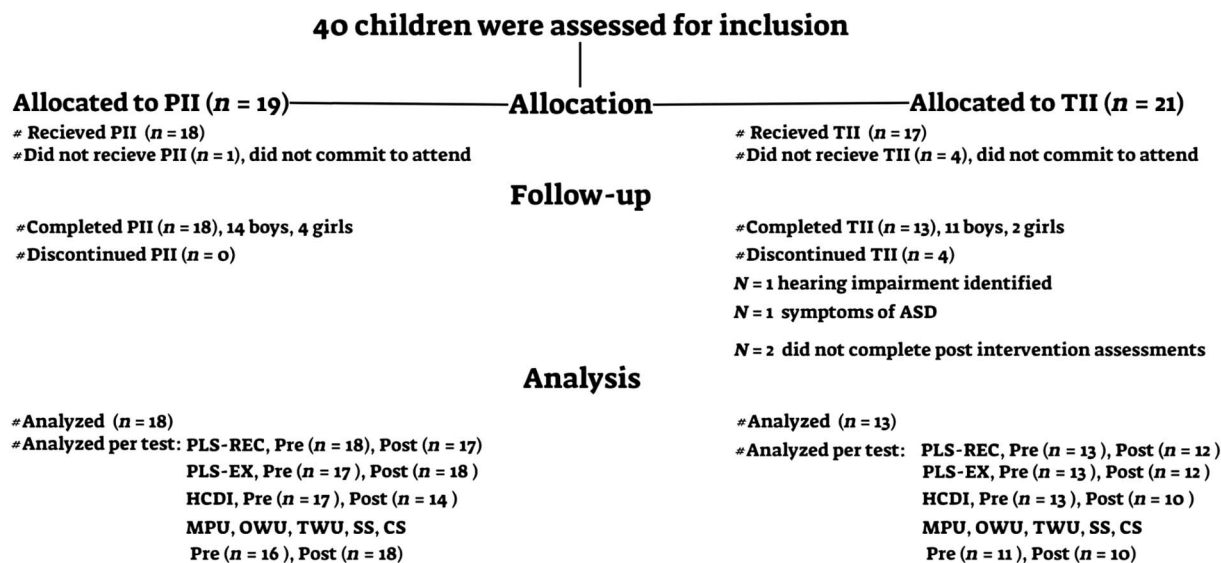
Forty children with language delay aged 24–48 months were referred to the Meuhedet North Child Developmental Service for language concerns. They were assigned to one of two pair-matched intervention groups: (a) PII, treatment through parental training, $n = 19$ (15 boys, four girls); and (b) TII, a standard treatment by SLPs, $n = 21$ (18 boys, three girls). Although the assignment to PII and TII groups was controlled for background variables (age, gender), it was not random due to parental preferences, as some parents were willing to participate only if their child received traditional TII therapy. Respecting parental preferences was crucial for ethical reasons and to ensure participation in the study (i.e., ensuring that parents were comfortable with the treatment their children received was a key factor in obtaining informed consent and participation). More information about the participants' allocation is presented in the flow diagram (see Figure 1).

Inclusion Criteria

1. Expressive language function of at least 1.5 *SDs* below standardized scores or lower and receptive language of 1.5 *SDs* below standardized scores or

Figure 1. Flow diagram for the study. MPU = mean morpheme per utterance; OWU = one-word utterances; TWU = two-word utterances; SS = simple sentences; CS = complex sentences; PII = parent-implemented intervention; TII = therapist-implemented intervention.

Flow Diagram for the Study



better on the Hebrew version of the PLS-4 (Preschool Language Scale–Fourth Edition; Zimmerman et al., 2010).

2. Native Hebrew speakers or bilingual individuals exposed to a Hebrew-speaking environment for a minimum of 1 year.
3. Nonverbal cognitive abilities of > 70 on the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) III or Mullen Scales of Early Learning.
4. Enrollment in the mainstream education system.
5. Normal or corrected hearing and vision.

