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Original Article

Investigation of the relationship between language skills and behavioral problems in children assessed for language and speech delay

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ABSTRACT

Objective: Delays in language and speech skills can profoundly affect various developmental domains and emotional regulation processes. This study aimed to investigate the relationship between receptive and expressive language skills and behavioral problems in preschool-aged children assessed for language and speech delay.

Material and Methods: The study included 2- to 4-year-old children referred to the Developmental Pediatrics Clinic of Ankara Bilkent City Hospital for language and speech delay, undergoing thorough physical and developmental assessments. The receptive and expressive language development of the children was evaluated using the Test of Early Language Development-Third Edition: Turkish Version. To assess behavioral problems, parents completed the Strengths and Difficulties Questionnaire for 2-4 Year Olds (SDQ 2-4).

Results: The study included 58 children with a mean age of 32.48 ±5.69 months. Notably, 56.9% exhibited total difficulty scores on the SDQ 2-4 that surpassed the cutoff, with an average score of 11.06 ±5.53. The children's receptive language scores showed a negative correlation with conduct issues, hyperactivity/inattention, difficulties in peer relationships, and overall difficulty scores (p=0.017, p=0.029, p=0.007, p=0.004, respectively), while no significant associations were found between their expressive language abilities and behavioral problems. Children with typical language skills had a total difficulty score of 7.90 ±2.84, whereas those with expressive delays scored 11.06 ±5.55 and those with both receptive and expressive delays scored 13.40 ±6.06, indicating significant group differences (p=0.043).

Conclusion: Preschool-aged children with language and speech delay are frequently seen by primary care providers and pediatric specialists. They often present with behavioral issues, particularly among those from low socioeconomic and sociocultural backgrounds. It can be suggested that addressing behavioral problems alongside language interventions may help mitigate potential long-term effects.

Keywords: Behavioral problem, children, language and speech delay

INTRODUCTION

The process of language acquisition represents a critical milestone, establishing a foundational basis for a range of subsequent developmental achievements. Early language skills exert a substantial influence on lifelong developmental outcomes by contributing to the development of cognitive, social-emotional, and academic competencies (1, 2). Language comprises two components: receptive language, which involves understanding others' language outputs both auditorily and visually, and expressive language, which refers to the ability to convey information, ideas, feelings, and thoughts through the use of words and gestures. Speech is the vocalized form of the language system (3).

Speech and language development delays are the most frequent developmental causes for hospital visits among preschool-aged children. Parents may be more attuned to communication and language problems due to the constraints children experience in their daily functioning. Between 13.4% and 19.1% of toddlers present with delays in language development (4).

Research demonstrates a negative association between preschool behavior problems and language skills, observed both concurrently and longitudinally (1). This relationship is primarily elucidated through the critical role of language in self-

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regulation and emotional regulation processes. Language and speech delay may adversely affect children's ability to utilize language for the purpose of emotional regulation. Skills related to emotion regulation have been linked to both internalizing and externalizing behaviors among young children (5, 6). A recent meta-analysis demonstrated a moderate distinction in problem behavior ratings between children with language disorders and their typically developing counterparts (4). A multitude of studies have explored the intricate relationships between language skills and both internalizing and externalizing problems during childhood (1, 7). Despite the substantial body of literature on this topic, significant methodological heterogeneity exists among studies, attributable to the diverse assessment and measurement techniques employed for language skills and behavioral issues (1, 4).

Although studies from Türkiye indicate that children with language and speech delay show a higher prevalence of behavioral problems, there remains a lack of research specifically focusing on the link between expressive and receptive language skills and behavioral issues (8-10). Consequently, this study sought to assess children presenting with language and speech delay within this context. It further aimed to explore the relationship between receptive and expressive language skills and behavioral problems, as well as to identify the variables that affect both language competencies and behavioral issues.

MATERIALS and METHODS

Ankara Bilkent City Hospital is one of the largest pediatric institutions in Europe, serving a highly diverse patient population thanks to its strategic central location. The Developmental Pediatrics Clinic at Ankara Bilkent City Hospital offers thorough evaluation, intervention, and ongoing monitoring for children at risk for or exhibiting developmental delays, adhering to a family-centered approach in its care strategies.

