ONLINE FRIST

SHORT SURVEY

SLPs Perspective on Stuttering Intervention through Technological Rehabilitation

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ABSTRACT

OBJECTIVE: To investigate the practising patterns of speech-language pathologists regarding technological Rehabilitation for stuttering intervention.

METHODOLOGY: This study employed a cross-sectional, quantitative design using a 5-point Likert scale. The data were collected from January to June 2023 at Riphah International University. This study employed convenience sampling techniques. The research focused on finding tools and Software for pattern-based therapy techniques that utilize technological Rehabilitation to improve the therapy process. The Data was collected from Speech Therapist Online through Google Forms and Riphah Rehabilitation Clinic. The inclusion criteria consist of only qualified Speech and Language Pathologists (SLPs) who use technological Rehabilitation in their therapies; any other disorders and comorbid disabilities were excluded. Data analysis was conducted through SPSS Version 21.

RESULTS: The study sample consisted of 242 respondents, including qualified speech-language pathologists (SLPs) and rehabilitation therapists from public and private hospitals and clinics. Results of the study show the highest frequency of Using technological Rehabilitation is beneficial for patients (117), Use of Technology helps to overcome lifelong challenges (111), Use of Software and devices in stuttering therapy (120), and Cost of Software is high (100)

CONCLUSION: The technological Rehabilitation in stuttering therapy; the majority of respondents give preference to using it, and they also recommend it to their peers. A similar number of respondents believe that technological Rehabilitation needs Software and devices that are costly, but they are hopeful about its future. The research emphasizes the call for future research on low-cost, accessible technology tools and longitudinal studies to measure their effectiveness.

KEYWORDS: Speech, Language, SLPs, Therapy, Technological, Rehabilitation

INTRODUCTION

Stuttering is also used as a term Stammering or Childhood-onset Fluency Disorder is a speech disorder that causes constant, habitual, and notable complications in the normal flow of speech. Individuals who suffer from stammering are aware of what they are trying to say, but they encounter obstacles in expressing it[1]. Stuttering is a speech disorder that is represented by the repetition of speech sounds, repetition of syllables in words or repetition of words in a sentence[2]. Stuttering is one of the communication disorders interrelated with psychological problems, negative frame of mind, social phobias, bullying in growing years and youth[3]. Technological interventions, such as speech apps, biofeedback devices, or virtual reality exposure, may assist in mitigating the psychological load by providing individualized, self-directed, and interactive therapy options. Hence, the incorporation of psychological support within technology-based interventions is critical for an integrated approach to stammering therapy[4].

Technological Rehabilitation may help patients fulfil their needs and daily life necessities, knocking down barriers and creating more space in education and communication[5]. Many practitioners across the Globe are using technological devices in their therapy sessions to rehabilitate patients, helping them maintain and balance their speech flow[6]. These devices are of different types. For example, a device used by a stuttered patient fits in the ear canal almost like a hearing aid, which digitally alters the patient's voice and plays it back into the ear, making the stuttered person feel as though they are speaking in unison with another person[7]. Stuttering can restrict the patient's capability in vocal communication and compromise speech behaviors that affect the fluency of speech[8].

To enhance fluency, the app or device can also utilize Delayed Auditory Feedback (DAF) and/or Frequency-shifted Auditory Feedback (FAF) to replay the speech with a slight delay or pitch change[9]. A wireless link makes the multi-component device less conspicuous than a single-component device[10]. Technology breakthroughs and the creation of various telecommunication systems are both results of innovation. Many healthcare providers are using telehealth as a result of technological advancements. The phrase "telemedicine" refers to medical services, such as diagnosis and treatment, that are provided by a doctor, nurse, or other healthcare professional across a distance.

Most people in the world use smartphones that run multiple applications. Smartphone applications can help with a variety of communication issues, including stammering. Smartphone applications have significant implications for healthcare due to their extensive impact on communication difficulties. Smartphone applications can be used to treat all communication difficulties, as well as other linked medical conditions. These applications contain all the information that enables clinicians or parents to rely on them. These applications, being adaptable, can be used in home training sessions and are helpful in therapy.