Exclusion Criteria

1. Diagnosis of autism spectrum disorder, intellectual disability, epilepsy, cerebral palsy, or the presence of a known genetic syndrome.
2. Uncorrected hearing/vision impairments.
3. Severe behavioral difficulties that did not allow for cooperation on regular TIL.
4. Enrollment in special education settings.
5. Receipt of concomitant additional speech therapy in the educational setting or privately at home.

Measures

Cognitive Measures

The Mullen Scales of Early Learning. The Mullen Scales of Early Learning (Mullen, 1995) is used to assess cognitive functioning of toddlers from birth to 5.08 years. It consists of five cognitive scales: gross motor skills, fine motor skills, receptive language, expressive language, and visual reception.

The WPPSI. The WPPSI (Wechsler, 2012) is designed to assess the general cognitive ability in children aged 2;6–7;7 (years;months). Two scales are measured: verbal (vocabulary, information, similarities, and comprehension) and nonverbal (block design, matrix reasoning, digit span, picture concepts, picture memory, and coding).

Language Measures (Pre- and Post-Intervention)

PLS–Hebrew version. The PLS (Hebrew version, Zimmerman et al., 2010) provides receptive and expressive language scores for children through age 6;11 years. Note that the reliability of this version was assessed using a test–retest method, indicating high stability and reliability between the two administrations. The manual of this scale does not specify any limitations regarding the appropriate time interval between repeated administrations of the test, supporting its use as a pre- and post-intervention tool.

The MacArthur–Bates Communicative Development Inventories. This parent-based measure (The MacArthur–Bates Communicative Development Inventories; Fenson et al., 1991) provides information on a child's expressive vocabulary. It has been adapted to Hebrew (Hebrew communicative development inventories—words and sentences; Maital et al., 2000), with Israeli norms recently published (Gendler-Shalev & Dromi, 2022). It contains three sections: (a) words related to 18 semantic and grammatical categories (e.g., sounds, animals, and food), (b) verbs and gestures, and (c) a list of questions that estimate the syntactic level of the child. Parents are presented with a list of words and instructed to mark with an “X” those that their child produces independently, without being prompted to imitate or recite. Importantly, since the test focuses on vocabulary acquisition rather than articulation, parents are asked to mark words that the child says, even if they are not pronounced accurately.

Recorded Language Sample

Different language measures were calculated based on using a recorded language sample of at least 50 utterances for each child based on parent–child interaction. The parent–child interaction was set in the public child development center in a dedicated room with age-appropriate developmental tools including toys, books, and construction games. The parents were instructed to play with their children as spontaneously as possible to mimic their interaction in a natural environment. The interaction was auditorily recorded by a SLP who was instructed to take a passive stance and not to intervene in the parent–child interaction. The child's utterances were transcribed in Hebrew by a trained certified SLP. Another experienced SLP, a coauthor of the current study, supervised the coding process and, together with another trained SLP from her lab, reviewed approximately 20% of the recordings. An agreement rate of over 80% regarding the transcript coding was achieved. Based on this sample, two measures were calculated:

1. Mean morpheme per utterance (MPU): This measure was calculated based on the rules established for Hebrew by Dromi and Berman (1982). Briefly, each morpheme was assigned a point value as follows. (a) Noun system: One point was assigned to inanimate nouns, while two points were given to animate nouns, feminine adjectives, and all nouns or adjectives in the plural form. (b) Verb system: One point was assigned to infinitives, imperatives, and verbs in the third-person masculine singular form. Two points were given to verbs inflected for number, gender, or person. (c) Function words: One point was assigned to pronouns in the nominative case, prepositions, demonstratives, time adverbs,

question words, and quantifiers. Two points were given to inflected pronouns. For additional details on the MPU calculation, see Dromi and Berman (1982).

