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Persistence of Speech and Language Concerns in Preschool Children: Clinical Characteristics and Follow-up Outcomes

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ABSTRACT

Background

Speech and language concerns are common reasons for referral to developmental pediatrics services. This study aimed to characterize children referred for speech and language concerns and identify baseline clinical factors associated with persistence of parent-reported concerns at follow-up.

Methods

This retrospective cohort study included 301 children aged 24–87 months evaluated at a tertiary developmental pediatrics clinic. Baseline demographic and clinical characteristics were obtained from medical records. Follow-up information regarding persistence of speech and language concerns and intervention use was collected through structured telephone interviews with caregivers. Group comparisons were performed using appropriate statistical tests, and multivariable logistic regression was used to examine factors associated with persistent concerns.

Results

The mean age was 39.1 ± 13.5 months, and 68.4% were boys. Expressive language delay was identified in 84.4%, receptive language delay in 51.8%, and suspected autism spectrum disorder in 18.6%. Follow-up data were available for 242 children (80.4%), of whom 108 (44.6%) had persistent parent-reported concerns. Among children receiving intervention, 65.1% of caregivers reported significant perceived benefit. Suspected autism spectrum disorder at baseline was associated with persistence (adjusted odds ratio, 2.66; 95% confidence interval, 1.28–5.49; $p = 0.008$), although the overall regression model was not statistically significant ($p = 0.077$; Nagelkerke $R^2 = 0.061$).

Conclusions

Nearly half of children with available follow-up data had persistent parent-reported speech and language concerns. The association with suspected autism spectrum disorder highlights the potential importance of comprehensive developmental assessment and individualized follow-up planning.

Keywords: Speech delay; Language delay; Autism spectrum disorder; Developmental pediatrics; Follow-up

1. INTRODUCTION

Speech and language difficulties are among the most common developmental concerns in early childhood and represent an important reason for referral to pediatric and developmental services. These difficulties encompass heterogeneous conditions affecting expressive and receptive language, speech sound production, or multiple communication domains (1,2). Early language development plays a central role in social interaction, learning, and subsequent academic achievement, making timely identification and appropriate developmental assessment essential components of pediatric care (3,4).

Speech and language development is influenced by a complex interaction of biological, familial, and environmental factors (5-7). Previous studies have identified several characteristics associated with early language difficulties, including family history, developmental characteristics, and aspects of the home communication environment (7-9). Although some children show substantial improvement over time, others experience persistent communication difficulties that may affect later educational and psychosocial functioning (8,10,11). Distinguishing between these developmental trajectories remains a challenge in clinical practice.

Importantly, speech and language concerns may occur in isolation or alongside broader neurodevelopmental difficulties, including autism spectrum disorder (ASD) (1,12). Accordingly, assessment should extend beyond the identification of language delay to consider the child's overall developmental profile, social communication, and functional needs (4,13). This distinction may be particularly relevant when planning follow-up and determining the need for multidisciplinary services.

Although previous studies have extensively investigated the prevalence and associated factors of early speech and language delay, understanding the clinical course of children following referral for specialist developmental assessment remains important. Identifying baseline clinical characteristics associated with persistent concerns may provide clinically relevant information for comprehensive developmental assessment, individualized follow-up planning,

and timely referral to appropriate intervention services. However, such associations should not be interpreted as establishing individual prognosis.

Therefore, the primary objective of this study was to examine baseline clinical factors associated with the persistence of parent-reported speech and language concerns among children evaluated in a developmental pediatrics clinic. Secondary objectives were to describe the clinical characteristics of the referred population, follow-up outcomes, intervention service use, and caregivers' perceptions of intervention benefit.

2. METHODS

2.1. Study Design and Participants

This retrospective cohort study included children aged 24–87 months who were referred to a tertiary developmental pediatrics clinic because of speech and language concerns between August 2024 and January 2026**.** Speech and language concerns included speech delay, delayed sentence formation, unintelligible speech, and speech sound disorders.

Children with a previous diagnosis of speech or language delay who had already received intervention before referral to our clinic were excluded. Patients with chronic genetic, neurological, or metabolic disorders known to affect neurodevelopment were also excluded.