Between March and June 2024, children who were evaluated at the Developmental Pediatrics Clinic and referred for language and speech delay between the ages of 2 and 4 years were included in the study. Comprehensive clinical evaluations and observations were conducted by specialists in developmental pediatrics. The study excluded children presenting with global developmental delay, severe cognitive impairment, neurodevelopmental disorders, or genetic syndromes. None of the patients were receiving specialized education in any developmental domain, and this marked their first visit to the clinic. The family sociodemographic characteristics of 58 children who met all these criteria, as well as their daily screen time, background screen exposure, and reading frequency, were collected through questionnaires administered to their parents. The Hollingshead-Redlich Scale was used to determine the socioeconomic and sociocultural levels of families. This scale is based on the educational and occupational status of the parents.

Parents completed the Strengths and Difficulties Questionnaire (SDQ) to evaluate their children's behavioral issues. Each child underwent the Test of Early Language Development-Third Edition: Turkish Version (TEDIL), a comprehensive assessment of receptive and expressive language skills, administered by a qualified speech-language therapist.

Test of Early Language Development-Third Edition: Turkish Version (TEDIL)

Language development was evaluated using the TEDIL, the Turkish version of the Test of Early Language Development (TELD-3), which was developed by Hresko et al. (11) in 1999. The TEDIL is a widely utilized language assessment tool for children aged 0 to 7 years, designed to evaluate receptive and expressive language skills. The test was adapted to our cultural context by Güven and Topbaş, and it has been established as a valid and reliable language assessment tool (12). The TEDIL provides norm-referenced scores, including standard scores, percentiles, and age-equivalent values, for receptive and expressive language skills. Standard scores ranging from 90 to 110 are accepted as within the average range. Based on the composite score results obtained from the assessment, the level of language development is classified as very poor; weak/poor; below average; average; above average; good; and very good.

Strengths and Difficulties Questionnaire for 2–4 Year Olds (SDQ 2–4). The Strengths and Difficulties Questionnaire, developed by British psychiatrist Robert Goodman in 1997, serves as a screening tool for childhood psychopathologies. The SDQ is characterized by its ease of application and widespread use globally. It comprises 25 items that assess both positive and negative behavioral characteristics and is organized into five subcategories: emotional symptoms, hyperactivity/inattention, conduct problems, peer relationship difficulties, and prosocial behavior. The 'Total Difficulty Score' is derived by summing the scores from the first four categories (13). A reliability-validity study and psychometric evaluations of the SDQ for children aged 2–4 years were conducted by Dursun and colleagues. They established a cut-off value of 10 for the Total Difficulties Scale, which demonstrated 80% sensitivity and 88% specificity (14).

Statistical analysis

Statistical analyses were conducted using IBM Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Armonk, NY, IBM Corp., USA). The normality of continuous variables was assessed using the Shapiro–Wilk test, histograms, and boxplots. Numerical variables were summarized as means, standard deviations (SD), and/or medians (min-max), while categorical variables were reported as frequencies and percentages. Differences between groups in continuous variables were assessed using either an independent samples t-test or a Mann-Whitney U test, as appropriate. The Pearson chi-square test was employed to evaluate differences among

categorical variables. The relationships among continuous variables were assessed using both bivariate Pearson and Spearman correlation coefficients. To compare more than two independent groups, the Kruskal–Wallis test was used as a nonparametric method. Furthermore, a meta-analysis in the literature indicated a moderate effect size (g=0.43; 95% confidence interval:0.34 to 0.53; p<0.001) in the ratings of problem behaviors between children with language disorders and their typically developing peers. Assuming that the receptive or expressive language skills of children with language delays have a moderate effect size (0.40) on the total difficulties scale scores of the SDQ 2–4, a sample size of 58 was calculated, achieving 95% power with a 5% type I error rate. A p-value of less than 0.050 was regarded as statistically significant.