2. The Hebrew Index of Productive Syntax (H-IPSyn): The H-IPSyn (Ayal-Smikt & Dromi, 2001) was used to analyze the linguistic output of each child. According to this index, one-word utterances, two-word phrases, and simple and complex sentences were identified and categorized. Simple sentences were defined as subject–verb–object or subject–verb–adverbial constructions. Such sentences consisted of three-word utterances that included a verb, expanded by either an object or an adverbial complement (e.g., *ha-yeled fata mayim*, “The boy drank water”). Complex sentences included the following. (a) Complement clauses: Sentences containing a subordinating conjunction (similar to “that” in English). For example, *ha-yeled paxad fe-ima tilex*, “The boy was afraid that his mother would leave.” (b) Adverbial clauses with basic conjunctions: Sentences using causal or temporal conjunctions such as “because” or “since.” For example, *ha-yalda ?axla ki hayta re?eva*, “The girl ate because she was hungry.” (c) Adverbial clauses with advanced conjunctions: Sentences using conjunctions of condition, purpose, concession, or time, such as “if . . . then,” “so that,” “in order that,” “when,” or “although.” For example, *?im ha-tinok boxe, ?az ima felo mexabeket ?oto*, “If the baby cries, his mother hugs him.” (d) Final relative clauses: Sentences ending with a relative clause. For example, *ha-yalda zarka ?et ha-balon fe-ima fela hevi?a*, “The girl threw the balloon that her mother brought.” (e) Center-embedded relative clauses: Sentences with relative clauses embedded within them. For example, *ha-yeled f-lavaf mixnas ?adom hitgalef al ha-maglifa*, “The boy who wore red pants slid down the slide.”

Procedure

Parents who had preschool children presenting with language delay at the Meuhedet North Child Development Service were informed about the study. After the informed written parental consent was obtained, children were assessed for meeting study criteria, and those who met the criteria were included in the study. Regarding language assessments, all children were evaluated using the receptive subtest of PLS-4, and all but one of the children in the PII were evaluated using the expressive subtest. Regarding cognitive assessments, six of 21 in the TII group and five of 18 in the PII group were evaluated using the Mullen test. However, due to logistical constraints, the remaining children were assessed cognitively using the WPPSI.

TII Procedure

The control group consisted of children who attended the standard weekly one-on-one direct individual language treatment by a licensed SLP for 12 weeks, with attendance at a minimum of 10 sessions. Each treatment lasted 45 min. In this setting, the child–therapist interaction was the focus of the meeting. SLPs in the TII were instructed to ensure the parent’s presence during the therapy sessions and to involve him/her in the therapeutic process as much as possible. The children in the TII received a “business as usual” therapy in the child development center. As a result, the extent to which SLPs involved parents in the TII was not controlled and no mandatory protocol was outlined. The goals of the treatment were set according to the child’s results in the initial language assessment. Usually on these ages (2–4 years), the therapy focuses on enriching receptive and expressive vocabulary, expanding syntactic structures, and promoting learning of morphological rules using various developmental tools (such as symbolic play, books).

PII Procedure

The parent training design was adopted from the Parent-Based Intervention program by Gibbard (1994). One parent (15 mothers, three fathers) of the children attended a total of 12 group sessions over a 3-month period. The same parent attended all the sessions. Each session lasted 90 min, outlined according to a structured protocol and guided by two licensed SLPs. Weekly objectives were undertaken during each group session, and parents were given specific tasks for home practice. For example, parents were asked to film a video of their interaction with their children while applying the techniques learned in the group sessions. Some of these videos were presented in the group sessions to connect theoretical topics with practical implementation. Out of the 12 sessions, three individual sessions involved the child, the parent, and the SLP, aimed at ensuring the correct execution of the goals introduced in the parent group sessions. An example of a PII session is presented in the Appendix.

Statistical Analysis

The analyses were conducted using SPSS software (Version 27.0.1) using analysis of variance (ANOVA) for repeated measures with Time as a within-subject variable ($\times 2$: pre- and post-intervention) and Group ($\times 2$: PII vs. TII) as a between-subject variable. More specifically, the analysis aimed at (a) revealing the differences between the pre- and the post-intervention assessments across different language measures and (b) examining the differences between the PII and the TII groups in language outcomes. We used the Shapiro–Wilk along with Skewness > 2 and Kurtosis > 7 to test for normality. None of the study

Table 1. Test of normality.

