Research Article

Parental Satisfaction in Tele and Face-to-Face Listening Training: Insights from COVID-19 Pandemic

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Highlights

- Tele-intervention benefits in audiology during COVID-19
- Face-to-face therapy is preferre by parents
- Audiologists should be aware of factors affecting tele-therapy outcomes

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ABSTRACT

Background and Aim: The use of tele-intervention services in audiology has grown exponentially, as it has the potential to address many of the key challenges during the pandemic. The present study focused on the survey of parental satisfaction on listening therapy of their Hearing-Impaired (HI) children in tele and face-to-face mode during COVID-19 pandemic.

Methods: Parents of children with Hearing Impairment (HI) who attended tele and face-to-face therapy sessions participated in the study. Group I participants were 25 parents of 0–3 years' children with HI (mean age 1.8±0.25 y), while Group II had 25 parents of children with HI aged 3.1–5 years (mean age 4.1±0.33 y). The adapted and validated questionnaire was administered.

Results: Frequency count and percentage were detailed for all questions across groups. The chi-square test of association revealed a significant difference between the tele and face-to-face therapy across the ratings in both groups, with parents rating better satisfaction and therapy efficacy in face-to-face therapy compared to tele-therapy. Principal Component Analysis (PCA) revealed that few questions can best categorize the variance in satisfactory ratings between the two therapy conditions.

Conclusion: The findings of the study showed that tele-listening therapy appears to be a promising rehabilitative option in the COVID-19 pandemic when factors affecting its successful implementation are considered, although in the present conditions parental satisfaction ratings are higher for face-to-face therapy.

Keywords: Parental satisfaction; COVID-19 pandemic; questionnaire; children; hearing-impaired

Introduction

Hearing loss affects 34 million children worldwide [1]. According to the Institute for health metrics and evaluation, global burden of disease study reveals that congenital hearing loss accounts for 2.75% of the total congenital defects globally, in the children aged 0–5 years [2]. Region-wise analysis of the prevalence of disabling hearing impairment (>30 dB HL) in children aged 0–5 years was highest in Asia, east Asia and Oceania (2.94 %, range 2.51–3.4%), sub-Saharan Africa (2.84%, range: 2.4–3.87%), south Asia (2.47%, range: 2.08–2.86%), while it was lowest (1.5%, range: 1.33–1.77%) in the high-income regions of North-America (World Health Organization, 2016). Given the prevalence of hearing impairment across the regions, it is important to highlight the need for early detection, identification, and diagnosis of hearing loss. This subsequently facilitates the timely delivery of early intervention services. If early communication intervention services commences before the age of six months and if family-centered intervention is continuously offered during the critical period of central auditory pathway development (0–5 years), a child can develop language abilities that are similar to those of normal-hearing peers [3].

Audiologists are the fore-bearers of hearing health care professionals who are involved in prevention, assessment and treatment of hearing disorders. They are also offer hearing rehabilitation services for children with hearing difficulties, along with counselling for their family. According to a recent report from the American Speech and Hearing Association (ASHA), the ratio of certified audiologists to population was approximately 4.1 audiologists for one million residents in United States of America (USA) in recent years (ranging from 4.0–4.1 from 2010 to 2019) [4]. The shortage of the Audiologists is not only felt in USA, but also in other regions of world. For instance, the audiologist -to-population ratio ranging as low as 1 per 500000 people in India [1, 5] to 4000 per 60 million in developed countries like the United Kingdom [6].

A recent breakthrough that addresses the scarcity of professionals is utilization of digital platforms for delivering hearing care services known as ‘Tele-health services’. Tele-health is a method of providing healthcare services remotely via distance technologies. It has proven effective for remote screening, diagnosis, intervention, counselling, education and specialised interdisciplinary care. Furthermore, it holds the potential to alleviate the supply-demand imbalance in intervention services by granting families of children with hearing loss increased access to properly trained clinicians. This method of remote service delivery is referred to as tele-intervention [7]. With the advent of 4G and 5G internet connectivity and cost-effective internet services, tele-intervention services are increasingly becoming popular, particularly in locations where in-person interactions with are challenging or overly costly [3].

