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ATINER's Conference Paper Series
TUR2016-2203

**The Relationship between Early Literacy Experiences,
Receptive Language and the Phonological Loop:
Assessment of Turkish Children Aged 48-66 Months**

Gözde Akođlu
Associate Professor
Kırıkkale University
Turkey

Çiđdem Kızılöz
Research Assistant
Kırıkkale University
Turkey

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This paper should be cited as follows:

Akoğlu, G. and Kızılöz, C. (2016). "The Relationship between Early Literacy Experiences, Receptive Language and the Phonological Loop: Assessment of Turkish Children Aged 48-66 Months", Athens: ATINER'S Conference Paper Series, No: TUR2016-2203.

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10671 Athens, Greece
Tel: + 30 210 3634210 Fax: + 30 210 3634209 Email: info@atiner.gr URL:
www.atiner.gr
URL Conference Papers Series: www.atiner.gr/papers.htm
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ISSN: 2241-2891
24/05/2017

**The Relationship between Early Literacy Experiences,
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Turkish Children Aged 48-66 Months**

Gözde Akođlu
Associate Professor
Kırıkkale University
Turkey

Çiğdem Kızılöz
Research Assistant
Kırıkkale University
Turkey

Abstract

The study was aimed at identifying the possible relationships between home literacy experiences, receptive language skills and the phonological loop component of working memory. The study group comprised 60 preschoolers (25 female, 35 male) aged 48-66 months who were native speakers of Turkish. In the study, the Turkish Nonword Repetition List (TNWRL) (Akođlu and Acarlar, 2014) was used to assess the phonological loop, the Test of Early Language Development – Turkish Version (TEDL-T) (Topbaş and Güven, 2011) was employed for the assessment of receptive language skills, and the Home Early Literacy Environment Questionnaire (HLE) (Sarıca, Ergül, Akođlu, Deniz, Karaman, Bahap-Kudret et al., 2014) was used to assess home literacy experiences. The study results revealed that mother's educational attainment, gender and chronological age were effective on the children's performance in the HLE– Reading and Shared Book Reading subtest, receptive language standard score and CPPN. In addition, there was a moderate positive and significant relationship between the HLE – Reading subtest and CPPN.

Keywords: Early literacy, receptive language, phonological loop

Introduction

Early literacy skills denote an awareness of printed materials, words and phonemes that constitute words, in the preschool period (Gillen and Hall, 2003). Early literacy, in principle, comprises vocabulary and alphabet knowledge, phonological awareness and print awareness skills (Anthony and Lonigan, 2004). There are numerous longitudinal studies demonstrating quality early literacy experiences during preschool led to significant developmental gains and improved reading and writing, as well as, verbal language skills (Badian, 1995; Gillon, 2002; Justice and Sofka, 2010; Lonigan, Burgess and Anthony, 2000; Nunes, Frota and Mousinho, 2009; Shanahan and Lonigan, 2010). Some studies investigated the various factors that could have an impact on early literacy skills and emphasized the importance of verbal language skills on the development of early literacy skills (Senechal and LeFevre, 2002). In the literature, there are also studies that reported that especially phonological awareness and alphabet knowledge skills were associated with verbal language skills, and that word knowledge contributed to the development of phonological awareness (Whitehurst and Lonigan, 2001). Furthermore, a positive correlation of language and phonological awareness skills with reading and writing skills (Whitehurst and Lonigan, 2001; Puranik and Lonigan, 2012) and the significant contribution of verbal language skills to acquiring phonological knowledge were also reported (Snowling, 2000). There are various studies investigating the relationship of various variables for early literacy skills with language and cognitive skills. The results of these studies indicate the existence of complex relationships between different variables. In this context, it will be beneficial to broadly mention the studies examining the relationship between home early literacy environment, the phonological loop component of working memory and receptive language skills.