Measure	Shapiro–Wilk		Skewness		Kurtosis	
	Statistic	<i>p</i>	Statistic	<i>SE</i>	Statistic	<i>SE</i>
Receptive language pre	0.94	.096	−0.86	0.42	1.80	0.82
Receptive language post	0.98	.736	−0.44	0.43	0.38	0.85
Expressive language pre	0.90	.008	1.09	0.43	0.82	0.83
Expressive language post	0.97	.636	0.27	0.43	1.31	0.83
MPU pre	0.96	.325	0.30	0.45	−0.88	0.87
MPU post	0.97	.526	0.06	0.44	−0.56	0.86
HCDI pre	0.97	.514	−0.04	0.43	−0.81	0.83
HCDI post	0.89	.011	−1.35	0.47	2.07	0.92
One-word utterances pre	0.89	.008	1.43	0.45	3.64	0.87
One-word utterances post	0.96	.322	0.35	0.44	−0.48	0.86
Two-word utterances post	0.94	.149	0.47	0.45	−0.36	0.87
Two-word utterances post	0.92	.042	0.93	0.44	0.57	0.86
Simple sentences pre	0.90	.012	0.55	0.45	−0.26	0.87
Simple sentences post	0.96	.427	0.40	0.44	−0.48	0.86
Complex sentences pre	0.37	< .001	2.62	0.45	5.27	0.87
Complex sentences post	0.48	< .001	2.31	0.44	4.44	0.86

Note. MPU = mean morpheme per utterance; HCDI = Hebrew communicative development inventories.

variables showed severe deviation across all criteria (see Table 1).

Results

Thirty-one children completed the study. Of the 21 children assigned to the TII, four children were excluded due to their parents' difficulty in committing to attend training, two were excluded due to their absence from the post-assessment, one child was excluded due to a detection of hearing impairment, and one was excluded due to communication difficulties based on an SLP's report. Thus, 13 children (11 boys and two girls), with an average age of 32.77 ± 4.7 (months $\pm SD$) completed the TII. Of the 19 children assigned to the PII, one child was excluded from the study due to parents' difficulty in committing to attend training. Thus, 18 children (14 boys and four girls), ages 34 ± 5.4 months, and their parents have completed the PII. The TII and PII groups did not statistically differ on the baseline cognitive score, gender distribution, and age (see Table 2).

Table 2. Background variables.

Measure	PII	TII	Statistical analysis
<i>N</i>	18	13	
Gender (m, f)	14, 4	11, 2	$\chi^2(1, 31) = 0.226, p > .05$
Age in months (<i>SD</i>)	34 (5.4)	32.77 (4.7)	$F(1, 26) = 0.304, p > .05$
Cognitive mean score (<i>SD</i>)	83.81 (13.2)	90.58 (15.5)	$F(1, 26) = 1.548, p > .05$

Note. PII = parent-implemented intervention; TII = therapist-implemented intervention; m = male; f = female.

The effects of Time (pre- vs. post-intervention) as a within-subjects factor and Group (PII vs. TII) as a between-subjects factor were separately examined for each language measure to avoid losing data for those children for whom data were lacking on one of the measures. We used Bonferroni correction to adjust for multiple analyses.

On the PLS-4, ANOVA showed a significant effect for Time in both receptive scores, $F(1, 27) = 9.34, p = .010, \eta^2 = .26$, and expressive scores, $F(1, 27) = 18.95, p < .01, \eta^2 = .412$ (see Table 3). No effect for group nor for group by time interaction was found.

Similar results were found for vocabulary (HCDI) with a significant time effect, $F(1, 21) = 11.38, p = .003, \eta^2 = .35$, indicating significant differences between the pre- and post-intervention in both groups. Group and interaction effects were not significant (see Table 4).

