

# Impact of Bilingualism on Speech Sound Disorder/ Articulatory and Phonological Disorders

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## Author's Contribution

<sup>2</sup>Conception and design, <sup>3</sup>Collection and assembly of data, <sup>1,2,3</sup>Analysis and interpretation of the data, Statistical expertise, drafting of article, <sup>4</sup>Critical revision of the article for important intellectual content, <sup>2</sup>Final approval and guarantor of the article.

## Article Info.

Received: April 4, 2023

Acceptance: January 05, 2024

Conflict of Interest: None

Funding Sources: None

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Cite this article as: Noveen S, Saqulain G, Habibullah S, Babur MN. Impact of Bilingualism on Speech Sound Disorder/ Articulatory and Phonological Disorders. JRCRS. 2024; 12(1):16-21.

DOI:

<https://dx.doi.org/10.53389/JRCRS.2024120104>

## Introduction

All the literary products, the effective verbal communication and the expression of ideas or intellectual work depends on speech. Referring to ayah number 4 of Surah Al-Rahman speech is the top most executive function bestowed by Allah Almighty to human beings. If impaired, effective communication is compromised. In this era of communication, the world has become a global village, making children learn more than one language a necessity. Parents understand this need, however they sometimes feel or are informed that

## A B S T R A C T

**Objectives:** To explore the impact of bilingualism on Articulatory and Phonological Disorders in Pakistani 4-8 years old children.

**Methodology:** This cross sectional study using convenient sampling recruited N=140 children suspected or having speech sound disorders. Sample included 4-8 years old children of both genders speaking Urdu and their native language from the speech clinics of four provinces of Pakistan from 1st March to 31st October 2016. Basic demographic sheet and Test for Assessment of articulation and Phonology in Urdu was used for data collection. Analysis done using SPSS Version-21. Chi-square & Pearson correlation was utilized and  $p < 0.05$  was considered significant.

**Results:** The number of errors and mother tongue did not show correlation ( $r = .006$ ,  $p = .499$ ), while error type and mother tongue revealed weak negative correlation ( $r = -.091$ ), concluding their non-relation with language. However, there was predominance of substitution 93(66.4%) followed by omission 27(19.3%) and distortion 20(14.3%) errors, with substitution being commonest in Pushto, omission in Urdu and distortion in Punjabi speaking. Also phonological process of liquid gliding was absent ( $/r/$  is substituted with  $/l/$ ) in Urdu language and children were intelligible despite articulatory or phonological errors and intelligibility continues developing after 4 years of age.

**Conclusion:** The speech sound errors are independent of languages learned by the child because the phonetic repertoire and articulatory movements for a sound in every language is similar. A child growing up in a native language environment will make similar articulatory errors in Urdu and the native language.

**Key Words:** Language, Multilingualism, Speech disorders.

exposure of more than one language for a child can be a reason of speech and language delay or disorder and are advised to avoid exposing child to more than one language.<sup>1</sup>

Most of the population of the world is bilingual with one in three persons speaking more than one language<sup>2</sup>, however, the impact of bilingualism has mostly been studied on typically developing children and rarely in reference to Speech Sound Disorders (SSD).<sup>3</sup> In Pakistan too, most of the populace is bilingual, with Urdu being the national language of Pakistan, spoken and understood by the urban population with almost 100 million orators of Urdu language in 20 countries. In

Pakistan, in addition to Urdu, multiple native languages are in use like Punjabi, Baluchi, Saraiki, Pushto and etc. <sup>3</sup>

Urdu is used and taught in all the schools of Pakistan and school going children develop reading, writing and speaking proficiency of Urdu language despite using their regional language frequently. Having knowledge of two languages is common characteristic of a Pakistani children. Schools also teach English language as a compulsory subject and officially English is the mode of communication in Pakistan.<sup>4</sup> Hence, it seems that children from every region of Pakistan need to learn Urdu language and in order to attain a job they need to be proficient in English language as well.

