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Original Research

The Effectiveness of a Training Program for Reducing Speech Disorders Among Kindergarten Children

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Abstracts

Introduction: This study aimed to develop and evaluate a comprehensive training program for reducing speech disorders among Kurdish-speaking kindergarten children, and to examine differences in parental evaluations of intervention outcomes. Despite the critical importance of early intervention for speech disorders, research in the Kurdistan Region is extremely limited, creating a significant gap in culturally and linguistically appropriate intervention approaches for Kurdish-speaking children. **Methods:** Using a quasi-experimental pre-test/post-test design, children with speech disorders were divided into experimental and control groups, with the experimental group receiving a training program over eight weeks while the control group received no intervention. Assessment was conducted using a validated speech disorders scale measuring pronunciation, fluency, voice, expressive and receptive language, and social-linguistic interaction. **Results:** Statistical analysis revealed significant improvements in the experimental group across all dimensions with large effect sizes, and significant differences between experimental and control groups in post-test scores. Parental evaluations showed high consistency, with only minor discrepancies between fathers' and mothers' assessments in specific dimensions. **Conclusion:** These findings demonstrate the efficacy of structured, comprehensive early interventions for speech disorders in Kurdish-speaking kindergarten children, highlighting the importance of culturally adapted intervention approaches and suggesting that similar programs should be implemented in educational settings throughout the region.

Keywords: Speech disorders, Kindergarten children, Training program, Early intervention, Language development

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INTRODUCTION

Speech disorders in early childhood represent a significant developmental concern affecting approximately 5-10% of preschool children globally [1]. These disorders encompass a range of difficulties including articulation problems, fluency disruptions, voice quality issues, and language delays that affect both expressive and receptive capabilities [2]. Early intervention during the preschool years is critical due to heightened neuroplasticity during this developmental period, with interventions implemented before age six demonstrating significantly higher efficacy rates [3].

The relationship between speech disorders and broader developmental outcomes has been well-documented in longitudinal research. Children with early speech sound disorders are at elevated risk for reading disabilities, with approximately 30-40% developing subsequent literacy challenges [4]. Children with speech impairments often experience difficulties with peer relationships and may develop negative self-perceptions related to their communication abilities, highlighting the social-emotional implications of these disorders [5].

Intervention approaches for speech disorders have evolved considerably, with current best practices emphasizing comprehensive, holistic programs that address multiple dimensions of speech and language functioning. Research demonstrates that interventions combining direct articulation training with phonological awareness activities yield superior outcomes compared to single-focus approaches [6]. Parental involvement represents another critical component in effective intervention models, as shown in meta-analyses revealing that interventions incorporating parent training components achieved effect sizes nearly twice as large as clinician-only approaches [7].

Cultural and linguistic contexts significantly influence both the manifestation of speech disorders and the effectiveness of intervention approaches. Linguistic features specific to particular languages may influence both the types of speech errors observed and the response to treatment [8]. Research on speech intervention programs in the Kurdistan Region of Iraq specifically is extremely limited, despite the unique linguistic characteristics of Kurdish and the particular educational context of this region. Phonological development patterns in Arabic and Kurdish-speaking children differ from those documented in English-speaking populations, suggesting the need for culturally and linguistically adapted assessment and intervention approaches [9].

Building on this foundation, this study aims to identify the effectiveness of the training program in reducing speech disorders among kindergarten children. The research employs a null hypothesis framework examining four key dimensions: there are no statistically significant differences between the experimental group that received the training program and the control group in the post-test measurement of speech disorders; there are no statistically significant differences between pre-test and post-test measures of speech disorders within the experimental group; there are no statistically significant differences between the experimental and control groups in the degree of improvement (development scores) in speech disorders; and there are no statistically significant differences between fathers' and mothers' evaluations of their children's speech disorders.