For MPU and the related syntactic measures (number of one-word utterances, two-word utterances, simple sentences, and complex sentences), the multivariate ANOVA showed significant effect for Time only for two measures: MPU, $F(1, 22) = 13.45, p < .01, \eta^2 = .38$, and simple

Table 3. Means and standard deviation for receptive and expressive measures across groups and *F* values for the effect of time.

PLS-4	PII (<i>N</i> = 17)		TII (<i>N</i> = 12)		Time	Group	Interaction
	Pre	Post	Pre	Post	<i>F</i> value	<i>F</i> value	<i>F</i> value
Receptive language <i>M</i> (<i>SD</i>)	85.29 (13.8)	89.47 (11.4)	90.33 (8.1)	97.08 (6.8)	9.336**	2.94	0.52
Expressive language <i>M</i> (<i>SD</i>)	77.29 (9.2)	82.71 (13.7)	78.42 (5.9)	88.17 (9.7)	18.95***	0.88	1.55

Note. One participant from each group did not attend the pre- or posttest (Preschool Language Scale–Fourth Edition [PLS-4]) assessments. PII = parent-implemented intervention; TII = therapist-implemented intervention.

p* < .01. *p* < .001.

sentences, $F(1, 22) = 18.22$, $p < .001$, $\eta^2 = .45$, indicating that both groups significantly improved over time (see Table 4). For simple sentences, the interaction between Group and Time was also significant, $F(1, 22) = 5.45$, $p = .029$, $\eta^2 = .20$. Following this interaction, a *t* test for dependent variables was conducted. The results indicated that the increase in the number of simple sentences was significantly evident in the TII, $t(7) = 3.74$, $p = .007$, but not in the PII, $t(15) = 1.74$, $p = .102$. No other significant main group effects were found.

Discussion

The current study examined the effects of PII versus TII on Hebrew-speaking children, aged 2–4 years with language delays. Key findings include significant improvements in both receptive and expressive languages for the PII and TII groups, as measured by the PLS-4, indicating the effectiveness of both interventions in enhancing language skills. Additionally, vocabulary growth, as assessed by the HCDI, showed a significant increase from pre- to post-intervention in both groups. Both interventions also enhanced other expressive language skills, as evidenced by the recorded language samples, which showed a significant increase in MPU and simple sentences. Notably, the use of simple sentences increased significantly in both groups, with a notable interaction effect showing that the TII group exhibited a more pronounced improvement in this measure compared to the PII group.

Overall, these results are consistent with the existing literature, confirming the efficacy of PII as a language intervention (Lawler et al., 2013; Roberts & Kaiser, 2011; Tukiran et al., 2023; van Balkom et al., 2010). Referring to the first research question, the results indicate that most of the language outcomes were significantly improved from pre- to postintervention in the PII. This finding implies that PII could be an effective therapy for children with language delay, suggesting its implementation in the services policy of child development centers. In addressing the second question, the results indicate that for most language measures, no significant effect for group was found, indicating that both intervention types improve language.

The abovementioned findings align with those of Gibbard (1994), whose research underpinned our PII protocol. These results challenge the assumption of qualitative differences in communication patterns between parents of children with DLD or those who are late talkers and parents of children without these conditions (Blom et al., 2023; Vigil et al., 2005). Instead, they indicate that a 3-month PII, based on a professional protocol, can effectively train parents to implement language intervention strategies. The substantial improvements across various language measures following PII underscore the pivotal role of parents in their child's developmental journey, aligning with findings from a recent meta-analysis (Heidlage et al., 2020).

The current PII—which emphasizes daily parent-child interactions, parental awareness of the child's communicative

Table 4. Means and standard deviation for morphological, syntactic, and vocabulary measures across groups based on raw scores and *F* values of time effect.