Home Literacy Environment

Early literacy is basically affected by the quality of the environmental stimuli present before the formal learning of reading and writing. Past research has revealed that early literacy experiences provided at home and the literacy level of the parents were as significant determinants in the acquisition of early literacy skills as cognitive processes and verbal language skills (Lonigan et al., 2013; Aram et al., 2013). In addition, recent studies have clearly revealed the relationship between verbal language performance and early literacy skills (Wilsenach, 2015). There are also various studies investigating the effect of demographic variables on the acquisition of these skills. In the studies, the effects of the literacy performance of the parents and home literacy experiences were also examined (Breit-Smith, Cabell and Justice, 2010; Aram et al., 2013). Furthermore, the importance of early literacy skills for development was emphasized and their impact on future reading and writing skills was studied (Doctoroff, Greer and Arnold, 2006). Recent studies on the subject show that home literacy experiences promoted receptive language development and

affected future reading and writing skills (Marjanovic, Peklaj, Socan, and Tasner, 2015). Another important factor of note in the studies is the socioeconomic status of the family (Breit-Smith, Cabell and Justice, 2010; Aram et al., 2013). Children raised in a family with a low socioeconomic level were reported to be at risk in the acquisition of early literacy skills (Wilsenach, 2015). Furthermore, home literacy experiences play a significant role in the prediction of children's reading skills at the beginning of elementary school (Hammer, Farkas, and Maczuga, 2010). Some longitudinal studies report that deficits in early literacy skills during the preschool period could become more resistant in elementary school and the following years, and the problems experienced could increase in the future (Evans et al., 2006). Studies have also revealed that home literacy experiences were associated with various developmental competencies during the preschool period and were a strong predictor of children's cognitive developmental performance (Niklas, and Schneider, 2013; Niklas, Cohrssen, and Tayler, 2016).

Phonological Loop and Early Literacy Skills

Studies investigating the relationship of early literacy skills and different components of the working memory model reported that working memory capacity played a significant role in the acquisition of early literacy skills (Abreu et al., 2014).

In general, working memory is concerned with storing, manipulating and/or processing information for short periods of time. Most contemporary studies on the assessment of working memory capacity are based on the multicomponent model of working memory proposed by Baddeley (1974). According to this model, working memory is composed of the phonological loop, the visuospatial sketchpad, the episodic buffer and the executive function components. The phonological loop is responsible for the storage of auditorily presented phonemes and their reorganization for production. In addition, this component allows short-term storage of auditorily presented phonemes. The organization necessary for the production of the information stored in the short-term memory takes place in the visuospatial sketchpad. The episodic buffer is defined as a system that enables visual and verbal codes to be combined and linked to multidimensional representations in the long-term memory. The executive function is considered to be the area responsible for more complex cognitive skills (Baddeley, 2003).

Various studies investigating the possible relationship between early literacy skills and working memory have examined the effects of the visuospatial sketchpad and the phonological loop capacity of working memory on the early literacy skills of alphabet knowledge and print awareness. Particularly, the studies investigating the effects of the visuospatial sketchpad on orthographic coding skills emphasize that the phonological loop capacity is an important determinant of children's ability to express their thoughts in writing (Bourke, Devies, Sumner and Green, 2014).

Based on the role of the working memory components on academic skills, there are various studies on the possible association of early literacy skills and working memory (Alloway and Copello, 2013). These studies stress the significance of the phonological loop component of the multicomponent model of working memory for the acquisition of literacy skills and the effect of this component on phonemic awareness (Oakhill and Kyle; 2000). The limited number of studies examining the association between the phonological loop and phonological awareness, and their mutual effect on reading skills reported the existence of a high-level relationship between these two variables, and that both the phonological loop and phonological awareness separately contributed to early reading development (Tattersall, Nelson, and Tyler, 2014). Furthermore, Gathercole and Pickering (2001) suggested that the phonological loop was effective in the learning of letter-sound correspondence and the phonological sequencing skills required for phonological coding and combining, while phonological awareness skills played an important role in dividing words into phonological representations. In the study by Oakhill and Kyle (2000) investigating the relationship between phonological awareness skills and working memory, the researchers found that sound categorization, a phonological awareness skill, was associated with working memory as it required simultaneous processing and storing, whereas phoneme deletion was not associated with working memory.