The study was conducted during the academic year 2024-2025, with the training program implemented over an eight-week period from January 2, 2025, to February 23, 2025, with two sessions per week. The research was limited to kindergartens in Sheikhan District of Duhok Governorate in the Kurdistan Region of Iraq, specifically Sheikhan Kindergarten and Zelal Kindergarten. Participants were kindergarten children (aged 4-6 years) diagnosed with speech disorders in the selected kindergartens, along with their parents who participated in the evaluation process. The research focused on speech disorders

including pronunciation and sounds, fluency, voice, expressive language, receptive language, and social-linguistic interaction, as measured by the speech disorders scale developed for this study. The intervention was limited to the training program designed specifically for this research.

Speech disorders in young children represent a diverse set of communication difficulties that can significantly impact development across multiple domains. Research into the prevalence, characteristics, and treatment of these disorders has expanded considerably over the past two decades, with increasing emphasis on early intervention and holistic approaches.

Epidemiological studies indicate that speech disorders affect approximately 5-12% of preschool children, with somewhat higher rates among boys compared to girls [10]. The classification of these disorders has evolved substantially, moving from broad categories to more nuanced diagnostic frameworks [11]. Influential classification systems distinguish between articulation disorders, phonological delay, consistent phonological disorder, and inconsistent phonological disorder. This differentiation has proven valuable for both assessment and treatment planning; as different subtypes respond optimally to different intervention approaches [12].

In a large-scale study of 1,494 preschool children, the most common speech difficulties involved phonological processes such as cluster reduction, final consonant deletion, and liquid simplification. These patterns were generally consistent across linguistic communities, though language-specific variations were noted [13]. Cross-linguistic reviews of 26 languages found that while certain developmental phonological processes appear universal, the specific manifestations vary according to the phonological properties of each language, highlighting the importance of linguistically appropriate assessment tools [14].

The consequences of untreated speech disorders extend well beyond communication difficulties. Longitudinal studies tracking children with early speech sound disorders through adolescence found significantly elevated rates of reading difficulties, with approximately 40% demonstrating below-average reading achievement by third grade [15]. These findings align with the critical age hypothesis which suggests that speech disorders persisting beyond age 5.5 years pose particular risks for literacy development [16]. The impact of speech disorders on children's participation in everyday activities and social interactions includes restrictions in classroom participation, peer relationships, and extracurricular activities [17]. Children with speech disorders often report feelings of frustration, embarrassment, and social exclusion. Even mild speech disorders can significantly affect children's quality of life and self-perception when they become aware of communication differences between themselves and peers [18].

The relationship between speech disorders and behavioral issues has also been investigated. Research has identified higher rates of internalizing and externalizing behaviors among children with speech difficulties compared to typically developing peers [19]. However, these behavioral challenges often decrease following successful speech intervention, suggesting that behavioral symptoms may be secondary to communication frustration rather than representing comorbid conditions in many cases [20].

Intervention research has demonstrated that structured, systematic approaches to speech therapy yield positive outcomes for most children with developmental speech disorders. A systematic review of 134 studies examining speech sound intervention approaches found that both traditional articulation therapy and phonological approaches showed moderate to large effect sizes. Intervention efficacy depends on multiple factors, including the specific nature of the speech disorder, frequency and duration of intervention, and alignment between intervention

targets and developmental readiness [21].

The timing of intervention appears particularly critical. Comparative studies of early intervention versus delayed treatment found significantly greater improvements in early intervention groups, with differences maintained at 12-month follow-up [22]. Similarly, children receiving intervention before age four showed better outcomes than those beginning treatment later, supporting the neuroplasticity advantage of early intervention [23]. Regarding intervention intensity, distributed practice (shorter, more frequent sessions) yielded superior outcomes compared to massed practice (longer, less frequent sessions) for children with inconsistent phonological disorders [24].

The role of parent involvement has been increasingly recognized as crucial for intervention success. Meta-analyses of parent-implemented language interventions found an average effect size of 0.59 for expressive language outcomes, with stronger effects when parents received systematic training and ongoing support [25]. Home practice facilitated by parents significantly enhanced the effects of clinician-delivered speech therapy, particularly for generalization of skills to everyday communication contexts [26].