Measure, <i>M</i> (<i>SD</i>)	PII (<i>N</i> = 16)		TII (<i>N</i> = 8)		Time	Group	Interaction
	Pre	Post	Pre	Post	<i>F</i> value	<i>F</i> value	<i>F</i> value
MPU	1.92 (0.64)	2.25 (0.74)	2.01 (0.62)	2.52 (0.64)	13.45**	0.46	0.59
One-word utterances	63.25 (32.49)	54.06 (27.29)	87.00 (64.09)	73.00 (32.13)	1.68	2.42	0.07
Two-word utterances	19.38 (15.27)	19.00 (16.24)	25.38 (13.42)	26.13 (15.18)	0.01	1.54	0.02
Simple sentences	16.75 (11.45)	22.94 (16.76)	17.50 (17.26)	38.63 (19.68)	18.22***	1.85	5.45*
Complex sentences	0.13 (0.34)	0.25 (0.58)	0.13 (0.35)	0.38 (0.74)	1.78	0.13	0.20
HCDI (vocabulary)	66.64 (9.80)	72.25 (10.49)	63.71 (13.47)	73.54 (12.78)	11.38**	0.04	0.85

Note. PII = parent-implemented intervention; TII = therapist-implemented intervention; MPU = mean morpheme per utterance; HCDI = Hebrew communicative development inventories.

p* < .05. *p* < .01. ****p* < .001.

intentions, and language and play proficiency using supportive strategies (e.g., expansions and recasting)—yielded language outcomes comparable to those achieved by the trained SLPs. By combining theoretical knowledge with practical application and using real-world video examples, this approach helps bridge the gap between understanding “what to do” (content) and “how to do it” (implementation). Such an approach increases the likelihood of generalization by leveraging the extensive duration and enhanced quality of parent–child interactions that extend beyond the formal intervention period (Roberts & Kaiser, 2011). We posit that the greater opportunities for child–parent interactions in natural settings (following PII) compared to child–therapist interactions (following TII) may enable parents to make changes in their children’s language course through a shorter period. Mediation analyses in a previous PII study (Suttora et al., 2021) showed that the increase in parental expansions and amount of talking over reading activities were significantly associated with the children’s expressive improvement.

A greater effect of TII compared to PII was observed only for simple sentences. Considering the small sample size of the intervention groups, the following interpretations for this finding should be treated with caution. Future research aiming to compare the equivalence of the two intervention types across various language outcomes is needed. Following this cautionary comment, we hypothesize that the existing advantage of TII in promoting simple sentences might be affected by two factors. (a) Intervention structure: PII was designed with a phased, graduated approach, introducing developmental topics and strategies sequentially. In contrast, TII, implemented by skilled SLPs, integrated various language techniques and addressed multiple goals simultaneously from the outset. (b) Parental focus: Parents may find it easier to concentrate on vocabulary enhancement rather than complex syntactic skills. However, the limited occurrence of complex sentences in both groups makes it challenging to conclusively verify this hypothesis. The lack of progress in the use of complex sentences in both interventions suggests that children with language delays require more intensive or prolonged treatment to achieve advanced language milestones. Using complex sentences is a highly linguistic and cognitive demanding milestone since it draws on various linguistic skills including semantics, pragmatics, syntax, and morphosyntax. This explanation converges well with the finding indicating the high sensitivity and specificity of a sentence repetition task (using different complex syntactic structures) in discriminating children with and without DLD among Hebrew-speaking preschoolers (Armon-Lotem & Meir, 2016).

It is also noteworthy that the lack of progress in one-word utterances across interventions might indicate a trade-off relationship between MPU, two-word utterances, and simple sentences versus one-word utterances. As children increased their use of more complex utterances, the frequency of one-word utterances decreased proportionally.