Association of Receptive Language Development, Early Literacy and Working Memory

The level of receptive language skills acquired in the preschool period both set the foundation of more complex future language skills and have an impact on the acquisition of early literacy skills. Various studies on receptive language skills and associated variables identify vocabulary and phonological awareness skills as the basis of receptive language skills (Whitehurst and Lonigan, 2001). Furthermore, the studies investigating the association between vocabulary knowledge and phonological awareness emphasize that the phonological awareness skill that enables combining phonemes into words facilitates learning new vocabulary (Senechal and LeFevre, 2002) and argue that the receptive language and phonological awareness skills acquired during the preschool period are important developmental predictors for future reading and writing skills (Dickinson and Tabors, 2001; Senechal and LeFevre, 2002; Whitehurst and Lonigan, 2001). In addition, various studies in the literature examine the relationship between print awareness and language skills. These studies indicate that the print awareness skill directly affects receptive language skills by enabling children to establish a connection between written language and spoken language (Vacca et al., 2006). In the studies, the different components of working memory are also examined among the variables that are directly and/or indirectly associated with receptive language skills, and the impact of the phonological loop particularly on the comprehension skill is emphasized (Baddeley, 2003; Engel, Santos and Gathercole, 2008). According

to the studies examining the relationship between the phonological loop, which greatly affects the storage and recall of phonemes, and receptive language skills, the phonological loop has a significant impact on word recall, recognition and comprehension skills (Javanbakht and Miri, 2014).

The researchers have not encountered a study that demonstrates the relationship between the early literacy experiences provided at home to Turkish-speaking children, receptive language skills and the different components of working memory. With this perspective, the study was aimed at identifying the relationship between home literacy experiences, receptive language skills and the phonological loop component of working memory in Turkish-speaking children aged 48-66 months.

Method

Study Group

The participants of the study comprised 60 children (25 female, 35 male) aged 48-66 months attending private preschools of middle socioeconomic status, affiliated to the Ministry of National Education, and located in Ankara and Kırıkkale city centers. Typically developing children without any neurological disorder, hearing loss and/or language and speech disorder were included in the study. Turkish was the only language spoken in the participants' homes.

Measures

Home Early Literacy Environment Questionnaire (HLEQ; Sarıca, Ergül, Akoğlu, Deniz, Karaman, Bahap-Kudret et al., 2014): The HLE Questionnaire is an assessment instrument developed to collect data on the early literacy experiences provided at home to preschool children aged 5-6. The lowest and highest possible scores for the instrument comprising 23 items in four subscales were 23 and 114, respectively. A high score indicates favorable early literacy experiences in the home environment for the child. The Cronbach's Alpha coefficients for the internal consistency of the subscales ranged between .70 and .84.

Turkish Nonword Repetition List (TNWRL; Akoğlu and Acarlar, 2014): The Turkish NWR List consists of a total of 36 words. There are 210 phonemes on the list compiled using the words the 70 children in the Turkish SALT database (Systematic Analysis of Language Transcripts) (Acarlar, Miller and Johnston, 2006) between the ages of 4 and 6 frequently used in their language samples. The list, used together with audio records, provides information on the nonword repetition performance of typically developing children between the ages of 3 and 9. Parallel to the results of the studies in the literature, the NWR List was used in the present study for the assessment of the phonological loop.

Test of Early Language Development – Turkish Version (TELD-T; Topbaş and Güven, 2011): The TELD-T is an individually administered test used to assess the receptive and expressive verbal language skills of children aged 2-7. The receptive Language and Expressive Language subtests comprise items that assess the semantic, morphology and syntax areas of language. The Receptive Language subtest has 25 items for semantic and 12 items for syntax/morphology, while the Expressive Language subtest has 24 items for semantic and 15 items for syntax/morphology. The test-retest reliability coefficient, interrater reliability value and internal consistency coefficient for the Receptive Language Subtest were .96, .99 and .94, respectively. The correlation between the two parallel forms of the test ranged between .64 and .96, while the correlation of the test items with the overall test score ranged between .87 and .91. Only the Receptive Language Subtest of the Test of Early Language Development - Turkish Version was used within the scope of this study.

Procedure

In the study, the family information form developed by the researchers was used to gather the demographic information of the families. The HLE used to determine home early literacy environment experiences were conveyed to the parents for the questionnaire to be filled out by the children's preschool teachers. The Turkish NWR List used to assess the phonological loop component of working memory and the TELD-T used to assess receptive language skills were administered to the study group children individually in a single session on the same day.