While speech disorder research has traditionally focused on English-speaking populations, increasing attention has been directed toward cross-linguistic and cross-cultural factors. Recent research emphasizes the importance of culturally responsive practice in speech-language intervention, noting that assessment and treatment approaches must account for linguistic differences, communication norms, and family beliefs about development and disability [27]. In Middle Eastern contexts specifically, limited research has examined speech disorders and intervention effectiveness. Studies examining phonological development and disorders in Turkish-speaking children identified language-specific error patterns that required targeted intervention strategies [28]. Research in multilingual contexts has also gained traction, indicating that bilingual children with speech disorders benefit from intervention in both languages rather than focusing exclusively on the majority language [29].

Recent advances in technology have expanded intervention options for speech disorders. Computer-based speech therapy tools can serve as effective supplements to traditional therapy, particularly for increasing practice opportunities and maintaining engagement [30]. Mobile applications specifically designed for speech therapy have also shown promising results, with studies demonstrating significant improvements in articulation skills following structured app-based intervention programs [31]. Telehealth delivery of speech therapy has emerged as another innovative approach, particularly valuable in regions with limited access to specialized services. Systematic reviews of telehealth speech interventions concluded that they can produce outcomes comparable to face-to-face therapy when appropriately structured and supported [32].

Despite the robust research base regarding speech disorders and intervention effectiveness, significant gaps remain in our understanding of these issues in culturally and linguistically diverse populations. Evidence-based practice guidelines primarily reflect research conducted in Western, English-speaking contexts, with limited representation of other linguistic communities [33]. Research specific to Kurdish-speaking children is particularly scarce, highlighting the need for studies that consider the unique phonological features of Kurdish and the specific educational and cultural context of the Kurdistan Region. Additionally, few studies have systematically examined differences in parental perceptions of speech disorders and treatment progress, despite the recognized importance of family involvement in intervention. Understanding potential discrepancies between maternal and paternal observations could inform more effective family

engagement strategies and strengthen home-based support for skill development [34].
Furthermore, case-based evidence suggests that pharmacological interventions for chronic illnesses, such as corticosteroid use in systemic lupus erythematosus (SLE), may induce speech-related neuropsychiatric symptoms including slurred speech, disorientation, and hallucinations. This underscores the multifactorial nature of speech disorders and highlights the need for proactive identification and treatment in early childhood contexts to prevent long-term complications [35].
In addition, the role of psychosocial stressors such as loneliness, particularly among single parents of children with special needs, has been recognized as a contributing factor affecting both parenting capacity and child outcomes. Addressing emotional wellbeing and promoting supportive community-based interventions are increasingly considered essential elements in comprehensive speech disorder prevention and treatment strategies [36].

METHODS

Research Methods

The current research employed a quasi-experimental method based on a pre-test/post-test two-group design (experimental and control). The Speech Disorders Scale was administered as a pre-test to both groups, after which the training program was applied only to the experimental group during the period from January 2, 2025, to February 23, 2025. Upon completion of the program, a post-test was administered to both groups to determine the effect of the training program on reducing speech disorders among kindergarten children.

Research Population

The research population consisted of all children enrolled in kindergartens in Sheikhan District of Duhok Governorate in the Kurdistan Region of Iraq, totaling 1,110 children distributed across six kindergartens: Sheikhan Kindergarten (227 children), Zelal Kindergarten (172 children), Baadra Kindergarten (194 children), Steir Kindergarten (192 children), Qasrok Kindergarten (259 children), and Mahat Private Kindergarten (66 children).