The overall similar interventional trends between PII and TII confirm that SLPs can effectively train parents to be an active agent in children’s language development. However, although a team of SLPs adapted the current study’s protocol and implemented both the PII and TII, the specific responsibilities of SLPs in mentoring parents remain somewhat ambiguous and lack consistency across the field. A qualitative study by Davies et al. (2019) revealed that SLPs’ professional self-concept was more clearly defined for direct child treatment and planning home activities than for coaching parents to support language development. Considerable variability was observed in SLPs’ confidence levels when guiding parents to transition from mere observers or helpers to active co-interveners and agents of change. In Israel, SLPs have noted a lack of parental awareness regarding the importance of treatment and the practice of language skills at home (Uziel-Karl et al., 2014). Empowering parents to become catalysts for their children’s developmental progress and securing their collaboration during the therapeutic process requires clearer guidelines and enhanced formal training for SLPs in parent coaching. Despite challenges in viewing parents as active agents of change, research indicates that PII is effective in speech and language therapy, often more so than in other health disciplines (Lawler et al., 2013). PII appears to extend beyond the 2- to 4-year age range examined in our study, as evidenced in both younger (McGillion et al., 2017) and older children (Allen & Marshall, 2011). This indicates that PII’s positive impact on language outcomes may be applicable across a wide developmental spectrum.

The generally similar effects between the TII and the PII found in the current study shed light on the potential cost-effectiveness of PII administered in a group format. Delivering intervention for a group of parents might be valuable in resource-limited settings with limited access to SLPs. Also, the extension of benefits to siblings in terms of language strategies and high-quality interactions, alongside peer support for parents in the interventional group, highlights the societal advantages of group PII. While previous study showed better language outcomes for PII accompanied with slightly more cost per child compared to general care (Gibbard et al., 2004), the current comparison of group PII with TII delivered across similar duration and frequency might result in greater cost-effectiveness for PII.

The successful application of this approach with Hebrew-speaking children provides prominent support for broader literature on PII (e.g., Lawler et al., 2013; Roberts & Kaiser, 2011; Tukiran et al., 2023; van Balkom et al., 2010). The positive effect of PII in Hebrew as a Semitic language is crucial since it features a wide variety of linguistic structures significantly different from Indo-European languages, such as English, in aspects of phonology, phonotactics, inflectional and derivational morphology, and syntax. These variations can influence how language delays manifest and how interventions need to be designed and tailored. Given that Indo-European languages predominate in most interventional studies, the successful generalization of PII effects to a Hebrew-speaking population demonstrates the adaptability of the protocol and intervention principles to this unique linguistic context. To our knowledge, this study is the first to empirically support PII as a clinically valid intervention for young Hebrew-speaking children with language delays.

It is also important to note that language is deeply intertwined with culture. Strategies for PII that are effective in Indo-European language contexts may not translate well culturally or function effectively in non-Indo-European contexts. Cultural differences can affect parent-child interactions, communication styles, and the overall environment in which language development occurs. Conducted within Israel's unique cultural landscape, this study highlights the challenges parents face in managing therapy for families with multiple children. Israeli families have an average of 2.43 children, with about one fifth having four or more (Israel's Central Bureau of Statistics, 2020). Our findings suggest that empowering parents as developmental agents is both effective and economically and socially beneficial. This approach offers a practical solution for families, maximizing the impact of interventions across siblings and optimizing resource utilization.

Limitations and Future Directions

It is important to acknowledge certain limitations of our study. While ethically justified, the absence of a non-intervention control group limits our ability to attribute language improvements exclusively to the interventions. This limitation should be seriously considered when interpreting the significant improvement exhibited in the HCDI, reducing the ability to fully isolate the effects of the intervention from natural vocabulary growth over time. Future studies may consider alternative research designs, such as delayed intervention or longitudinal follow-ups, to further clarify the specific contributions of the intervention beyond expected developmental gains.

Due to the lack of standardized Hebrew language assessment tools for early vocabulary development, the

HCDI was used in this study despite its normative age range being limited to 18–24 months. While this tool provides valuable insights into lexical development, its use beyond the standardized age range limits the ability to fully differentiate between natural vocabulary growth over time and the effects of the intervention. The decision to use the HCDI was made with full awareness of this limitation, as it remains one of the few available measures for assessing early vocabulary development in Hebrew.