The dynamic system theory when applied to language development of bilinguals, suggested that phonological skills increase or decrease depending on the factors like environment, language use and proficiency and phonetic and phonemic factors.<sup>4</sup> Typically developing children pass through the stages of speech development with preschool children start developing the sounds and words of native language with children developing both languages simultaneously depending on the induction time during child development. (8 to 30 months old children babble the common speech sound that they perceive from their environment. The perception and production relationship is evident in a study on children in Urdu environment, as during acquisition period they babble stop sounds /b & d/ and master these sounds at word learning stage with Urdu typical sounds, developing after the age of 30 months).<sup>5</sup> Friedrich M et al reported that children exposed to two languages during infancy face difficulty discriminating between sounds perceived at neural level till 9 months, but start discriminating at 12 months age and responses improve in later age with children responding to both language stimulation similarly, just like adults <sup>6</sup>. Some studies on typically developing children concluded that the rate of speech sound acquisition is similar in both bilingual and monolingual children like a study of Maltese-English speaking bilinguals on 241 children revealed advanced speech sound skills in bilingual children as compared to the monolingual peers <sup>7</sup>.

Speech sound development has been studied frequently in typically developing bilingual children whereas there is dearth of studies which focus on speech sound disorders in bilingualism. Speech sound disorders (SSD) in bilingual or monolingual children, if remain untreated affect communication, literacy and socialization skills.<sup>8</sup> A speech clinician needs to have evidence about the impact of bilingualism on speech disorder to answer the query and concern of parents so that they can train their children in more than one languages, fearlessly and since children at 4 years are

100% intelligible on Intelligibility in Context Scale (ICS) <sup>8</sup>, and all speech sounds are mastered by the age of 8 years, being a universal trend of speech development.<sup>9</sup> Hence this study was conducted to explore impact of bilingualism on speech sound disorders in Pakistani 4-8 years old children. It has significant importance, since it will provide reliable evidence to inform parents and guide clinical decisions to treat the bilingual child in the Pakistan's cultural perspective where local languages are quite prevalent.

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## Methodology

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Early identification of speech sound disorders requires a valid and efficient assessment tool in the concerned language. This study is of significant importance because this is the first of its type in Pakistan as well as in national language "Urdu" and "local languages", since this study is supported by author's previous research regarding validity and reliability of "Test for Assessment of Articulation and Phonology in Urdu (TAAPU)" without which this was not possible. TAAPU is the standardized single picture norm referenced test for assessment of Articulatory and Phonological Disorders (APD) in Urdu languages. The validity of TAAPU was measured using factor analysis that illustrated 7 factors had Eigenvalues greater than 1 and were those for which no or least frequent error was received. Further content validity was determined by showing the tool to experts of the field. Cronbach's Alpha reliability was 0.899 for entire sample of 140. Substantial and almost perfect (0.61-0.80) agreement was found among raters in determination of inter-rater reliability. In this study TAAPU is used to explore the relationship of bilingualism and APD among 4-8 years old bilingual children.<sup>10</sup>

The present cross sectional study was conducted while standardizing "Test for Assessment of Articulation and Phonology in Urdu (TAAPU)" and studied the impact of bilingualism on SSD in relation to APD. Study was carried out in speech clinics of four provinces of Pakistan over a period of 8 months from 1<sup>st</sup> March 2016 to 31<sup>st</sup> October 2016. Utilizing convenient sampling, study recruited a sample of N=140, 4-8 years old bilingual children of both genders with or suspected SSD and using Urdu and their native language. Children with any other disorder or disability were excluded from the study. Basic demographic sheet and TAAPU<sup>10</sup> was utilized for data collection.

TAAPU is a reliable and valid, single picture norm referenced test for assessing APD in Urdu language. It is used to assess 34 consonantal sounds at three positions including initial middle and final positions of words utilizing 60 colourful pictures.<sup>11</sup> A total Sample of N=140 children with or suspected APD i.e., 35 from each stratum, was determined by using

formula with 95% confidence level (standard value of 1.96), 5% margin of error and prevalence of 10%.<sup>10</sup>

Study was conducted following approval of Advanced Studies and Research Committee, Isra Institute of Rehabilitation Sciences, Isra University vide approval number IIRS/Whom Concern. Letter/ Student/2015/10/27/1505. Following informed consent for voluntary participation from the parents, data was collected by the researcher herself from speech clinics of Lahore, Peshawar, Sargodha, Abbotabad, Rawalpindi. To collect data from Karachi, Quetta, Khushab and Mandi Bahauddin. Study sample size was focused to each province that was n=35. The sample from every city was inconsistent depending on the number of children with SSD visited SLP clinic during study duration, Speech clinicians were contacted and research details were explained and TAAPU test with manual was posted to them in hard form. After careful analysis of recorded speech sample by all the speech clinicians articulation errors were noted on the response sheets of TAAPU.<sup>11</sup> The data was then analyzed using SPSS 21.