RESULTS

The study involved 58 children with an average age of 32.48 ±5.69 months, of which 63.8% were male. Among the participants, 12% had a history of prematurity. Additionally, 43% of the mothers and 67% of the fathers had an education level below high school (Table I). The average daily screen time for the children was 2.19±2.20 hours, with 44.83% adhering to the guidelines set by the American Academy of Pediatrics regarding screen time (Table II).

The participants' average receptive language scores were 95.51 ±11.45, whereas their average expressive language scores were 82.05±11.45. Table II presents a detailed classification of receptive and expressive language skills. Among the children referred for language and speech delay, 11 (19%) demonstrated typical development in both receptive and expressive language. In contrast, 32 (55.2%) exhibited delays in both receptive and expressive language development, while 15 (25.9%) had delays solely in expressive language. Notably, no children were identified with impaired receptive language skills alongside normal expressive language capabilities. Furthermore, 56.90% of the children had total difficulty scores on the SDQ 2-4 that surpassed the established cutoff value, with an average score of 11.06±5.53.

The relationships between sociodemographic variables, language abilities, and behavioral problems were thoroughly investigated. Specifically, children of mothers with a high school education or higher exhibit significantly higher receptive and expressive language scores than those whose mothers possess less than a high school education (receptive language: 99.2±11.9 vs. 90.6±8.9, p=0.002; expressive language: 85.6 ±11.9 vs. 77.3±9.0, p=0.004). Likewise, children of fathers with higher educational attainment had significantly higher receptive and expressive language scores than those with less educated fathers (receptive language: 100.4±13.1 vs. 93.1±9.9, p=0.041; expressive language: 86.8±9.9 vs. 79.7±11.6, p=0.019). Total difficulty scores on the SDQ 2-4 were significantly higher in children of mothers with less than a high school education compared to those of mothers with education above high school (13 [6–25] vs. 9 [1–23], p = 0.030). No significant difference was found between fathers' education levels and children's total difficulty scores (10 [1–25] vs. 10 [3–18], p=0.584). The socioeconomic and sociocultural level of families, as determined by the Hollingshead-Redlich Scale, demonstrated a negative correlation with receptive and expressive language skills (receptive language: r =–0.359, p = 0.002; expressive language: r=–0.292, p=0.009), while no significant association was observed with behavioral problems (r=0.235, p=0.076). Daily screen time among children exhibited a significant negative correlation with both receptive and expressive language scores (receptive language: r=–0.332, p=0.011; expressive language: r=–0.334, p=0.010), whereas increased screen time was associated with a notable rise in hyperactivity and inattention problems (receptive language: r =–0.332, p=0.011; expressive language: r=–0.334, p=0.010) (r=0.326, p=0.013). An increase in the frequency of daily

Table I: Sociodemographic characteristics of the children with language delay

Variable	Values
Age (months)*	32.48±5.69
Sex (male)†	37 (63.8)
Gestational age‡	38 (31-42)
<37 weeks †	7 (12.06)
Birth weight (grams)‡	3200 (1220-4200)
Maternal age*	31.48±5.69
Maternal education level †	
Illiterate/unschooled	0
Primary school	11 (18.96)
High school	14 (24.13)
University	33 (56.90)
Employed mothers †	13 (22.41)
No maternal chronic disease †	48 (82.76)
Paternal age*	35.20±6.37
Paternal education level †	
Illiterate/unschooled	0
Primary school	13 (22.41)
High school	26 (44.83)
University	19 (32.76)
Employed fathers †	58 (100)
No paternal chronic disease †	51 (87.93)
Child's birth order‡	2 (1-4)
Number of members in the family‡	4 (3-7)
Number of siblings‡	2 (1-4)
Hollingshead-Redlich Scale †	
I	0
II	15 (25.86)
III	19 (32.76)
IV	24 (41.38)
V	0

**: mean±SD, †: n(%), ‡: median (min-max)*

Table II: Communicative environmental factors, TEDIL scores, and behavioral problem scores in children with language delay