Data Analysis

The Shapiro-Wilk test was used to determine whether the data had a normal distribution ($p > .05$). Independent Samples T-test was conducted for the comparison of the means with respect to gender and age for the HLE subtests, the TELD-T – Receptive Language subtest standard scores and the results for the number of correctly produced phonemes in the Turkish NWR List. One-Way ANOVA for Independent Samples was performed for the comparison of the means with respect to parents' educational attainment for the HLE subtests, the TELD-T – Receptive Language subtest standard scores and the results for the number of correctly produced phonemes in the Turkish NWR List. The Pearson coefficient of correlation was used in the computation of the correlations between variables

Results

In the study carried out to determine the possible relationship of home early literacy experiences with receptive language and the phonological loop, the chronological age of the participants ranged between 48 and 66 months with an average of 60.21 (S=5.58) months. 41.7% of the participants were female children while 58.3% were male. The majority of the mothers were high school graduates (61.7%) followed by elementary school graduates (25%), university graduates (6.7%) and literates (6.7%), while the majority of the fathers were high school graduates (55%) followed by elementary school graduates (33.3%), university graduates (10%) and literates (1.7%). The study variables that had significantly different means with respect to gender were given in Table 1.

Table 1. Comparison of the Study Variables by Gender

| Gender | | Mean | S | sd | t | p |
|----------------------------------|---------------|--------|-------|----|------|------|
| HLE – Shared Book Reading | Female (n=25) | 15.24 | 4.44 | | 2.02 | .04* |
| | Male (n=35) | 12.82 | 4.61 | | | |
| TNWRL- CPPN | Female (n=25) | 190.20 | 16.68 | | 2.16 | .02* |
| | Male (n=35) | 182.85 | 12.97 | | | |

*P<.05

HLE: Home Early Literacy Environment Questionnaire (HLE; Sarıca, Ergül, Akoğlu, Deniz, Karaman, Bahap-Kudret et al., 2014); **TELD-T:** Test of Early Language Development – Turkish Version (TELD-T; Topbaş and Güven, 2011); **TNWRL-CPPN:** Turkish Nonword Repetition List (TNWRL; Akoğlu and Acarlar, 2014) – Number of Correctly Produced Phonemes

According to the table, the phonological loop performance assessed via the number of correctly produced phonemes obtained from the shared book reading experience provided in the home environment to the participants and the nonword repetition list displayed significant differences with respect to gender [t(58)=2.02, p<.05; t(58)=2.16, p<.05, respectively]. The study variables that had significantly different means with respect to age were given in Table 2.

Table 2. Comparison of the Study Variables by Age Group

| Age | | Mean | S | sd | t | p |
|---|--------------------|--------|-------|----|------|------|
| TELD-T – Receptive Language standard score | 4 years-old (n=23) | 104.65 | 12.80 | | 2.66 | .01* |
| | 5 years-old (n=37) | 96.13 | 11.56 | | | |

P<.05

According to the table, the TELD-T – Receptive Language standard scores of the participants displayed a significant difference with respect to age group [t(58)=2.66, p<.05]. The study variables that had significantly different means with respect to mother’s educational attainment were given in Table 3.

Table 3. Comparison of the Study Variables by Mother’s Educational Attainment

| | | Sum of Squares | sd | Mean Square | F | p | Post-Hoc |
|---|----------------|----------------|----|-------------|-------|-------|----------|
| HLEQ-T – Reading | Between Groups | 509.792 | 3 | 169.931 | 5.929 | .001* | H>E |
| | Within Groups | 1604.941 | 56 | 28.660 | | | |
| | Overall | 2114.733 | 59 | | | | |
| TELD-T – Receptive Language standard score | Between Groups | 1705.791 | 3 | 568.597 | 4.111 | .010* | U>E |
| | Within Groups | 7744.609 | 56 | 138.297 | | | |
| | Overall | 9450.400 | 59 | | | | |

*P<.05

The analysis results revealed a significant difference with respect to the educational attainment of the mother between the stimuli provided in the home environment to the participants to promote reading skills (HLE – Reading) and the TELD-T – Receptive Language standard scores [F(3,56)=5.92, p<.05; F(3,56)=4.11, p<.05, respectively]. The results of the Scheffe test carried out to determine which groups were significantly different showed that the HLE – Reading subtest mean score of the mothers with a high school degree was significantly higher in comparison to the mothers with an elementary school degree, and that the children of the mothers with a university degree had a greater mean in the TELD-T – Receptive Language standard score than the children of the mothers with an elementary school degree. The study variables that had significantly different means with respect to father’s educational attainment were given in Table 4.