Demographic characteristics and clinical data were retrospectively retrieved from the hospital information system. Recorded variables included age, sex, parental sociodemographic characteristics, developmental assessment findings, language assessment results, speech sound assessment findings, referrals for special education services, and applications for the Special Needs Report for Children (ÇÖZGER)**.**

Following the initial evaluation, families were subsequently contacted by telephone by a pediatric resident using a structured questionnaire, regardless of whether the child had attended follow-up visits during the study period. Information was collected regarding the persistence of presenting speech and language concerns, current participation in intervention programs, weekly frequency of intervention sessions, ÇÖZGER status, privately funded rehabilitation services, and parent-reported benefit from the interventions received.

Child sex was recorded as male or female in the medical records and was examined in relation to follow-up outcomes. Gender identity was not assessed because this information was not routinely collected.

2.2. Clinical Assessment

All children underwent a comprehensive developmental evaluation by a developmental pediatrician. Developmental functioning across multiple domains was assessed using age-appropriate standardized developmental assessment tools routinely employed in our clinic.

Receptive and expressive language abilities were subsequently evaluated by an experienced speech-language therapist using the Turkish Early Language Development Test (TEDIL). Children with suspected speech sound disorders additionally underwent articulation assessment using the Ankara Articulation and Phonology Test (SST). Based on the multidisciplinary evaluation, children requiring intervention were referred to appropriate rehabilitation services, including speech-language therapy, special education, and occupational therapy, when clinically indicated.

2.3. Follow-up Assessment

Following the retrospective review of medical records, families were contacted by telephone by a pediatric resident using a structured questionnaire. Because participants entered the cohort over an 18-month recruitment period, the interval between the initial outpatient evaluation and the follow-up interview varied among participants.

Information obtained during the follow-up interview included the persistence of the presenting speech and language concerns, current participation in intervention programs (including speech-language therapy, special education, occupational therapy, and other supportive services), the weekly frequency of intervention sessions, ÇÖZGER status, and whether additional rehabilitation services were obtained through private funding.

Parents were also asked to rate the perceived benefit of the interventions using a three-point ordinal scale **(**0 = no benefit, 1 = some benefit, and 2 = significant benefit**).**

2.4. Assessment Tools

2.4.1. Turkish Early Language Development Test (TEDIL)

Receptive and expressive language abilities were evaluated using the Turkish Early Language Development Test (TEDIL)**,** the Turkish adaptation of the Test of Early Language Development–Third Edition (TELD-3)**.** TEDIL is a standardized, norm-referenced language assessment for children aged 2 years 0 months to 7 years 11 months that evaluates receptive and expressive language abilities through separate subtests. The Turkish version has demonstrated satisfactory validity and reliability .

2.4.2. Ankara Articulation and Phonology Test (SST)

Children with suspected speech sound disorders underwent articulation assessment using the Ankara Articulation and Phonology Test (SST). SST is a standardized, norm-referenced Turkish assessment for children aged 2–8 years that evaluates articulation and phonological abilities, and supports the screening, differential diagnosis, and characterization of articulation and phonological disorders. The Turkish version has demonstrated satisfactory validity and reliability .

Ethical Approval

The study was approved by the Eskişehir City Hospital Scientific Research Ethics Committee (approval no. ESH/BAEK 2026/320; March 5, 2026) and was conducted in accordance with the principles of the Declaration of Helsinki.

Verbal informed consent was obtained from parents or legal guardians before the telephone interviews.

Clinical trial number: not applicable.

2.5. STATISTICAL ANALYSIS

Statistical analyses were performed using JASP software (Version 0.19.3; JASP Team, Amsterdam, The Netherlands). Continuous variables were assessed for normality using the Shapiro–Wilk test and visual inspection of histograms and Q–Q plots. Normally distributed variables are presented as mean ± standard deviation (SD), whereas non-normally distributed variables are presented as median and interquartile range (IQR). Categorical variables are presented as frequencies and percentages.

Comparisons between children with persistent and resolved speech and language concerns at follow-up were performed using the Mann–Whitney U test for continuous variables and the Pearson chi-square test (or Fisher's exact test, when appropriate) for categorical variables.