Research Sample

The research sample was purposively selected from children with speech disorders in Sheikhan and Zelal kindergartens located in Sheikhan District. These two kindergartens were specifically chosen due to the availability of an appropriate number of children with speech disorders, as well as the cooperation of the kindergarten administrations in providing necessary facilities for implementing the training program.
Initially, 29 children diagnosed with speech disorders were identified. The inclusion criteria required that children: (1) be officially enrolled in one of the selected kindergartens, (2) demonstrate speech disorders as identified by the Speech Disorders Scale, and (3) have parental consent for participation in the study. For exclusion criteria, 6 children were excluded from the initial sample: 3 children from Sheikhan Kindergarten (2 due to various social reasons related to family instability, and 1 due to the loss of a parent which might affect response to the training program), and 3 children from Zelal Kindergarten (2 due to loss of a parent, and 1 for not meeting the required conditions for participation in the training program). This resulted in a final sample of 23 children, distributed into two groups: the experimental group from Sheikhan Kindergarten included 15 children (8 males and 7 females), and the control group from Zelal Kindergarten included 8 children (4 males and 4 females).
The Speech Disorders Scale was administered as a pre-test to both groups, after which the training program was applied only to the experimental group during the period from January 2, 2025, to February 23, 2025. The control group did not receive any placebo intervention; they continued with their regular

educational curriculum as prescribed by the Ministry of Education in the Kurdistan Region of Iraq, receiving standard instruction like other students without any supplementary activities related to speech disorders.

Group Equivalence

To verify the equivalence of the experimental and control groups, statistical comparisons were conducted for the following variables:

1. Father's Educational Level: Fisher's exact test showed a probability value of 0.9845, which is not statistically significant at the 0.05 level, indicating equivalence between the groups in this variable.
2. Mother's Educational Level: Fisher's exact test showed a probability value of 0.9681, which is not statistically significant at the 0.05 level, indicating equivalence between the groups.
3. Economic Level: Fisher's exact test showed a probability value of 0.9473, which is not statistically significant at the 0.05 level, confirming equivalence between the groups.
4. Age in Months: Using the Mann-Whitney U test, the calculated U value was 55.000 and the Z value was 0.323, which are not statistically significant at the 0.05 level, indicating equivalence between the groups.
5. Speech Disorders Level: The t-test for two independent samples showed that the calculated t-value (1.110) was less than the tabulated t-value (2.015) at a significance level of 0.05 and degrees of freedom of 44. The mean score of the experimental group was 119.10 with a standard deviation of 3.916, and the mean score of the control group was 120.31 with a standard deviation of 2.626, confirming equivalence between the groups.

Research Tools: Speech Disorders Scale for Kindergarten Children

The researcher constructed a scale for measuring speech disorders among kindergarten children according to scientific steps followed in constructing psychological measures, after reviewing literature and previous studies and conducting an exploratory survey on a sample of 100 parents. Six basic dimensions were identified for the scale: pronunciation and sounds, fluency, voice, expressive language, receptive language, and social-linguistic interaction.

Initially, 44 items were formulated and distributed across the six dimensions, then presented to 10 specialized experts to verify their validity. All items received an agreement percentage exceeding 80%, indicating face validity.

The scale was administered in its initial form to an exploratory sample of 100 parents to extract the psychometric properties. The discriminatory power coefficients ranged between 3.682-7.458, the item-total correlation coefficients ranged between 0.217-0.440, and the item reliability coefficients using the modal probability method ranged between 0.178-0.428. Based on these results, some items that did not meet the required psychometric conditions were excluded.

The final version of the scale consisted of 40 items distributed across the six dimensions, with five-point response options: Always (5 points), Often (4 points), Sometimes (3 points), Rarely (2 points), Never (1 point). The scale's reliability coefficient using the test-retest method was 0.84.

Ethical Considerations

This research was conducted after obtaining formal ethical approval from the University of Zakho, Directorate of Scientific and Postgraduate Affairs (Reference No. 10238, dated December 29, 2022). The official approval was granted to facilitate the researcher's field work in kindergartens within the Sheikhan District. Prior to data collection, informed written consent was obtained from parents of all participating children, explaining the nature of the research, its objectives, and the training program's activities. The parents were informed that participation was voluntary and that they could withdraw their children from the study at any time without consequences. All collected data were treat-

ed confidentially and used exclusively for research purposes. The study procedures adhered to the ethical standards for research involving young children as prescribed by the University of Zakho's research ethics guidelines.