Table 4. Comparison of the Study Variables by Father’s Educational Attainment

| | | Sum of Squares | sd | Mean Square | F | p |
|---|----------------|----------------|----|-------------|-------|-------|
| HLEQ-T – Reading | Between Groups | 580.441 | 3 | 193.480 | 7.062 | .000* |
| | Within Groups | 1534.292 | 56 | 27.398 | | |
| | Overall | 2114.733 | 59 | | | |
| TELD-T – Receptive Language standard score | Between Groups | 2420.052 | 3 | 806.684 | 6.426 | .001* |
| | Within Groups | 7030.348 | 56 | 125.542 | | |
| | Overall | 9450.400 | 59 | | | |

*P<.05

The analysis revealed a significant difference with respect to the educational attainment of the father between the stimuli provided in the home environment to the participants to promote reading skills (HLE– Reading) and

the TELD-T – Receptive Language standard scores [$F(3,56)=7.06$, $p<.05$; $F(3,56)=6.42$, $p<.05$, respectively]. The results of the correlation analysis for the study variables were presented in Table 5.

Table 5. *Correlation between Study Variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--|-------|-------|-------|-------|-------|-------|-------|-----|-----|----|
| 1.Chronological Age | - | - | - | - | - | - | - | - | - | - |
| 2. Mother’s Education | .18 | - | - | - | - | - | - | - | - | - |
| 3. Father’s Education | .43 | .35 | - | - | - | - | - | - | - | - |
| 4. HLE– Reading | -.21 | .46** | .51** | - | - | - | - | - | - | - |
| 5. HLE – Writing | .11 | -.07 | -.25 | .07 | - | - | - | - | - | - |
| 6. HLE– Phonological and Print Awareness | -.06 | .03 | .01 | .23 | .44** | - | - | - | - | - |
| 7. HLE– Shared Book Reading | -.16 | .04 | .10 | .48** | .35** | .65** | - | - | - | - |
| 8. HLE– Overall | -.11 | .16 | .15 | .64** | .62** | .79** | .84** | - | - | - |
| 9. TELD-T – Receptive Language standard score | .34** | .39** | .49** | .27* | -.11 | -.02 | .03 | .06 | - | - |
| 10. TNWRL-CPPN | .37* | .20 | .17 | .30* | .24 | .09 | .05 | .08 | .01 | - |

* $p<.05$; ** $p<.01$

The analysis yielded the following results: a moderate positive and significant relationship between the HLE– Reading Subtest and mother’s educational attainment ($r=.46$, $p<.01$), a moderate positive and significant relationship between the HLE– Reading subtest and father’s educational attainment ($r=.51$, $p<.01$), a moderate positive and significant relationship between the HLE– Phonological and Print Awareness subtest and the HLE– Writing subtest ($r=.44$, $p<.01$), a moderate positive and significant relationship between the HLE– Shared Book Reading subtest and the HLE– Reading subtest ($r=.48$, $p<.01$), a moderate positive and significant relationship between the HLE– Shared Book Reading subtest and the HLE– Writing subtest ($r=.35$, $p<.01$), a moderate positive and significant relationship between the HLE– Shared Book Reading subtest and the HLE– Phonological and Print Awareness subtest ($r=.65$, $p<.01$), a moderate positive and significant relationship between the HLE– Overall score and the HLE– Reading subtest ($r=.64$, $p<.01$), a moderate positive and significant relationship between the HLE– Overall score

and the HLE– Writing subtest ($r=.62, p<.01$), a strong positive and significant relationship between the HLE– Overall score and the HLE– Phonological and Print Awareness subtest ($r=.79, p<.01$), a strong positive and significant relationship between the HLE– Overall score and the HLE– Shared Book Reading subtest ($r=.84, p<.01$), a moderate positive and significant relationship between the TELD-T – Receptive Language standard score and chronological age ($r=.34, p<.01$), a moderate positive and significant relationship between the TNWRL-CPPN and chronological age ($r=.37, p<.01$), a weak positive and significant relationship between the TNWRL-CPPN and the HLEQ-T – Reading subtest ($r=.30, p<.01$).