## Results

Sample population N= 140 children revealed that majority 61(43.6%) belonged to 6.6-7.5 years age group followed by 54(38.6%) of 5.6-6.5 years age group (figure 1) and comprised both genders with majority being males 106(75.7%). Demographic and geographic diversity with inclusion of small provinces like Baluchistan, added to the richness of data.

Table I revealed that as regards total number of errors 76-85 errors were noted in 99(70.71%) of population. and errors were most common in Pushto speaking bilinguals with 76-85 errors reported in 27(27.27%) and least in potohari, while 66-75 errors were reported most frequently in Urdu speaking and least in Brahvi speaking bilinguals, however the difference was not significant ( $X^2=15.357$ ,  $p=.499$ ) and Pearson's correlation coefficient,  $r = 0.006$  support null hypothesis that there is no relationship between language spoken and error presence.

Also as regards types of errors, substitution was present in majority 93(66.4%) population and distortion was least common 20(14.3%). Substitution was the commonest error type in majority 27(29.03%) noted in Pushto speaking children and least common 1(1.07) each in Potohari and Brahvi speaking, while Omission was common 14(51.85%) in Urdu speaking and distortion was common 5(25%) in Punjabi speaking and chi-square revealed significant association ( $X^2=31.671$ ,  $p=.011$ ) however Pearson correlation coefficient  $r = -0.091$ , indicating weak negative correlation.

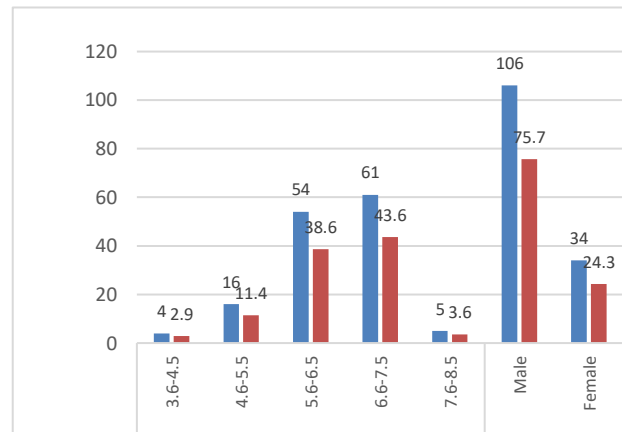


Figure 1. Demographic profile of study population. (N=140)

As regards association of intelligibility of the speech sounds with age groups (table II), intelligibility was more with higher age groups with maximum intelligibility was noted at age group 6.6-7.5, followed by 5.6-6.5 years. The age related difference was significant ( $X^2=27.003$ ,  $p=0.008$ ).

Table II: Age Group \* Intelligibility. Cross Tabulation (Chi-square). (N=140)

Age Group	Intelligibility (n)				Chi-Square
	100% (79)	75% (43)	50% (11)	25% (7)	
3.6-4.5 (4)	2	1	1	0	27.003
4.6-5.5 (16)	6	5	4	1	0.008
5.6-6.5 (54)	25	22	1	6	
6.6-7.5 (61)	41	15	5	0	
7.6-8.5 (5)	5	0	0	0	

Table I: Mother tongue \*Error types, Total Errors and Intelligibility. Cross Tabulation