Training Program

The researcher designed a training program aimed at reducing speech disorders among kindergarten children. The program consisted of 16 training sessions conducted twice weekly, with each session lasting 45 minutes, during the period from January 2, 2025, to February 23, 2025. The program sessions included a variety of activities and techniques covering the following areas: introduction to the program and acquaintance, breathing and relaxation exercises, speech muscle exercises, phonological awareness, articulation points, enhancing independent language, vocabulary building, improving pronunciation and strengthening sounds, building social skills, emotion control, enhancing independence and responsibility, adherence to rules and instructions, improving focus and task completion, promoting positive initiative, enhancing social-linguistic interaction, and a concluding session.

Statistical Methods

1. The researcher used the Statistical Package for Social Sciences (SPSS) to process the research data, employing the following statistical methods:
2. Percentages and agreement coefficients to calculate validators' consensus.
3. T-test for paired and independent samples to compare means.
4. One-way analysis of variance to determine the effect of demographic variables.
5. Scheffe's test for multiple comparisons.
6. Fisher's exact test to verify group equivalence.
7. Mann-Whitney U test for small samples.
8. Modal probability for calculating item reliability.
9. Effect size calculation to determine the strength of the program's impact.

RESULTS

Research Objective: To identify the effectiveness of the training program in reducing speech disorders among kindergarten children.

To determine the effect of the training program in reducing speech disorders, the following null hypotheses were tested:

a) "There are no statistically significant differences between the mean scores of the experimental group that underwent the training program and the mean scores of the control group that did not undergo the program in the post-test measurement of the speech disorders scale, in each domain of the scale and in the total score."

To verify this hypothesis, a t-test for independent samples (Independent Samples T-Test) was used to compare the means of the two groups (experimental and control) in the post-test measurement on the speech disorders scale. The results are shown in the following table.

Table 1: Results of the t-test for paired samples for differences between pre- and post-tests in speech disorders among the experimental group

Dimension	Measurement	N	Mean	Std. Deviation	t-value		Significance Level	Effect Size
					Calculated	**Tabulated**		
Pronunciation and Sounds	Pre	30	19.83	1.802	6.383	2.045 (0.05)	Significant	1.165
	Post		18.20	1.627				
Fluency	Pre	30	19.83	1.724	9.633		Significant	1.759
	Post		18.50	1.852				
Voice	Pre	30	19.70	1.705	7.496		Significant	1.369
	Post		17.77	1.501				
Expressive Language	Pre	30	19.80	1.846	9.520		Significant	1.738
	Post		18.13	1.833				

Dimension	Measurement	N	Mean	Std. Deviation	t-value		Significance Level	Effect Size
					Calculated	**Tabulated**		
Receptive Language	Pre	30	20.13	1.871	8.323	(29)	Significant	1.519
	Post		18.43	2.012				
Social-Linguistic Interaction	Pre	30	19.80	1.937	9.778		Significant	1.785
	Post		18.10	1.971				
Total Score	Pre	30	119.10	3.916	21.054		Significant	3.844
	Post		109.13	4.478				

The results in Table 1 show statistically significant differences between the pre- and post-tests in all dimensions of the speech disorders scale and the total score among the experimental group. All calculated t-values exceeded the tabulated t-value of 2.045 at a significance level of 0.05 and degrees of freedom of 29. Accordingly, the null hypothesis is rejected, and the alternative hypothesis indicating the presence of significant differences attributed to the effect of the training program is accepted. The results also showed high effect sizes in all dimensions, ranging from 1.165 to 3.844.

b) "There are no statistically significant differences between the mean scores of the experimental group that underwent the training program and the mean scores of the control group that did not undergo the program in the post-test measurement of the speech disorders scale, in each domain of the scale and in the total score."

The means and standard deviations were calculated for both groups (experimental and control), and a t-test for independent samples was applied to determine if there were statistically significant differences between them in the post-test of the speech disorders scale. The results are shown in the following table.