According to studies and literature reviews, tele-intervention has emerged as a viable alternative to conventional methods in the field of audiology, specifically in neonatal and infant hearing assessment [8, 9], as well as in providing tele-intervention such as programming hearing aids and online therapy for children using hearing aids [10-12]. Clinicians involved in tele-intervention programs for children with hearing loss, report several advantages. These include active parental engagement, rapid acquisition of early intervention skills, and easier integration of therapy strategies into daily life. Furthermore, clinicians reported increased participation from fathers and other family members [12]. Tele-listening training sessions enabled parents to continue guiding their children’s training at home through online therapist assistance. Despite the technical difficulties and poor cooperation of a few young children attending tele-therapy sessions, parental satisfaction with tele-therapy sessions has been notably higher. This favourable feedback from parents highlights the positive outcomes of digital revolution in health-service delivery of audiologists, during the COVID-19 pandemic [13].

The outbreak of COVID-19, has led to exponential growth in tele-intervention services in audiology. This approach has proven effective in addressing many of the challenges during the pandemic. Tele-intervention helped audiologists to avoid direct physical contact and minimize the risk of COVID-19 transmission, also enabling them to provide uninterrupted care to the hearing-impaired children, even during the nation-wide lockdown. The COVID-19 scenario placed serious limitations on transport and public services, which forced many audiologists to deliver services including listening training virtually. Although tele-intervention

proved to be effective during the pandemic and offers many benefits, its implementation in certain settings may pose challenges. The required infrastructure, including equipment and high-quality broadband internet connectivity (necessary for reliable video communication between the clinician and the family), is often expensive and unavailable in communities where children and their families need it most. Even with proper infrastructural setup, audio and video quality can be unpredictable due to other external factors. Some families may experience a lack of confidence with technology and even those who are comfortable using technology might need technical support. Another creating an ideal therapy space in the house, considering both acoustic and visual aspects, can be challenging. Lastly, some families may simply prefer the physical presence of the clinician. It is thus important to bear in mind that tele-intervention is merely one possible vehicle for delivering quality family centred early intervention services. Despite its challenges, preliminary evidence suggests that tele-intervention could be used to overcome barriers like the shortage of trained early-intervention providers and the high costs of providing services to geographically dispersed families of children with hearing loss [12-15].

Although the efficacy of tele-intervention for children with hearing loss is empirically proven [12], there is limited evidence on its clinical efficacy compared to conventional face-to-face intervention. Therefore, the current study aimed to investigate the effectiveness of tele-therapy for children with hearing impairment and compare it with face-to-face listening therapy, based on listening and language performance of the children using amplification devices. In addition, the study also assessed the parental/caregiver's satisfaction with these intervention modes (tele and face-to-face therapy) using a structured survey questionnaire.

Methods

Study design and participants

The research followed a within-subject design. 50 parental satisfaction ratings of children using hearing aids in tele and face-to-face listening therapy were compared. To facilitate comparison, the study selected children who had previously attended face-to-face listening training sessions before pandemic and were later attended tele- listening training sessions during the pandemic. The study involved analyses of retrospective data of children using hearing aids and availing listening therapy in the Listening Training Unit of an autonomous institute under the Ministry of Family and Health Welfare, Government of India. In the face-to-face sessions, therapy was conducted in a silent room, where the clinician directly interacted with the children. In contrast, the tele-listening training sessions were conducted using google meet, with at least 4G broadband connectivity.

Children taken for the study were diagnosed with hearing loss ranging from moderate to profound. All these children were using hearing amplification devices, mostly binaural digital hearings or cochlear implant. However, the listening age of these children varied between three months to forty-two months. The participants were divided into two groups based on the age of intervention of the child. Group I comprised of parents of children aged 0–3 years (mean age 1.8±0.25 y) and Group II (mean age 4.1±0.33 y, 24 males; 26 females) included parents of children aged 3.1–5 years. Each group consisted of 25 participants, this a total of 50 participants answered the survey questionnaire. The parents of the children enrolled in the study belonged to both urban and rural areas, had at least a primary education level, and English as their second language.

Procedure

All the participants were contacted over the telephone to explain the study and obtain their consent for participation. Verbal consent was obtained over telephone from all the participants, considering the participants' social distancing norms and safety for inclusion into the study. Each participant was thoroughly explained the purpose of the research study. Before administering the questionnaire (Appendix A), information regarding the child's age, duration of face-to-face therapy and tele-therapy, education of the parent, and socioeconomic status were also collected and documented. Further, information regarding their living place, mode of attending the tele-listening training session, education level of the parents was also collected. Parents were also asked to provide any additional comments or opinion relating to each section of the questionnaire wherever appropriate.