Error Type	Mother Tongue (n)	Urdu (31)	Punjabi (21)	Balochi (5)	Sindhi (22)	Pushto (36)	Hindko (16)	Potohari (2)	Brahvi (3)	Saraiki (4)	X <sup>2</sup> ,P-Value	Pearson's r
		n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)			
Substitution 93(66.4%)		15(16.13)	13(13.98)	2(2.15)	19(20.43)	27(29.03)	12(12.90)	1(1.07)	1(1.07)	3(3.22)	31.671, 0.011	-0.091
Omission 27 (19.3%)		14(51.85)	3(11.11)	1(3.70)	1(3.70)	5(18.52)	-	1(3.70)	1(3.70)	1(3.70)		
Distortion 20(14.3%)		2(10)	5(25)	2(10)	2(10)	4(20)	4(20)	-	1(5)	-		
Total Errors												
55-65 (10.71%)		0	0	0	0	1(100)	0	0	0	0	15.357 0.499	0.006
66-75 (40)(28.57%)		12(30)	6(15)	1(2.5)	3(7.5)	8(20)	6(15)	2(5)	0	2(5)		
76-85 (99)(70.71%)		19(19.19)	15(15.15)	4(4.04)	19(19.19)	27(27.27)	10(10.10)	0	3(3.03)	2(2.02)		

## Discussion

When the sounds were assessed in all three positions (table III) in the words using TAAPU, it revealed that children with APD committed least errors on bilabial stops /bpm/ the labio-dental fricatives /f & v/ and lingua velar /s/. Rest of the sounds showed high frequency of errors in the whole sample. Table also shows some Urdu typical errors, children with APD in the sample substituted /r/ with /l/ and replaced aspirated sounds with their non-aspirated counterparts.

**Table III: Frequency distribution of errors per sounds in Urdu Language using TAAPU.**

	Type of Sound	Speech Sound Errors		
		Substitution	Omission	Distortion
		n(%)	n(%)	n(%)
1.	/p/	9(6.4)	6(4.3)	3(2.1)
2.	/b/	-	-	3(2.1)
3.	/m/	3(2.1)	-	-
4.	/f/	15(10.7)	8(5.7)	-
5.	/v/	3(2.1)	3(2.1)	-
6.	/s/	36(25.7)	13(9.3)	5(3.6)
7.	/z/	108(77.1)	130(92.9)	134(95.7)
8.	/ʃ/	118(84.3)	131(93.6)	139(99.3)
9.	/dʒ/	120(85.7)	136(97.1)	139(99.3)
10.	/ʃ/	101(72.1)	131(93.6)	135(96.4)
11.	/ʒ/	135(96.4)	139(99.3)	139(99.3)
12.	/t/	135(96.4)	134(95.7)	139(99.3)
13.	/d/	136(97.1)	127(90.7)	127(90.7)
14.	/t/	80(57.1)	116(82.9)	139(99.3)
15.	/d/	99(70.1)	134(95.7)	139(99.3)
16.	/r/	99(70.7)	120(85.7)	139(99.3)
17.	/l/	139(99.3)	127(90.7)	139(99.3)
18.	/r/	79(56.4)	126(90)	140(100)
19.	/k/	62(44.3)	139(99.3)	139(99.3)
20.	/g/	70(50)	139(99.3)	139(99.3)
21.	/x/	77(55)	137(97.9)	140(100)
22.	/χ/	86(61.4)	134(95.7)	139(99.3)
23.	/n/	136(97.1)	137(97.9)	139(99.3)
24.	/h/	139(99.3)	121(96.4)	139(99.3)
25.	/pʰ/	136(97.1)	139(99.3)	131(93.6)
26.	/bʰ/	131(93.6)	139(99.3)	134(95.7)
27.	/tʰ/	111(79.3)	134(95.7)	131(93.6)
28.	/dʰ/	137(97.9)	139(99.3)	131(93.6)
29.	/tʰ/	111(79.3)	130(92.9)	137(97.9)
30.	/dʰ/	128(91.4)	136(97.1)	136(97.1)
31.	/dʒʰ/	139(99.3)	137(97.9)	139(99.3)
32.	/tʃʰ/	110(78.6)	136(97.1)	136(97.1)
33.	/kʰ/	81(57.9)	139(99.3)	136(97.1)
34.	/gʰ/	96(68.6)	139(99.3)	136(97.1)
<b>Additional Errors Detected</b>				
	// r	47(33.6)		
	Urdu Phonemes	Aspirated	104(74.3)	
		No aspiration	36(33.6)	