This study examines SLPs' perceptions about technology use in stuttering therapy. Technology offers several potential benefits, including greater access, interactive tools, enhanced data tracking, and more practice opportunities. However, the success of this integration relies on the skill of SLPs. Their input will be crucial for identifying effective technologies, developing suitable protocols, troubleshooting, and bridging the gap between research and practice. This area has limited research regarding SLP perspectives, which is what the present study attempts to address for the better improvement of stuttering intervention and client outcomes.

METHODOLOGY

This study employed a cross-sectional survey design. The data was collected from January to June 2023. A convenience sampling procedure was used to recruit participants in this study. A total of 242 speech-language pathologists (SLPs) participated, selected based on their availability and willingness to participate. The sample size was calculated using an online Sample Size Calculator[11]. The inclusion and exclusion criteria were applied to this study, as the inclusion criteria used only qualified speech and language pathologists and SLPs using technological Rehabilitation in their practices. The exclusion criteria include Therapists who do not or are limited in their practice with technology and apps. The data were collected through an online survey questionnaire. The study's questionnaire had two main sections. Section 1 was based on demographic information of the respondents, including their age, gender, qualification, work experience, and organization affiliation. Section 2 was based on one survey, and a 5-point Likert scale was used (with specific options of "Never," "Rarely," "Sometimes," "Always," and "Often") to examine the use of technological Rehabilitation by SLPs. The researcher obtained ethical approval from the research ethics committee (REC) before data collection, and permission was also secured from the relevant organizations to collect the data.

Statistical software SPSS was used for analysis. These variables were the use of technological Rehabilitation and Perceived benefits. These variables are compared with the demographic variable of the experience of SLPs. Correlation analysis had been conducted to examine the relationship between variables of perceived benefits of using technological Rehabilitation. Additionally, the regression analysis predicts the likelihood of using technological Rehabilitation based on demographic factors such as age, experience, and organizational affiliation.

RESULTS

The purpose of the study was to determine the practices of speech-language pathologists (SLPs) about technological rehabilitation-assisted stammering therapy. Of the respondents, the majority (55.4%) were in the 18–28 age group, with the smallest number in the 40–50 age group. Study participants were predominantly female (81.8%). Most participants (53.3%) had a master's degree in SLP, whereas postgraduate diplomas (PGDs) in SLP were the least common educational background. Concerning work experience, the majority (61.6%) had worked in hospitals and rehabilitation institutions for 1-4 years. **Table I**

Table I: Demographic Information of Participants

		Frequency	%
AGE	18-28	134	55.4
	29-39	90	37.2
	40-50	6	2.5
	51+	12	5.0
Gender	Female	198	81.8
	Male	44	18.2
Qualification	MS	129	53.3
	BS	86	35.5
	PGD	10	4.1
	Others	17	7.0
Work Experience	1-4 Years	149	61.6
	5-10 Years	49	20.2
	10+ Years	44	18.2
Job Organization	Rehabilitation Centre	84	34.4
	Hospital	74	31.4
	Clinic	56	23.1
	Others	28	11.6

Fewer participants (3.3%) never used technology rehabilitation in stammering therapy, compared to around 37.6% of respondents who used it occasionally. Furthermore, 37.6% of respondents reported occasionally feeling supported by the community through technology-assisted speech therapy for stammering. The affordability of Software varied; 33.5% thought it was sometimes inexpensive, while 8.7% never thought it was.

40% of the respondents preferred Software and programs for stammering therapy, and 47% frequently thought that patients with stammering would benefit from technology rehabilitation. But 38.8% said that their caseload occasionally prevented them from using technology rehabilitation. While 32.2% of respondents occasionally felt it helped them achieve their therapy goals, a sizable portion (38.4%) occasionally thought it was a waste of time. Furthermore, 45.9% of respondents frequently believed that technology could help individuals with stammering overcome their lifelong challenges. The majority (49.6%) frequently thought about employing Software and programs for stammering therapy, and 32.6% frequently advised their friends to use technological Rehabilitation for stammering therapy.