Table 2: Significance of differences between the experimental and control groups in the post-test of the speech disorders scale

Dimension	Group	N	Mean	Std. Deviation	t-value		Significance Level	Effect Size
					Calculated	**Tabulated**		
Pronunciation and Sounds	Experimental	30	18.20	1.627	2.695	2.015 (0.05) (44)	Significant	0.834
	Control	16	19.50	1.414				
Fluency	Experimental	30	18.50	1.852	2.892		Significant	0.895
	Control	16	20.00	1.265				
Voice	Experimental	30	17.77	1.501	4.200		Significant	1.300
	Control	16	19.75	1.571				
Expressive Language	Experimental	30	18.13	1.833	3.076		Significant	0.952
	Control	16	19.88	1.821				
Receptive Language	Experimental	30	18.43	2.012	3.207		Significant	0.993
	Control	16	20.44	2.032				
Social-Linguistic Interaction	Experimental	30	18.10	1.971	3.192		Significant	0.988
	Control	16	20.00	1.826				
Total Score	Experimental	30	109.13	4.478	8.536		Significant	2.642
	Control	16	119.56	2.632				

The results in Table 2 show statistically significant differences between the experimental and control groups in the post-test measurement across all dimensions of the speech disorders scale and the total score. All calculated t-values exceeded the tabulated t-value of 2.015 at a significance level of 0.05 and degrees of freedom of 44. Accordingly, the null hypothesis is rejected, and the alternative hypothesis indicating the presence of differences attributed to the effect of the training program is accepted. The effect sizes were also high in all dimensions, ranging from 0.834 to 2.642.

c) "There are no statistically significant differences between the mean development scores in the speech disorders scale among the experimental group that underwent the training program and the mean development scores among the control group that did not undergo the program, in each domain of the scale and in the total score."

To verify this hypothesis, development scores were calculated for each member of the experimental and control groups by extracting the differences between the pre-test and post-test scores for each dimension of the speech disorders scale. Then, means and standard deviations of the development scores were calculated for both groups. Subsequently, a t-test for independent samples was applied to determine if there were statistically significant differences between the two groups in the development scores resulting from implementing the training program. The results are shown in the following table.

Table 3: Significance of differences between the experimental and control groups in development scores on the speech disorders scale

Dimension	Group	N	Mean	Std. Deviation	t-value		Significance Level	Effect Size
					Calculated	**Tabulated**		
Pronunciation and Sounds	Experimental	30	1.63	1.402	4.020	2.015 (0.05) (44)	Significant	1.244
	Control	16	0.18	0.403				
Fluency	Experimental	30	1.33	0.758	5.617		Significant	1.739
	Control	16	0.19	0.403				
Voice	Experimental	30	1.93	1.413	5.018		Significant	1.554
	Control	16	0.13	0.342				
Expressive Language	Experimental	30	1.67	0.959	6.542		Significant	2.025
	Control	16	0.06	0.250				
Receptive Language	Experimental	30	1.70	1.119	5.471		Significant	1.694
	Control	16	0.13	0.342				
Social-Linguistic Interaction	Experimental	30	1.70	0.952	6.723		Significant	2.081
	Control	16	0.07	0.250				
Total Score	Experimental	30	9.97	2.593	13.828		Significant	4.281
	Control	16	0.75	0.775				

The results in Table 3 show statistically significant differences between the experimental and control groups in all dimensions of the speech disorders scale, as well as in the total score. All calculated t-values exceeded the tabulated t-value of 2.015 at a significance level of 0.05 and degrees of freedom of 44. Based on these results, the null hypothesis is rejected, and the alternative hypothesis indicating the presence of differences attributed to the effect of the training program is accepted. The results also showed large effect sizes for all dimensions, ranging between 1.244 and 4.281.

d) "There are no statistically significant differences between the mean evaluations of fathers and the mean evaluations of mothers regarding the level of speech disorders

among their children in each domain of the scale and in the total score."