Variables considered clinically relevant or showing an association with follow-up outcome in the univariable analyses were entered into a multivariable binary logistic regression model to identify independent factors associated with persistent speech and language concerns. The model included child age, expressive language delay, receptive language delay, suspected autism spectrum disorder, bilingual exposure, and family history of speech and language disorders**.** Multicollinearity was assessed using variance inflation factors (VIFs)**,** and no evidence of problematic multicollinearity was observed (all VIFs < 2). Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were reported. All statistical tests were two-sided, and a p value < 0.05 was considered statistically significant.

3. RESULTS

3.1. Baseline demographic and clinical characteristics

A total of 301 children were included in the study. The mean age was 39.1 ± 13.6 months, and boys comprised 68.4% of the study population. More than half of the children were first-born (52.5%), while 44.5% belonged to two-child families. Bilingual exposure was identified in 5.6% of participants. The mean maternal and paternal ages were 32.3 ± 6.1 and 35.7 ± 6.3 years, respectively. Maternal employment was reported in 11.6% of families, whereas almost all

fathers were employed (99.7%). The baseline demographic and family characteristics of the participants are summarized in Table 1.

At the initial developmental assessment, expressive language delay was identified in 254 children (84.4%), while receptive language delay was present in 156 (51.8%). Speech sound disorder was identified in 51 children (16.9%). Autism spectrum disorder was suspected in 56 children (18.6%), and a positive family history of speech and/or language disorders was reported in 142 children (47.2%). Following multidisciplinary assessment, special education was recommended for 194 children (64.5%) (Table 2).

3.2. Follow-up outcomes

Follow-up information was successfully obtained for 242 of the 301 children (80.4%). At the follow-up, presenting speech and language concerns had resolved in 134 children (55.4%), whereas 108 (44.6%) continued to have persistent concerns. A ÇÖZGER report had been obtained for 52 children (21.5%), and 57 (23.6%) were receiving privately funded rehabilitation services. Among children with available information on intervention frequency (n = 241), 133 (55.2%) were not receiving intervention, 33 (13.7%) attended one or fewer sessions per week, and 75 (31.1%) attended two or more sessions per week. Among children receiving intervention (n = 109), most parents reported a significant perceived benefit (71/109, 65.1%), whereas 31 (28.4%) reported some benefit and only 7 (6.4%) reported no benefit (Table 3).

3.3. Factors associated with persistent speech and language concerns

Baseline characteristics according to the persistence of speech and language concerns at follow-up are presented in Table 4. Children with persistent concerns were more likely to have suspected autism spectrum disorder at the initial evaluation than those whose concerns had resolved (25.9% vs. 13.4%, $p = .014$). No significant differences were observed between the two groups regarding child age, sex, expressive or receptive language delay, speech sound disorder, bilingual exposure, family history of speech and language disorders, or daily screen time (all $p > .05$).

3.4. Multivariable analysis

A multivariable logistic regression analysis was performed to identify factors associated with persistent speech and language concerns at follow-up. Child age, expressive language delay, receptive language delay, suspected autism spectrum disorder (ASD), bilingual exposure, and family history of speech and language disorders were entered into the model. Within the multivariable model, suspected ASD was the only variable significantly associated with persistence (adjusted OR = 2.66, 95% CI: 1.28–5.49, $p = .008$). Child age, expressive language delay, receptive language delay, bilingual exposure, and family history were not significantly

associated with persistent concerns (all $p > .05$). The overall model did not reach statistical significance ($\chi^2(6) = 11.38$, $p = .077$; Nagelkerke $R^2 = .061$) (Table 5).

4.DISCUSSION

This retrospective cohort study examined the clinical characteristics and follow-up outcomes of children referred to a developmental pediatrics clinic for speech and language concerns. Follow-up information was obtained for 80.4% of the original cohort, and 44.6% of children with available follow-up data continued to have parent-reported concerns. Although expressive and receptive language delays were common at baseline, suspected autism spectrum disorder (ASD) was the only variable significantly associated with persistence in the adjusted analysis. However, the overall regression model did not reach statistical significance and explained only a small proportion of outcome variability. These findings highlight the heterogeneity of speech and language concerns in early childhood and the challenges of identifying children likely to experience persistent difficulties.