In the present study, there is a notably high frequency of children with complaint of APD in the 6.6 to 7.5 years age group (figure 1). Also male encountered APD more frequently compared to females in 4-8 years old populace which visited speech clinics in four provinces of Pakistan. In a large cohort study involving Australian primary school, SSD was found to be more prevalent in children aged 5-7 years where in 75 boys and 36 girls were detected to have SSD.<sup>12</sup> In quite similarity, the prevalence of SSD among primary school children of one district of Punjab in Pakistan was reported as being common in males (80%) occurring in 61- 84 months old kids.<sup>13</sup> A Korean study also shared similar findings.<sup>14</sup>

Results revealed that among the children with APD number of error occurrence varied corresponding to the number of children visiting speech clinics, using Urdu language or/and their native languages. Convenience sampling was deployed while standardization of TAAPU hence there was variation in number of children included, using Urdu as language of communication with other languages as their native language. Most frequently errors occurred in Pushto speaking children while least were noted for Potohari speaking bilinguals. Frequency of children speaking Urdu, Sindhi, Punjabi, Hindko, Baluchi, Saraiki and Brahvi decreased in the sample respectively. The SLPs administering TAAPU in four provinces

of Pakistan had knowledge of the native language hence the error detection was not confusing.<sup>10</sup> Since TAAPU was developed using Urdu text books studied by early school age children<sup>11</sup>, therefore TAAPU was used to assess APD among children speaking Urdu and their native languages with basic knowledge of Urdu.

The impact of bilingualism on SSD has rarely been studied, with a study from Mandibahauddin involving 377 primary school children revealed that there are 1.3% primary school children have SSD indicating that these children hardly get SLP consultation.<sup>13</sup> The relationship of APD with native languages in Pakistan, in current study, revealed insignificant difference between languages and total number of error occurrence, further no correlation was present between the two variables. Substitution has been recorded to be the most frequent articulatory error type in all the languages. Whereas omission and distortion are less frequent. Distortion is a common error in children with oral motor mechanism deficits.<sup>15</sup> In a European study, involving preschool children aged >1 year bilinguals speaking Spanish and English, revealed improved rates of accuracy in both languages, indicating that exposure to more than one language does not hinder phonological development.<sup>16</sup> In contrast in study conducted in Hong Kong,



involving Putonghua and Cantonese speaking bilingual children revealed that bilinguals had less sound inventory in both Putonghua and Cantonese languages and were delayed compared to monolinguals.<sup>17</sup>

A systematic review by Hambly H et al. revealed that speech sound acquisition varies between children who are monolingual and bilingual especially in terms of error patterns and rate of error.<sup>18</sup> In current study the generalized error of lingua palatal fricatives, lingua velar stops and fricatives, lingua alveolar affricates, replacement of aspirated Urdu phonemes with non-aspirated phonemes, lingua alveolar stops, lingua dental affricates and retroflex Urdu sound in all languages in the study. Holm et al.<sup>19</sup> concluded in their study “speech disorder are language independent, (i.e., that a single deficit underlies the speech disorder across both languages)”. The current study depicted that APD is independent of language, hence the null hypothesis has been approved.

As regards intelligibility it was found that the speech of older children was more intelligible as compared to younger children. It is further supported by the findings of Hustad et.al about development of intelligibility by the age of 47 months, they reported that by this age few children are 100% intelligible and it keeps on developing past four years.<sup>20</sup> Also Prezas<sup>21</sup> noted higher level of intelligibility at 5 years compared to 4 years age group.

According to Millar et al. glides replace laterals, whereas in Urdu language the // for /r/ substitution is common error and seen in all the languages spoken in Pakistan, because // sound develops earlier and there is no /w/ in Urdu language whereas there is /j/ but /r/ and /t/ are substituted by //.<sup>22</sup>

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## Conclusion

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Current research shows that the phonetic repertoire and articulatory movements for a sound in every language is similar. A child growing up in a native language environment will make similar articulatory errors in Urdu and the native language, both.

Acknowledgments: We are very grateful to the administration of mentioned hospitals for allowing us to collect our data. We are also very thankful to all the participants in the study.

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