Table II: Practices of SLPs in technological rehabilitation-assisted stammering therapy

Statement	Never	Rarely	Sometimes	Often	Always
Have you used technological Rehabilitation in stammering therapy?	8	66	91	60	17
Do you think you get enough support from the community using technological Rehabilitation in stammering therapy?	8	42	88	91	13
Do you think software devices and apps are easily affordable for stammering therapy?	21	66	81	66	8
Do you give priority to using Software, apps and devices to use in stammering therapy?	18	34	97	72	21
Do you think using technological Rehabilitation is beneficial for patients with stammering?	4	20	86	117	15
Do you think in stammering therapy, technological Rehabilitation enhances its prognoses?	2	35	99	93	13
Do you think you are enough trained to use technological Rehabilitation in stammering therapy?	8	45	88	90	11
The cost of Software, apps and devices does not allow me to use technological Rehabilitation in stammering therapy.	8	29	83	100	22
Does case load prevent me from using technological Rehabilitation in stammering therapy?	10	45	94	80	13
Do you regard the use of technological Rehabilitation in stammering therapy as a waste of time?	12	47	93	63	27
Do you think using technological Rehabilitation helps achieve targeted goals in patients with stammering?	10	109	78	34	11
Do you think the use of technology helps to overcome the lifetime challenges of stammering patients?	8	4	96	111	23
Would you consider using Software, apps and devices in stammering therapy in the future?	2	17	81	120	22
Would you recommend other SLPs to use technological Rehabilitation in stammering therapy?	5	51	73	79	34

Table II shows That Positive correlations have been observed among the variables "Do you think the use of technology helps to overcome the lifetime challenges of stammering patients?" and "Would you consider using Software, apps and devices in stammering therapy in the

future?" (r = 0.653). Another Positive correlation between "Do you think using technological rehabilitation is beneficial for patients with stammering?" and "Do you think the use of technology helps to overcome the lifetime challenges of stammering patients?" (0.466), and "Do you think you get enough support from the community using technological rehabilitation in stammering therapy?" and "Do you think software devices and apps are easily affordable for stammering therapy?" (0.517).

Although there were significant correlations between the major variables, these do not create causation. Unobserved variables, such as personal experience, education, or exposure to technology, may influence the observed relationships. Thus, caution should be exercised in interpreting and future research using longitudinal designs or experiments is suggested to investigate causal mechanisms.

Table III: Correlation between variables

Statement	EU	S	A	P	B	ET	TU	CY	CP	WT	AG	LI	UI	TO
Ever used TR in ST.	1													
Support Community	.272**	1												
Is it Affordable?	.218**	.517**	1											
Prioritize Software?	.338**	.288**	.400**	1										
Beneficial for Patients	.317**	.463**	.148*	.507**	1									
Enhance prognoses?	.121	.268**	.320**	.106	.352**	1								
Trained to use?	.266**	.494**	.286**	.074	.295**	.284**	1							
Cost prevention	-.064	.238**	.144*	.009	.347**	.437**	.245**	1						
Caseloads prevent you	-.156*	.194**	.169**	.015	.232**	.388**	-.057	.531**	1					
Waste of time?	-.184**	.126	.255**	.065	.127*	.283**	.160*	.446**	.263**	1				
Achieve goals?	-.193**	.190**	.242**	-.249**	-.130*	.248**	.367**	.236**	.301**	.357**	1			
Lifetime challenges?	.253**	.307**	.315**	.351**	.466**	.432**	.435**	.419**	.178**	.383**	.123	1		
Use in the future?	.180**	.185**	.264**	.206**	.288**	.153*	.330**	.145*	.050	.245**	.121	.653**	1	
To other SLPs?	-.051	.005	.313**	.186**	-.012	.249**	.017	-.066	.304**	.194**	.262**	.095	.186**	1

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

DISCUSSION

The study "Practicing Patterns in SLPs for Stuttering Therapy Using Technological Rehabilitation" reveals a strong inclination among Speech-Language Pathologists (SLPs) in Pakistan to adopt technological Rehabilitation for Stuttering therapy. The mean values for the adoption and use of technological Rehabilitation in Stuttering therapy are above the midpoint (M = 3.05, 3.21, 3.17, and 3.19), which indicates that SLPs are willing to learn, adopt, and receive training in technological Rehabilitation. The positive perception among respondents reflects their readiness to integrate technology into their practice[12].

The study further highlights that SLPs recognize the significance of technology in improving Stuttering therapy, as indicated by the higher mean values. This recognition includes the benefits of enhanced prognosis, community support, and the use of smartphone applications, Software, and Stuttering-related devices, which play a crucial role in motivating clients[13]. Several previous studies support these findings. Lewis et al. demonstrated the effectiveness of Skype-delivered therapy, showing positive outcomes at both the initial and maintenance stages[14,15]. Similarly, Boey R 2022[16] assessed tele-practice during the COVID-19 pandemic in Belgium, where 1,222 German-speaking SLP participants identified a significant positive influence of tele-practice on individuals with speech disorders. Their results showed that most participants were satisfied with tele-practice, validating its potential as an effective therapy method.