Previous studies have identified several demographic, familial, and environmental factors associated with the occurrence of speech and language delay, including male sex, family history, parental educational characteristics, and screen exposure (8,9,11,16-20). However, factors associated with the initial presentation of language difficulties may not necessarily show the same associations with their persistence following specialist developmental assessment. Our study provides follow-up information from a clinical population in which children underwent multidisciplinary developmental evaluation, allowing baseline characteristics to be examined in relation to subsequent parent-reported concerns.

The most notable finding was the association between suspected ASD at baseline and persistent speech and language concerns at follow-up. Children with persistent concerns were more likely to have suspected ASD at the initial assessment than those whose concerns had resolved (25.9% vs. 13.4%, $p = 0.014$). This association remained statistically significant after adjustment for selected baseline characteristics (adjusted OR = 2.66, 95% CI: 1.28–5.49, $p = 0.008$). Speech and language difficulties are common presenting concerns among children with ASD and may coexist with differences in social communication, joint attention, and reciprocal interaction, which are relevant to subsequent communication development (21-23). These broader developmental characteristics may help explain the observed association. Nevertheless, suspected ASD was a clinical finding rather than a confirmed diagnosis, and the overall regression model was not statistically significant ($p = 0.077$; Nagelkerke $R^2 = 0.061$). Therefore, this association should be interpreted cautiously and should not be regarded as evidence of reliable individual prediction.

Interestingly, expressive language delay, receptive language delay, and speech sound disorder were not significantly associated with persistent concerns in the univariable comparisons. Expressive and receptive language delays also remained nonsignificant in the adjusted analysis. One possible explanation is that children presenting with speech and language concerns represent heterogeneous developmental profiles, ranging from difficulties primarily affecting language to broader neurodevelopmental concerns. However, our study was not designed to distinguish these developmental trajectories through repeated standardized assessments. Furthermore, baseline language difficulties were evaluated as categorical characteristics rather than longitudinal measures of language severity. Accordingly, the absence of statistically significant associations should not be interpreted as evidence that the nature or severity of language impairment lacks prognostic importance. Previous longitudinal studies have demonstrated that persistent language difficulties may be associated with later educational and psychosocial challenges (10,11,24).

Previous studies have also examined bilingual exposure and family history in relation to speech and language difficulties (20,25). In the present study, neither bilingual exposure nor a positive family history of speech and language disorders was significantly associated with persistence in the adjusted analysis. However, the relatively small number of children with bilingual exposure limits the interpretation of this finding. Importantly, bilingual exposure itself should not be considered a cause of language impairment, and previous evidence indicates that maintaining the home language does not adversely affect language development in children with developmental disorders . Our results therefore support interpreting linguistic and familial characteristics within the broader developmental context rather than using them in isolation to estimate outcomes.

Although excessive screen exposure has been associated with early language difficulties in previous studies (17-19), daily screen time was not significantly associated with persistent concerns in our cohort. This finding should be interpreted cautiously because screen-time information was unavailable for some participants and was based on caregiver report. Moreover, the present study did not assess the content, context, or interactive characteristics of screen use. Therefore, our findings do not establish whether screen exposure influences the persistence of speech and language difficulties.

More than half of the children with available follow-up data no longer had parent-reported speech and language concerns. Although this finding may suggest improvement in the presenting concerns over time, it cannot be equated with confirmed normalization of language development because standardized reassessments were not performed. Furthermore,

differences in follow-up duration and intervention exposure may have influenced the reported outcomes.

Among children receiving intervention, approximately two-thirds of caregivers reported significant perceived benefit. This finding provides information about families' experiences with intervention services but should not be interpreted as evidence of treatment effectiveness. Intervention approaches, frequency, and duration varied, and objective post-intervention language assessments were unavailable. Previous studies have demonstrated the potential benefits of parent-mediated language interventions and structured support for early communication development (27-29). In addition to specialist services, caregiver involvement through responsive communication, shared reading, storytelling, and interactive play may provide opportunities to support language development. However, the present study was not designed to determine the effectiveness of these approaches.