Tele-therapy sessions for the hearing impaired

children were scheduled on twice or thrice in a week. These sessions were conducted through video conferencing or other online platforms (Gmeet and zoom), enabling children with hearing loss to receive therapy regardless of their geographic location, provided there was stable internet connection with sufficient bandwidth. The expanding internet infrastructure in India facilitated by the government based programs like BharatNet, has contributed to rapid growth of tele-health services in recent years. This enables individuals with hearing loss to access specialized support and guidance from professionals, regardless of their physical location.

Prior to the start of tele-therapy services, the language level of each child was obtained using standardized tests like Receptive and Expressive Emergent Language Scale (REELS) [16], and Assessment Checklist for Speech –Language Skills (ACSLS) [17]. Listening age of the child was assessed through listening age checklist [18]. Sessions were tailored based on the child's listening age, including activities like auditory awareness, auditory discrimination, identification, comprehension, memory and sequencing exercises, along with parental counselling and home-training. The therapist used use various resources such as PowerPoint presentations, visual aids with auditory sound first approach, videos, and online materials were employed by therapists to facilitate the learning process. For e.g. to improve auditory identification of environmental sounds, variety of pre-recorded audio clips representing different environmental sounds (e.g. car honking, bird chirping, doorbell ringing, water running, etc.) were embedded in PowerPoint and hyperlinked to corresponding images. The clinician will then click on the display showing audio icon, and the audio file in the pre-determined sequence will be played. The child was then asked to point out picture which could have produced it. Reinforcement and feedback for the child's responses were provided. Based on the learning, the difficulty level was increased by including more challenging sounds within a category or asking the child to categorize the sounds into groups (e.g. animal sounds, household sounds, transportation sounds). A home-training material was given to the parent at the end of the session and he/she was counselled how to conduct the activity at home and how to encourage the child's participation in the activity. The activities for auditory learning and the progression to levels were similar in face-to-face therapy too, only with an exception that these involved direct physical contact and therapy. Child's receptive, expressive language age and listening age were documented before and after face-to-face and tele-listening training sessions.

Parents were asked to fill the questionnaire (Appendix A) through the google forms. The parent satisfaction questionnaire adapted from Constantinescu [19], aimed to gather information on tele-mode and face-to-face therapy sessions. The questionnaire was administered in the same language in which it was developed i.e. English. All the parents involved in the study had completed ten grade, with English as their second language. The educational background was considered as an inclusion criterion, so as to ensure that the participants could comprehend the questionnaire in English.

After obtaining permission from Constantinescu [19], the questionnaire was adapted and validated for the present study. The procedure for adaptation comprised of reviewing, revising and appropriately adapting the questionnaire. The questions that were culturally or socially inappropriate were replaced by more relevant questions by 4 experienced audiologists who had a minimum of 5 years of clinical research experience. They were asked to mark the questions as highly relevant or not relevant. The items were revised based on the suggestions provided by the experts for rephrasing and relevancy. The Content Validity Index (CVI) was applied [20]. Questions with CVI above 0.75 were retained. All the questions received a CVI score of 0.8, indicating a good content validity. The adapted modified questionnaire was divided into 2 sections. Section A had 20 questions related to tele-listening training and section B had 12 questions related to face-to-face listening training sessions, including the suggestions provided at the time of content validation. The adapted questionnaire was validated and it contained questions related to different aspects of tele and face-to-face listening training. It covers aspects related to child's attention, interaction during therapy, involvement in therapy, confidence level of the clinician, parent and child during therapy, comfort during the sessions, progress after therapy, support from the therapist, overall satisfaction sound and video quality, technical difficulties, internet connection, equipment's use, treatment efficacy, discussion on progress and quality of the services. Only 12 common questions were used for comparison and analysis between the therapy conditions.

Data analyses

The raw scores of the collected data were subjected to statistical analysis using IBM Statistical Package Social Sciences, version 26.0 (IBM Corp, Armonk, NY). Chi-square test was conducted to find the association (if any) between the satisfaction ratings across questions in each group and condition. Further test of residuals was carried out between the conditions of tele-therapy and face-to-face therapy for each rating (agree, disagree & neutral) for each question in each group. In addition, to elucidate the questions that best categorize the variance in satisfactory ratings between the two therapy conditions in each group, Categorical Principal Component Analysis (PCA) was carried out.

Results

The detailed demographic characteristics of the parents and children who participated in the study is provided in Table 1.