Variable	Values
Screen time (hours)*	2.19 ±2.20
Meeting screen time guidelines†	26 (44.83)
Background television exposure (hour)*	3.75±4.04
Daily reading to child (week/day)‡	3 (0-7)
Preschool attendance (yes)†	8 (13.80)
Having a family member with language delay (yes)†	13 (22.41)
TEDIL scores/Receptive language†	
Very good	0 (0)
Good	2 (3.45)
Above average	4 (6.90)
Average	37 (63.80)
Below average	13 (22.41)
Weak/poor	1 (1.72)
Very poor	1 (1.72)
TEDIL scores/Expressive language†	
Very good	0 (0)
Good	0 (0)
Above average	1 (1.72)
Average	10 (17.24)
Below average	24 (41.38)
Weak/poor	14 (24.14)
Very poor	9 (15.52)
SDQ/Total difficulties score*	11.06±5.53
<10†	25 (43.10)
≥10†	33 (56.90)

***:** *mean ± SD,* **†:** *n(%),* **‡:** *median (min-max),* ***TEDIL:** Test of Early Language Development-Third Edition: Turkish Version,* ***SDQ:** Strengths and Difficulties Questionnaire*

reading to children was associated with a significant reduction in all behavioral problems, including emotional symptoms, hyperactivity/inattention, conduct problems, peer relationship difficulties, and total difficulty scores (r=–0.266, p=0.043; r=–0.421, p=0.001; r=–0.348, p=0.007; r =–0.348, p=0.007; r =–0.502, p < 0.001; respectively). The frequency of book reading did not demonstrate a significant relationship with language skills.

The children's receptive language scores were negatively correlated with conduct problems, hyperactivity/inattention, peer relationship difficulties, and total difficulty scores (r=–0.313, p=0.017; r=–0.287, p=0.029; r=–0.350, p=0.007; r=–0.373, p=0.004; respectively), while no significant relationships were observed between their expressive language skills and behavioral problems. On the other hand, children with typical language skills had a total difficulty score of 7.90±2.84 on the SDQ 2-4, while those with only expressive language delays scored 11.06±5.55, and those with both receptive and expressive delays scored 13.40±6.06, revealing a statistically significant difference among the groups (p=0.043). Moreover, the findings indicated that within these three groups, the proportions of children with total difficulty scores exceeding 10 on the SDQ were 27.7%, 59.38%, and 73.33%, respectively. The pairwise comparison results indicated a statistically significant difference between children with typical language skills and those with both receptive and expressive language delays (p=0.013). It is notable that the total difficulty scores for children with expressive language delays exceeded the set cutoff values, even though the difference in behavioral problems between those with isolated expressive language delays and those with typical language development did not reach statistical significance (p=0.074).

DISCUSSION

Research indicates that children with diminished receptive language competencies may encounter significant challenges in comprehending communication during social interactions. This impairment can lead to a decline in positive peer engagement and may precipitate behavioral issues, including social withdrawal or disruptive conduct (15, 16). Expressive language is crucial for positive interactions and frequent exchanges about needs, desires, and emotions. Deficits in this skills can significantly increase the risk of internalizing behavioral problems, such as social withdrawal (1, 15). Alternatively, when poorer language skills hinder the use of verbal strategies for communication, they may potentially result in maladaptive behavioral expressions, such as temper tantrums and aggressive behaviors (6, 17).

While most studies link language and speech difficulties to behavioral issues, one study presented contrasting findings. After controlling for cognitive abilities, it reported that language delays did not predict behavioral problems, either concurrently or longitudinally (18). In our study, a negative correlation was observed between children's receptive language skills and conduct problems, hyperactivity/inattention, peer relationship difficulties, and overall difficulty scores. In contrast, expressive language skills did not exhibit significant correlations with behavioral issues. The observed relationships with receptive language skills align with and reinforce the findings established in the existing literature (1, 2). In contrast, the finding that 59.38% of children with only expressive language delays and 73.33% of those with both receptive and expressive delays exceeded the SDQ cutoff for total difficulty scores indicates that expressive language delays may indeed present a substantial risk for behavioral problems. The absence of a significant correlation may be attributed to the limited sample size or implies that behavioral problems might manifest independently of the severity of expressive language delays.