The clinical implications of our findings extend beyond the identification of language delay alone. Speech and language concerns may occur alongside broader neurodevelopmental difficulties, and comprehensive assessment can help identify coexisting developmental needs and guide individualized follow-up planning. This approach is consistent with the World Health Organization's International Classification of Functioning, Disability and Health framework, which emphasizes the interaction between an individual's functioning and environmental context . In developmental pediatrics practice, considering the child's overall developmental profile, family circumstances, and functional communication needs may support more comprehensive care. Nevertheless, our findings do not establish a validated prognostic model or demonstrate that any specific follow-up strategy improves outcomes.

This study has several strengths. It included 301 children evaluated in a specialist developmental pediatrics clinic, with follow-up information available for more than 80% of the original cohort. Baseline assessments were performed by a developmental pediatrician and a speech-language therapist using standardized assessment tools, providing clinically characterized information about children referred with speech and language concerns. The study also examined multiple baseline characteristics and described caregiver-reported intervention experiences, reflecting aspects of routine developmental pediatrics practice.

Several limitations should be acknowledged. First, the retrospective, single-center design limits causal inference and the generalizability of the findings. Second, follow-up outcomes were obtained through structured telephone interviews and relied on caregiver reports rather than repeated standardized speech and language assessments, introducing potential reporting and classification bias. Third, follow-up intervals varied because children entered the cohort over

an extended recruitment period, and this variation may have influenced the likelihood of reported persistence. Fourth, follow-up information was unavailable for 59 children, and potential differences between children with and without follow-up data could have introduced selection bias. Fifth, preschool or daycare attendance was not evaluated, although early educational experiences may influence communication development. Sixth, intervention exposure was heterogeneous, and detailed information regarding intervention content, duration, and intensity was insufficient to evaluate treatment effects. Finally, the overall multivariable regression model did not reach statistical significance and had limited explanatory capacity, indicating that the observed association with suspected ASD requires confirmation in larger prospective studies.

Conclusion

Persistent parent-reported speech and language concerns were common among children with available follow-up data after referral to a developmental pediatrics clinic. Suspected ASD at baseline was associated with persistence in the adjusted analysis; however, the overall regression model had limited explanatory capacity. These findings highlight the importance of comprehensive developmental assessment and individualized follow-up planning while emphasizing the need for prospective studies using standardized longitudinal measures to better characterize factors associated with persistent communication difficulties.

List of abbreviations

ASD: Autism spectrum disorder

OR: Odds ratio

CI: Confidence interval

ICF: International Classification of Functioning, Disability and Health

TEDIL: Turkish Early Language Development Test

SST: Speech Sound Test

Declarations

Ethics approval and consent to participate

The study was approved by the Eskişehir City Hospital Scientific Research Ethics Committee (Decision No. ESH/BAEK 2026/320; March 5, 2026) and was conducted in accordance with the principles of the Declaration of Helsinki. Verbal informed consent was obtained from the parents or legal guardians of all children who participated in the telephone follow-up interviews prior to data collection.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request, subject to institutional and ethical approval.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

TKA conceived and designed the study, performed the statistical analyses, interpreted the results, and drafted the manuscript. TA contributed to data collection and critically reviewed the manuscript for important intellectual content. Both authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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Table 1. Baseline demographic and family characteristics of the study population (n = 301)

Characteristic	**Overall (n = 301)**
Child characteristics	
Age, months	39.1 ± 13.5
Male sex, n (%)	206 (68.4)
Birth order, n (%)	
• First	158 (52.5)
• Second	77 (25.6)
• Third or later	66 (21.9)
Number of children in the family, n (%)	
• One	94 (31.2)
• Two	134 (44.5)
• Three or more	73 (24.3)
Bilingual exposure, n (%)	17 (5.6)
Daily screen time, n (%)	
• ≤1 hour/day	51 (16.9)
• 2–3 hours/day	43 (14.3)
• >3 hours/day	150 (49.8)
• Unknown	57 (18.9)
Parental characteristics	
Maternal age, years	32.3 ± 6.1
Maternal education, years	11 (IQR, 3)
Maternal employment (employed), n (%)	35 (11.6)
Paternal age, years	35.7 ± 6.3
Paternal education, years	11 (IQR, 3)
Paternal employment (employed), n (%)	300 (99.7)

Data are presented as mean ± standard deviation, median (interquartile range [IQR]), or n (%), as appropriate.