Comparison between tele-therapy and face-to-face therapy ratings of parent satisfaction and child's progress in group I (0-3 y) and group II (3.1–5 y):

Table 2 shows the frequency count and percentage of responses between the two therapy conditions (tele-therapy and face-face therapy) in group I for all questions. The corresponding data for group II is given in Table 3. In general, the parents of children both in group I and group II reported higher satisfaction rates for face-to-face therapy compared to the tele-therapy. For eg., in group I, 84% (n=21) of parents reported BEING satisfied ("agree") with rapport building and interaction in face-to-face therapy, whereas only 12% (n=3) opted "agree" for satisfaction with rapport building in tele-therapy. Similar pattern was observed for other questions in both the groups.

The chi-square test of association revealed a significant difference ($p<0.01$, with Bonferroni correction for multiple pairwise comparison at 0.008 derived from 0.05 divided by 6 and rounded to 0.01) between the tele and face-to-face therapy in both groups, as shown in Tables 4 and 5. For the parents with children in younger group (group I), there were significant difference between the two therapy conditions except for the parameters of comfort and session quality. Whereas for the older group participants (group II), significant differences between therapy conditions were found in the parameters such as satisfaction, child interaction and service recommendation.

Certain questions were highly specific to the audio and video quality of tele-listening therapy sessions. Regarding audio and video quality during tele-therapy, only 11.8% (n=6), and 15.7% (n=8) "agreed" that it was of acceptable quality. Others reported it as poor quality. Also, 33.3% (n=17) reported encountering technical difficulties, requiring troubleshooting during tele-therapy sessions, while 37.3% (n=19) "agreed" that equipment use in tele-therapy was straightforward. Only 9.8% (n=5) were comfortable using the equipment initially, but with continued use, 70.6% (n=36) become comfortable with usage of equipment.

Categorization of the variance in satisfactory ratings between the two therapy conditions in each group

The results of categorical PCA showed that for group I, all the questions carried equal weightage and collectively explained an overall variance of 66.19% on dimension/Principal Component 1 (PC1) in face-to-face data. In contrast, dimension 1/PC1 explained relatively lesser variance (32.98%) in tele-therapy data. The component loadings and the variance explained by each question in PC 1 and PC 2 is shown in Figure 1.

For group I (0–3 y), visual inspection of Figure 1 (upper panels), shows that the two therapy conditions can be categorised based on PC1. Tele-therapy condition exhibited lower weightages (canonical co-efficient/component loading range: –1.0 to 0.0) for questions Q5, Q6, Q8, and Q7 (see Appendix A), compared to relatively higher weightage (canonical co-efficient/component loading 0.0 to 1.0) in face-to-face therapy.

On other hand, in group II (3.1–5.0 y) the overall variance explained by PC1 was 61.94% and 86.52% for tele-therapy and face-to-face therapy condition, respectively. In contrast to group I, the weightages of questions in tele-therapy conditions followed a distinct trend. In group II, while a similar trend as in group I was noticed for the face-to-face therapy - where all the questions along PC1 carried relatively higher importance (canonical co-efficient/component

Table 1. Detailed demographic characteristics of the parents and children who participated in the study

Demographic details		Group I		Group II	
		N	%	N	%
Education of the parent	Grade 10/SSLC	6	24	5	20
	Graduation	11	44	8	32
	Post–graduation	8	32	12	48
Gender of the child	Male	13	52	11	44
	Female	12	48	14	56
Duration of hearing problem	0–6 months	6	24	3	12
	6 months-1 year	12	48	8	32
	1–3 years	7	28	10	40
	>3 years	0	0	4	16
Degree of hearing loss in left ear	Moderate	1	4	0	0
	Moderately severe	3	12	1	4
	Severe	7	28	2	8
	Profound	14	56	22	88
Degree of hearing loss in right ear	Moderate	1	4	0	0
	Moderately severe	3	12	0	0
	Severe	7	28	4	16
	Profound	14	56	21	84
Family income*	Less than 15000	19	76	22	88
	Greater than 20001	5	20	2	8
	Between 15001–20000	1	4	1	4
Listening age before face-to-face therapy	0–3 months	4	16	1	4
	4–6 months	5	20	1	4
	7–9 months	5	20	1	4
	10–12 months	1	4	4	16
	13–15 months	5	20	2	8
	16–18 months	4	16	5	20
	19–24 months	1	4	3	12
Listening age after face-to-face therapy	0–3 months	1	4	0	0
	4–6 months	9	36	2	8
	7–9 months	7	28	3	12
	10–12 months	6	24	4	16
	13–15 months	1	4	5	20
	16–18 months	1	4	4	16
	19–24 months	0	0	6	24
Receptive language age before face-to-face therapy	<2–2.11	20	80	13	52
	2–2.11	5	20	12	48
Receptive language age after face-to-face therapy	<2-2.11	15	60	10	40
	2-2.11	8	32	13	52
	3-3.11	2	8	2	8
Expressive language age before face-to-face therapy	<2–2.11	23	92	20	80
	2-2.11	3	12	5	20
Expressive language age after face-to-face therapy	<2–2.11	15	60	14	56
	2–2.11	10	40	11	44

