Relationship Between Speech Severity and Intelligibility of Children with Speech Sound Disorders

BUILDING BRIDGES
THE 14TH PANHELLENIC 1ST INTERNATIONAL CONGRESS ON SPEECH AND LANGUAGE THERAPY
28-30 MAY 2021 | DIGITAL CONFERENCE

Deniz KAZANOĞLU [1], Beyza Nur DÜKAR [2] Tuğçe NERGİZ [3]

[1]Department of Language and Speech Therapy, Ondokuz Mayıs University, Samsun, Turkey (deniz.kazanoglu@omu.edu.tr)

[2]Deparment of Language and Speech Therapy, Anadolu University, Eskişehir, Turkey (beyzanursezer@anadolu.edu.tr)

[3]Deparment of Language and Speech Therapy, Anadolu University, Eskişehir, Turkey (tugce_nergiz@anadolu.edu.tr)

Introduction

Speech sound disorder (SSD) is an umbrella term, including both speech difficulties in language and speech production (Bleile, 2014). SSD is a common disorder that can be seen in clinical settings. Therefore clinical measurements are essential for decision-making more simplistic phonological system (Donicht, Pagliarian, Mota & Keske-Soares, 2009). While intelligibility proceeded from mild to severe, children's communication ability and participation in the social environment may influence increasingly (Hustad, 2012). Therefore, the ultimate goal of the intervention is to increase the intelligibility of children with SSD (Flipsen, 1995; Dodd ve Bradford, 2000; Miller, 2003; Lousada, Jesus, Hall ve Joffe, 2014).

Intelligibility is how well one's speech is understood by someone else (Pascoe et. al, 2006), and it takes place as an essential variable in interventions. Miller (2013) states that speech intelligibility has a central role in clinical decisions, therefore different procedures such as word recognition tests and scale-based forms have been developed to evaluate intelligibility (Schiavetti, 1992; Kent, Miolo, and Bloedel, 1994). Severity is an indicator that points out the degree of the disorder, which is assessed by calculations such as the percentage of correct consonants, the percentage of the occurrence of phonological processes (Pascoe et. al, 2006).

There are different views in the literature about the relationship between intelligibility and the severity of speech. However, both are critical indicators for SSD in the intervention process.

In this study, the relationship between speech severity and intelligibility of Turkish-speaking children with speech sound disorders (SSD) was examined. It also revealed any possible differences in the intelligibility regarding the speech severity level.

Results

According to Spearman's correlation analysis, a statistically significant relationship between speech severity and ICS-T scores ($r = 0.495$, $p < .01$), speech severity and researcher 1 (R1) ($r = 0.737$, $p < .001$), speech severity and researcher 2 (R2) ($r = 0.717$, $p < .001$) were found.

Table 1. Correlations between speech severity and intelligibility

	R1	R2	Speech severity
R2	0.851 *** (< .001)	-	-
Speech severity	0.737 *** (< .001)	0.717 *** (< .001)	-
ICS-T scores	0.516 ** (0.005)	0.533 ** (0.003)	0.495 ** (0.007)

* p < .05, ** p < .01, *** p < .001

According to Kruskal-Wallis analysis, speech severity levels differed in terms of the researchers' speech intelligibility percentages (χ^2 (R1) = 17.69, χ^2 (R2) = 16.73, $p < .001$); however, it did not differ in terms of the ICS-T scores.

Table 2. Difference speech intelligibility according to speech severity levels

	χ^2	df	p	ε^2
ICS-T scores	6.40	2	0.041	0.237
R1	17.69	2	< .001	0.655
R2	16.73	2	< .001	0.620

Differences found in both between mild and severe(W (R1) = -3.82, W (R2) = -3.82, p = 0.019), and between moderate and severe groups (W (R1) = -5.03, W (R2) = -5.027, p = 0.001) among the researchers.