Discussion and Conclusion

The present study was aimed at determining the relationship between home literacy experiences, receptive language skills and the phonological loop in children aged 48-66 months. The study results revealed that shared book reading experiences carried out at home and the number of correctly produced phonemes displayed a significant difference between female and male children. Girls had a greater amount of shared book reading experiences and scored higher than boys in the number of correctly produced phonemes. In addition, there was a statistically significant difference in the TELD-T – Receptive Language standard scores between age groups. Similarly, there was a significant difference with respect to the mother’s educational attainment in the HLE– Reading subtest and TELD-T – Receptive Language standard scores. The analyses showed that the mothers with a high school degree scored significantly higher than those with an elementary school degree in the HLE– Reading subtest. Similarly, the children of the mothers with a university degree had higher mean scores than the children of the mothers with an elementary school degree with respect to the TELD-T – Receptive Language standard score. The parallel results for the father’s educational attainment led the researchers to think that the educational attainment of the parents had an impact on receptive language skills. Furthermore, the fact that the educational attainment of the parents was a determinant for the HLE – Reading subscale indicated that, in addition to the increase in quantity, the stimuli that promote reading also differentiated in quality with an increase in the educational attainment of the parents. The moderate positive and significant relationship between the educational attainment of the parents and the HLE– Reading subtest supports this finding. Similar to our study results, there are studies in the literature that demonstrate the association between the educational attainment of the parents and home literacy experiences (Aram, Korat and Arafat, 2013; Wilsenbach, 2015).

Investigation of the relationship between nonword repetition (i.e. the phonological loop), receptive language and the HLE subtests that constitute the fundamental inquiry of this study revealed a moderate positive and significant relationship between the HLE– Reading subtest and CPPN, but no statistical

relationship between the other subtests of the HLE and CPPN. Therefore, it is possible to suggest the existence of a relationship between the phonological loop and home environment characteristics and experiences that promote reading skills. The phonological loop performance, which greatly contributes to the acquisition of new skills such as language comprehension and learning new vocabulary, increases with the quality of the environmental characteristics that promote reading skills. In addition, various studies in the literature claim that, according to the multicomponent model of working memory, different components of working memory might be related to different components of early literacy skills. These studies report an association between the visuospatial sketchpad and reading, writing and vocabulary knowledge (Oakhill, Yuill and Garnham, 2011; Bourke, Devies, Sumner and Green, 2014). However, in the present study, the researchers have investigated solely the relationship of the phonological loop, home literacy experiences and receptive language. In this context, the researchers believe that the results would differ in a more comprehensive study evaluating the other components of working memory as well.

Although the researchers expected a similar increase in the children's receptive language skills with the stimuli provided in the home environment to promote reading, in other words, a significant relationship of receptive language standard scores with home literacy experiences and CPPN, the study revealed no such findings. However, there are studies that have reported a positive relationship of the phonological loop with receptive language skills, vocabulary, and sentence and story comprehension, in the literature (Montgomery, Magimairaj, and, Finney, 2010; Weighall and Altman, 2011). In this context, the number of participants in the present study poses a significant limitation, and a study conducted with a greater number of participants could yield more valid results. Investigation of the association between chronological age and the other study variables showed that receptive language standard score and CPPN was related to chronological age. In the literature, there are other studies with similar results reporting that nonword repetition assessments were sensitive to chronological age (Akoğlu and Acarlar, 2014).

When the results of the study aimed at determining the possible relationship between home early literacy experiences, receptive language skills and the phonological loop in children aged 48-66 months are discussed as a whole, the educational attainment of the mother and the gender and age of the participants were effective on the participants' performance in these skills. However, assessments should be conducted with a larger participant group for a more clear demonstration of the relationship between the variables. Furthermore, in addition to the research aiming to identify performance differences between sequential age groups, conducting studies to determine the relationships between these variables based on the changes characteristic to age groups in terms of the development of receptive language skills and working memory would greatly contribute to the literature.

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