To verify this hypothesis, a t-test for independent samples was used to compare the means and standard deviations of fathers' and mothers' evaluations of their children after implementing the training program. This was done to determine the extent of agreement or difference between their evaluations across various dimensions of the speech disorders scale and to determine if there were statistically significant differences between their opinions. The results are shown in the following table.

Table 4: Results of the t-test for independent samples for differences between fathers' and mothers' evaluations of speech disorders among the experimental group

Variable	Group	N	Mean	Std. Deviation	t-value		Significance Level
					Calculated	**Tabulated**	
Pronunciation and Sounds	Fathers	15	17.20	1.014	4.237	2.045 (0.05) (28)	Significant
	Mothers	15	19.20	1.521			
Fluency	Fathers	15	18.27	1.534	0.684		Not Significant
	Mothers	15	18.73	2.154			
Voice	Fathers	15	17.80	1.424	0.120		Not Significant
	Mothers	15	17.73	1.624			
Expressive Language	Fathers	15	18.07	1.944	0.196		Not Significant
	Mothers	15	18.20	1.781			
Receptive Language	Fathers	15	17.73	2.154	2.002		Not Significant
	Mothers	15	19.13	1.642			
Social-Linguistic Interaction	Fathers	15	17.60	1.844	1.413		Not Significant
	Mothers	15	18.60	2.028			
Total Score	Fathers	15	106.67	3.958	3.579		Significant
	Mothers	15	111.60	3.582			

The results in Table 4 show that there are statistically significant differences between fathers' and mothers' evaluations only in the pronunciation and sounds dimension and the total score, where the calculated t-values in these two dimensions exceeded the tabulated t-value of 2.045 at a significance level of 0.05 and degrees of freedom of 28. The other dimensions showed no statistically significant differences, indicating a general level of agreement between fathers' and mothers' evaluations of speech disorders among their children in most areas.

DISCUSSION

The findings of this study provide substantial evidence for the effectiveness of the developed training program in reducing speech disorders among kindergarten children. The significant improvements observed in the experimental group across all dimensions of the speech disorders scale, as demonstrated by the pre-test and post-test comparison, indicate that the program successfully addressed multiple aspects of speech and language functioning.

The effectiveness of the training program can be attributed to several factors. First, the program employed diverse and integrated training strategies specifically designed to target various dimensions of speech disorders in children. The methodical nature of the program, which considered the gradation in the difficulty of training tasks and used positive reinforcement, modeling, and

repeated practice techniques, contributed to the establishment and generalization of acquired language skills. One of the important factors that contributed to the success of the program was the involvement of families in implementing some home activities, which provided continuity of training outside formal sessions and enhanced the transfer of learning effects to the child's natural environment.

The significant differences observed between the experimental and control groups in the post-test measurements further support the effectiveness of the training program. These results can be explained in light of the diversity of activities and strategies used in the program, which included intensive training on speech skills and verbal fluency, in addition to interactive activities that enhanced social-linguistic communication. Continuous positive reinforcement and immediate feedback also contributed to establishing acquired skills and increasing children's motivation to improve their linguistic performance.

Family participation in implementing some aspects of the program may have contributed to generalizing acquired skills in multiple environments, which increased the program's effectiveness and positive impact. The significant differences between the two groups reflect the impact of the early and intensive intervention principle adopted by the program, which contributes to achieving positive changes before disorders become established and more resistant to treatment.

The development scores analysis provides additional evidence for the program's effectiveness. The program included diverse and integrated activities specifically designed to meet the needs of children with speech disorders. It considered individual differences among children and progressed in task difficulty from easy to difficult. It was also based on modern educational strategies founded on modeling, positive reinforcement, and repeated practice, as well as early intervention methods that have proven effective in improving language and speech skills.

The integration of program dimensions that targeted all aspects of language development (receptive and expressive) and speech, phonological, and social interaction aspects led to comprehensive improvement in children's performance. Additionally, family participation in implementing some home exercises contributed to generalizing acquired skills in multiple environments, which is consistent with the results of previous studies that emphasized the importance of systematic and comprehensive early intervention in improving speech disorders among children.