Table 3. Pairwise comparisions R1 and R2 according to speech severity level

		R1		R2	
		W	p	W	p
1	2	-3.18	0.063	-0.87	0.814
1	3	-3.82	0.019	-3.820	0.019
2	3	-5.03	0.001	-5.027	0.001

1=mild, 2=moderate, 3=severe+very severe

Method

Design: A relational research model was used.

Participants All children speak Turkish. They do not have additional diagnosis (neurological, structural, sensory) except the SSD, and attend any therapy. Approval of the Ethical Committee of Anadolu University (Protocol No: 6859) and the consent form were obtained for the study.

Table 4. Demographic information of participants

	Children			Parents	
	n (%)	Min-Max (months)	x̄ ± Sd		n (%)
Boys	18 (64)	41-88	63.6 ± 13.0	Male	9 (32.1)
Girls	10 (36)	49-82	61.6 ± 11.9	Female	19 (67.9)
Total	28	41-88	62.9 ± 12.4		28

Materials and Procedure

Turkish Articulation and Phonology Test-Articulation Sub-Test (SST-SET): SST, which was developed by Topbaş (2005), has three sub-tests. Due to the purpose of this study, SST-SET, evaluates the articulation abilities of children aged 2 to 8 years, was used to determine the speech severity of the children. The test is a picture-naming test which assesses the Turkish consonants. The speech severity levels of the participants were determined by the Percentage of Consonants Correct (PCC).

$$PCC = \frac{correct\ consonsan}{correct\ consonant\ frequency + wrong\ consonant\ frequency}\ x100$$

Classification of the participants' speech severity levels according to the PCC is as stated: Mild if 85% and above, moderate if 65-84%, severe if 51-65%, and very severe if 50% and below.

Intelligibility in Context Scale (ICS): *Turkish:* ICS was developed by McLeod, Harrison & McCormack (2012) and translated in Turkish by Topbaş (2012). The Likert-type form was filled by one of the family members. The form has seven items that are related to how much the child's speech is understood by other people.

Spontaneous Speech Sample: Spontaneous speech sample was transcribed and calculated the percentage of the intelligible utterance (PIU) by two SLTs.

$$PİU = \frac{intelligible\ utterance\ frequency}{total\ utterance\ frequency}\ x\ 100$$

Data Analysis

Jamovi (2020) was used for statistical analysis. Correlation between PCC scores and PIU scores of two researchers and PCC scores and ICS: Turkish scores were analyzed with Mann-Whitney U-Test.

Conclusion

Although there was a relationship between speech severity and speech intelligibility, parental assessment did not determine the differences between the speech severity levels and speech intelligibility. Researchers' assessment revealed differences between mild and severe group, moderate and severe groups.

We think that parents are generally concerned if their child's speech has is severe and intelligibility is very low. This study was conducted with children who have SSD. However, perceptual evaluation of parents' or teachers' is critical for the referral of children under risk. Therefore especially preschool-aged children should regularly be evaluated in terms of speech-language abilities.

Selected References

Bleile, K. M. (2014). *The manual of speech sound disorders: A book for students and clinicians*. Cengage Learning

Donicht, G., Pagliarin, K. C., Mota, H. B., ve Keske-Soares, M. (2009). Intelligibility of phonological disorder assessed by three groups of judges. Pró-Fono Revista de Atualização Científica, 21(3), 213-218.

Lousada, M., Jesus, L.M., Hall, A., & Joffe, V. (2014). Intelligibility as a clinical outcome measure following intervention with children with phonologically based speech-sound disorders. International Journal of Language and Communication Disorders, 49, 584–601. doi: 10.1111/1460-6984.12095

Miller, N. (2013). Measuring up to speech intelligibility. *International journal of language & communication disorders*, *48*(6), 601-612.

Pascoe, M., Stackhouse, J., ve Wells, B. (2006). Persisting speech difficulties in children: children's speech and literacy difficulties: 3. John Wiley & Sons.