Additionally, the research emphasized that tele-practice can effectively be applied to clients of all ages, including those with comorbid conditions[17]. Another Skype-based study, involving 49 participants, further confirmed the benefits of this approach, with participants in both experimental and clinical groups showing significant progress. These findings align with larger studies that suggest tele-practice provides low-cost stuttering therapy that is as effective as other approaches[15,18].

While technology, including equipment, virtual tools, and assessment software, serves as an adjunct to the treatment process, it must support rather than substitute for face-to-face interventions[19]. Treatment will require the support of trained speech-language pathologists knowledgeable in the management of stuttering to achieve the best results[20]. The integration of technology into stuttering therapy ultimately empowers individuals to achieve their communication goals and enhances their quality of life. However, mixed perceptions regarding tele-practice exist[21,22]. The data indicate in **Table II** that while 47% of respondents frequently believe technology can benefit stammering therapy, only 32.2% feel that it consistently helps achieve therapy goals. Furthermore, 38.4% occasionally consider technology-based Rehabilitation a waste of time, which may stem from difficulties in implementation, technical challenges, or a lack of sufficient training[23].

Financial and accessibility barriers also pose challenges to the adoption of technological rehabilitation in stuttering therapy[24]. The affordability of tele-practice tools is a significant concern, as 33.5% of respondents believed that Software and applications were occasionally affordable, while 8.7% never found them inexpensive. Financial constraints may therefore limit the widespread adoption of tele-practice tools in SLP, emphasizing the need for cost-effective solutions and funding. The study highlights that these applications provide feedback on both correct and incorrect ways of performing exercises; however, there are barriers to purchasing these devices, as they are not free of cost and may not always be available on demand[15]. Several studies indicate the promising role of technology in stuttering therapy; however, in Pakistan, due to high inflation, the cost of these devices is also high, making them inaccessible to all

clients[25,26]. Chaudhary C 2022[4] examined similar challenges, noting that such devices cannot be easily purchased for home use. Instead, government initiatives must be introduced to facilitate access to stammering-related Software and devices for clients. However, despite financial barriers, SLPs remain optimistic that they will eventually find a way to implement these technologies. The study also found that recommending technological Rehabilitation in Stuttering therapy to peers is a priority for SLPs, aligning with the findings of Butt M 2022[27].

The study further reinforces the idea that Stuttering therapy presents lifelong challenges, and these challenges can be addressed through technological Rehabilitation. The mean score indicates that SLPs recognize the importance of overcoming these challenges and designing well-fitted solutions for clients[22]. These findings are consistent with the results of studies conducted by Wang JC 2023[19] and Mwangi IA 2023[28]. The survey findings, summarized in **Table II**, reveal that while the majority of SLPs are currently using technology-supported Stuttering therapy, there is potential for greater adoption. The main barriers include access to technology, cost, level of training, and caseload management. Even when respondents appreciate the advantages of technology-supported therapy, concerns persist regarding its effectiveness and the necessary level of training. The study recommends ongoing professional education, technical support, and cost-effective solutions to facilitate the implementation of tele-practice.

CONCLUSION

The results of the study show that speech-language pathologists (SLPs) from different backgrounds and workplaces with varying levels of experience in their work, whether working in rehabilitation centres, hospitals, or private clinics, perceive the stuttering therapy approach positively. Their attitude towards using technological Rehabilitation in their daily practice is also positive. However, there are some barriers regarding the cost of the Software and stuttering devices. The benefits of technological Rehabilitation in stammering therapy include improved prognosis, positive feedback from clients, enhanced attachment to community members, and recommending the treatment to peers.

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AUTHOR CONTRIBUTION

Aziz F:	Conceptualization, methodology, formal analysis, writing original draft
Zahra SM:	Literature review, data curation, writing, review and editing, supervision
Hassan H:	Data collection, statistical analysis, visualization
Riaz M:	Project administration, validation
Javed A:	Review and editing, proofreading, final approval for manuscript
Irum A:	Review and editing

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