The nonrandom assignment of subjects introduces potential bias and may affect the generalizability of the findings, as the groups may differ in ways that are not solely due to the type of therapy received. To overcome this bias, baseline data were used to compare the groups on key characteristics before the intervention. Future studies should aim to use random assignment, if feasible, to strengthen the validity of the findings. Additionally, the small sample size, particularly in the TII group ($n = 13$ vs. $n = 18$ in PII), restricts the generalizability of the findings and may have reduced the statistical power to detect group differences.

Moreover, the active role of parents in TII and potential confounding factors such as home environment, parental education level, and intervention intensity at home were not controlled, which could influence the results. Future studies should compare TII with and without parental attendance to isolate the effect of parental involvement (van Balkom et al., 2010; Zwitterlood-Nijenhuis et al., 2023). They should also investigate social and emotional outcomes for both parents and children, such as adjustment competence, self-regulation, and parental responsiveness, alongside linguistic effects. Measuring and analyzing the unique contribution of the distal social and emotional components in addition to language and communication components might help to identify the “active ingredients” of the parental intervention (Frizelle et al., 2023). Evaluating different PII approaches, strategies, and components will add evidence-based knowledge for optimizing PII for achieving maximal effects with minimal investment in terms of dosage, time, and resources, leading to more refined interventions for children with language delays.

Conclusions

This study demonstrates the effectiveness of PII in improving receptive and expressive language outcomes for Israeli Hebrew-speaking children with language delays. The comparable results between PII and TII suggest that parents can be effectively trained to enhance their children's language development. These findings align with previous research (e.g., Roberts & Kaiser, 2011) and extend the evidence to an understudied population, Israeli

Hebrew-speaking children. The results have significant implications for clinical practice, resource allocation, and family-centered care in speech and language intervention. They also highlight the importance of designing and assessing PII for non-Indo-European languages, ensuring that interventions are effective, culturally appropriate, and accessible to children from diverse backgrounds.

Author Contributions

Mitchell Schertz: Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision, Validation. **Jasmeen Mansour-Adwan:** Methodology, Writing – original draft, Writing – review & editing, Validation. **Noa Provizor:** Methodology, Investigation, Writing – review & editing, Project Administration, Validation. **Ayelet Haskin:** Investigation, Writing – review & editing, Validation. **Inbal Ogran:** Formal analysis, Writing – review & editing, Validation. **Michal Icht:** Formal analysis, Writing – original draft, Writing – review & editing, Validation.

Ethics Statement

The study was approved by the Ethics Committee for research involving humans, Meuhedet Institutional Review Board 01-26-06-17.

Data Availability Statement

Data supporting the analyses and results presented in this article may be made available from the corresponding author on reasonable request.

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Appendix

Example Protocol for a Single Session in PII

Duration: 60 min

Setting: Child development center

Participants: Eight parents and two SLPs

Meeting objectives:

1. Expanding expressive vocabulary: verbs, nouns, and adjectives.
2. Utilize Hebrew books as a therapeutic tool.

Activities:

1. Brief recap: Reviewing the contents from the previous session (language strategies and coping with objections and avoidances).
2. Video activity and feedback: The group will watch a video recorded by one of the parents and provide feedback according to the content taught.
3. The topic acquisition phase: The SLPs will teach concepts of joint attention, shared and interactive reading, with illustrations via video or interactive activity.
4. Strategies: Introduce general techniques of vocal varieties and connecting events from the story to familiar events in the child's life beside more language-specific techniques of sentence completion, guided questions, developing dialogue around the story, semantic, and morphological cues.
5. Summary: Parents will receive a summary of key points and a list of age- and skill-appropriate books written in Hebrew, along with ideas for questions and an example for dialogue.

Home assignments:

1. Implement the learned strategies summarized in a personal diary.
 2. Select a Hebrew book from the provided list and engage in daily repeated readings. The parents are instructed to read the same story four to five times throughout the week and prepare a list of six new words for learning (two from each category: verbs, nouns, adjectives).
 3. Create an activity aimed at integrating the new words into daily conversations and encouraging their use by both the parent and the child.
 4. Record a 3-min video of shared reading session between the parent and the child.
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