Language and speech delay during early childhood often represent critical concerns for families. A study investigating the diagnostic processes for children with speech delays revealed that 19% of the participants demonstrated typical language

development, indicating a prevalence rate comparable to that found in our research (19). It is well established that low parental education and low socioeconomic status serve as potential risk factors for children's language development as well as for their overall developmental outcomes (20, 21). Mothers with higher educational attainment are more likely to facilitate their children's engagement with enriching learning experiences and to furnish a diverse array of educational resources at home, thereby significantly advancing their developmental outcome. An investigation into the factors influencing child development in low- to middle-income countries identified a notable association between the educational levels of both mothers and fathers and the language proficiency scores of their children (22). Poverty and socioeconomic adversity negatively impact children's physiological systems and brain development while also influencing their overall development through maternal sensitivity and the learning opportunities that parents create in home and social contexts (2, 22). Our research underscores the existing literature by elucidating the relationship between parental education, family socioeconomic status, and their significant influence on children's receptive and expressive language competencies.

Research suggests that excessive screen time during early childhood is associated with detrimental effects on children's receptive and expressive language skills, as well as their academic competencies in subsequent developmental stages (23). In this study, aligning with existing literature, we found that screen time was negatively associated with both receptive and expressive language skills. It is posited that this condition arises from both diminished parent-child interactions during television viewing and compromised family functioning in households marked by elevated media usage (24). Screen time is associated with poor mental health outcomes by displacing essential activities such as physical exercise, sleep, social interactions, and learning opportunities while simultaneously increasing arousal levels due to fast-paced and intense audiovisual effects, which may hinder self-regulation strategies and elevate the risk of behavioral issues (25). The finding that screen time is linked to hyperactivity and inattention problems in children aligns with the literature emphasizing a stronger connection between language delays and externalizing issues (26). A further notable finding is that children with speech delays had an average daily screen time of 2.19 hours (±2.20), with only 44.83% of the participants complying with the screen time guidelines established by the American Academy of Pediatrics (24).

Notwithstanding the extensive exploration of the relationships between language skills and behavioral problems in the literature, the methodological heterogeneity among studies highlights the continued necessity for further research in this domain. The majority of studies have focused on children with developmental language disorders or typically developing children. Families frequently voice concerns regarding their children's language and speech development; thus, our study's examination of children with language and speech delay, alongside those with typical language development, provides a distinctive and comprehensive perspective on this critical issue. A key strength of this study lies in its thorough examination of children presenting with language and speech delay complaints from a developmental pediatrics perspective, supported by comprehensive developmental assessments. The exclusion of children with neurodevelopmental disorders or significant cognitive delays, accomplished through the use of current developmental assessment tools, has effectively mitigated potential confounding factors. Furthermore, we posit that our study contributes to the literature as it represents one of the first investigations on this topic conducted in a developing country such as Turkiye.

Limitations

The limitations of our study are primarily related to the small sample size and its cross-sectional design. This limitation constrained the depth of data analysis and limits to generalisability of our findings. Future studies with a larger sample size and longitudinal design would facilitate a more comprehensive examination of the behavioral issues associated with children experiencing speech delays.

CONCLUSION

Preschool-aged children with language and speech delay represent a patient demographic that primary care providers, as well as pediatricians and pediatric subspecialists, often encounter in clinical practice. Children with delays in language and speech development frequently accompany behavioral issues, and it is particularly noteworthy that those from families with low socioeconomic and sociocultural backgrounds are at heightened risk. To potentially reduce the risk of long-term behavioral challenges that may extend into adulthood, it is important to address behavioral problems alongside language interventions.

Ethics committee approval

This study approved by Ankara Bilkent City Hospital Ethics Committee (date: 29.05.2024, number: TABED 2-24-192).

Contribution of the authors

Study conception and design: ***EÖ, F.A., G.H.T., A.M.Y., G.Ş., P.Ç***; Data collection: ***F.A., G.H.T., A.M.Y., G.Ş***; Analysis and interpretation of results: ***EÖ, P.Ç***; Draft manuscript preparation: ***EÖ, P.Ç***. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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