Table 2. Clinical characteristics at the initial developmental assessment (n = 301)

Characteristic	**n (%)**
Expressive language delay	254 (84.4)
Receptive language delay	156 (51.8)
Speech sound disorder	51 (16.9)
Suspected ASD	56 (18.6)
Positive family history of speech and/or language disorders	142 (47.2)
Special education recommended	194 (64.5)

Children could have more than one clinical characteristic; therefore, percentages do not total 100%.
ASD, autism spectrum disorder

Table 3. Follow-up outcomes among children with available follow-up data

Characteristic	**n (%)**
Persistence of presenting concerns (n = 242)	
Persistent	108 (44.6)
Resolved	134 (55.4)
Disability Health Board Report (ÇÖZGER) status **(n = 242)**	
Obtained	52 (21.5)
Not obtained	190 (78.5)
Privately funded rehabilitation (n = 242)	
Yes	57 (23.6)
No	185 (76.4)
Weekly intervention frequency (n = 241)	
No intervention	133 (55.2)
≤1 session/week	33 (13.7)
≥2 sessions/week	75 (31.1)
Parent-reported benefit among children receiving intervention (n = 109)	
No benefit	7 (6.4)
Some benefit	31 (28.4)
Significant benefit	71 (65.1)

Percentages were calculated using the number of participants with available data for each follow-up outcome. Weekly intervention frequency was unavailable for one child receiving intervention.

ÇÖZGER: Turkish Child Special Needs Report used for determining eligibility for special education and disability-related services.

Table 4. Baseline characteristics according to persistence of speech and language concerns at follow-up (n = 242)

Variable	**Persistent concerns (n = 108)**	**Resolved concerns (n = 134)**	**p value**
Child age, months	39.5 ± 13.0	38.3 ± 13.1	.401†
Female sex, n (%)	38 (35.2)	39 (29.1)	.313
Maternal age, years	32.9 ± 5.6	32.2 ± 6.0	.383†
Paternal age, years	36.3 ± 6.0	35.7 ± 6.5	.439†
Expressive language delay, n (%)	90 (83.3)	112 (83.6)	.959
Receptive language delay, n (%)	58 (53.7)	67 (50.0)	.567
Speech sound disorder, n (%)	21 (19.4)	22 (16.4)	.540
Suspected ASD, n (%)	28 (25.9)	18 (13.4)	**.014**
Bilingual exposure, n (%)	3 (2.8)	8 (6.0)	.354‡
Positive family history of speech/language disorders, n (%)	48 (44.4)	69 (51.5)	.275
Daily screen time*			.072
≤1 hour/day	21 (22.6)	20 (19.0)	
2–3 hours/day	24 (25.8)	15 (14.3)	
>3 hours/day	48 (51.6)	70 (66.7)	

Data are presented as mean ± standard deviation or n (%), as appropriate.
† Continuous variables were compared using the Mann–Whitney U test.
‡ Fisher's exact test. Other categorical variables were compared using the Pearson chi-square test.
* Screen-time information was available for 198 of the 242 children with follow-up data.
ASD, autism spectrum disorder.

Table 5. Multivariable logistic regression analysis of factors associated with persistent speech and language concerns at follow-up

Variable	Adjusted OR	95% CI	p value
Expressive language delay	0.81	0.32–2.06	.658
Receptive language delay	1.11	0.59–2.07	.752
Suspected ASD	**2.66**	**1.28–5.49**	**.008**
Bilingual exposure	2.37	0.59–9.59	.227
Family history of speech/language disorders	1.42	0.84–2.41	.194
Age, months	1.019	0.995–1.045	.125

Abbreviations: ASD, autism spectrum disorder; CI, confidence interval; OR, odds ratio. The dependent variable was persistence of speech and language concerns at follow-up (persistent = 1, resolved = 0). Odds ratios were adjusted for all variables included in the model. Model $\chi^2(6) = 11.38$, $p = .077$; Nagelkerke $R^2 = .061$.