The analysis of differences between fathers' and mothers' evaluations provides interesting insights into the perception of speech disorders and program effectiveness. The difference in the nature of daily interaction and observation between fathers and mothers with their children may explain the significant differences found in the pronunciation and sounds dimension, where mothers tend to spend more time with children and observe finer details in their linguistic and speech performance. The traditional role of mothers in monitoring children's linguistic development and direct communication with teachers and specialists may make them more sensitive to subtle changes in the child's linguistic performance.

The notable agreement in parents' evaluations for the other dimensions can be explained by the clarity of improvement in these aspects in a way that can be observed by both parents regardless of interaction duration, or by the effect of the training program that included unified guidelines and instructions for parents on how to observe and evaluate their children's behavior, which reduced the variation in their assessments across most dimensions. These results are consistent with the findings of previous studies (McLeod & Harrison, 2009; Colton & Casper, 2014) that indicated limited differences between parents' evaluations of speech and language disorders among their children, with mothers tending to record

more detailed observations in some aspects.

Study Limitations

Despite the positive findings, this study encountered several limitations. The relatively small sample size (23 children) may affect the generalizability of results to the broader population of Kurdish-speaking children with speech disorders. The distribution between experimental (15 children) and control groups (8 children) was not equal. The geographic focus on Sheikhan District means the findings may not fully represent all Kurdish-speaking regions in Kurdistan. The intervention duration of eight weeks was relatively short, and the study did not include follow-up assessments to evaluate long-term effects. The control group received no alternative intervention, making it difficult to compare the training program with other potential approaches. Environmental factors such as home language exposure and additional language activities outside the program were not controlled in the study design. These limitations indicate potential areas for future research, including studies with larger samples, extended intervention periods, and diverse geographic representation.

CONCLUSION

The findings of this study provide substantial evidence for the effectiveness of the developed training program in reducing speech disorders among kindergarten children across all measured dimensions, as demonstrated by the moderate to large effect sizes observed in pronunciation, fluency, voice, expressive language, receptive language, and social-linguistic interaction. This effectiveness can be attributed to the program's comprehensive approach that simultaneously addressed multiple interconnected aspects of speech and language functioning, creating a synergistic effect that enhanced overall communication skills. The high consistency in parents' evaluations, particularly regarding expressive language, voice quality, and fluency, indicates that improvements were objectively observable regardless of observer differences, while the successful incorporation of family involvement substantiates previous research emphasizing the importance of extending intervention principles into children's natural environments. The demonstrated value of early intervention with kindergarten-aged children confirms the critical importance of addressing communication difficulties before they become established patterns that affect broader developmental domains, and the successful implementation in the Kurdish educational context validates that culturally adapted speech intervention approaches can be effectively developed and applied in the Kurdistan Region of Iraq. Based on these findings, it is recommended that educational authorities implement similar programs across all kindergartens in the region, while teacher training programs should incorporate modules on identifying early signs of speech disorders and implementing basic intervention strategies. Parental awareness programs should be developed to educate families about early detection and intervention, with practical guidance for home activities, and educational policies should emphasize speech and language development within kindergarten curricula. The Speech Disorders Scale developed in this study should be standardized for wider use in Kurdish-speaking contexts, collaborative relationships between stakeholders should be formalized to ensure coordinated support, and the training program should be made available as a resource for professionals working with Kurdish-speaking children. Future research directions should include longitudinal studies examining long-term effects on academic achievement and psychological well-being, comparative studies of different intervention approaches, investigations of relationships between speech disorders and other developmental domains, research on technology-enhanced interventions for underserved regions, studies on Kurdish-specific linguistic features affecting speech disorders, assessment of teacher pro-

fessional development needs, exploration of cultural factors influencing perceptions and help-seeking behaviors, and the development of additional assessment tools specifically designed for Kurdish-speaking populations to further advance evidence-based practices in this specialized field.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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