Demographic details		Group I		Group II	
		N	%	N	%
Listening age before tele-sessions	0–3 months	1	4	0	0
	4–6 months	9	36	1	4
	7–9 months	6	24	2	8
	10–12 months	2	8	2	8
	13–15 months	5	20	3	12
	16–18 months	2	8	4	16
	19–24 months	0	0	4	16
	25–30 months	0	0	3	12
	>30 months	0	0	6	24
Listening age after tele-sessions	0–3 months	0	0	0	0
	4–6 months	6	24	1	4
	7–9 months	5	20	1	4
	10–12 months	2	8	3	12
	13–15 months	6	24	5	20
	16–18 months	3	12	4	16
	19–24 months	2	8	3	12
	25–30 months	0	0	2	8
	>30 months	0	0	6	24
Receptive language age before tele-sessions	<2–2.11	14	56	9	36
	2–2.11	9	36	14	56
	3–3.11	2	8	2	8
Receptive language age after tele-sessions	<2–2.11	10	40	7	28
	2–2.11	9	36	15	60
	3–3.11	4	16	3	12
Expressive language age before tele-sessions	<2–2.11 years	13	52	11	44
	2–2.11	12	48	13	52
Expressive language age after tele-sessions	<2–2.11 years	10	40	9	36
	2–2.11 years	13	52	16	64

* Classified based on ADIP (assistance to disabled persons for purchase/fitting of aids and appliances) scheme

loading of>0.7), the tele-therapy condition showed relatively lesser weightage (canonical co-efficient/ component loading 0.20 to 0.65, Figure 1, lower panels) for questions Q5, Q6, Q7, Q8 (see Appendix A) compared to face-to-face sessions. This makes these 4 questions crucial for distinguishing the parental satisfaction ratings between therapy sessions. While 4 questions (Q5, Q6, Q7, Q8) easily categorise the tele from face-to-face sessions in both the age groups, the degree to which they categorise these differences are more pronounced in group I than Group II, as can be interpreted from the component loadings (Figure 1) with these questions.

Discussion

The need for tele-therapy became mandated in the field of Audiology due to the COVID-19 pandemic. The necessity for protective tools like a face mask, sanitizers, social distancing, and other obligations was challenging during face-to-face therapy at the time of pandemic crisis [22]. Also, the lack of transportation made way for the initiation of tele-listening training as a priority for audiologists as the children with hearing loss are in the critical age of development [23]. The comparison of parents' satisfaction concerning the tele-therapy and face-to-face therapy is essential as it provides way to

Table 2. Responses to the parent satisfaction questionnaire by participants in group I (0–3 y)

Sl. No	Questions	Conditions	Responses in %(n)		
			Disagree	Neutral	Agree
1	Satisfaction with the level of rapport/interaction	Face-to-face	12(3)	4(1)	84(21)
		Tele-therapy	32(8)	56(14)	12(3)
2	Rehabilitation efficacy	Face-to-face	8(2)	12(3)	80(20)
		Tele-therapy	32(8)	40(10)	28(7)
3	Overall satisfaction with the therapist	Face-to-face	4(1)	16(4)	80(20)
		Tele-therapy	32(8)	48(12)	20(5)
4	Comfort while participating in the sessions	Face-to-face	4(1)	12(3)	84(21)
		Tele-therapy	12(3)	36(9)	52(13)
5	Quality and delivery of the sessions	Face-to-face	0(0)	16(7)	84(21)
		Tele-therapy	28(7)	12(3)	60(15)
6	Comfort in discussing family matters	Face-to-face	0(0)	12(3)	88(22)
		Tele-therapy	4(1)	28(7)	68(17)
7	Confidence in therapist in gaining an understanding of child's development	Face-to-face	0(0)	4(1)	96(24)
		Tele-therapy	8(2)	36(9)	56(14)
8	Complete involvement of child in sessions	Face-to-face	8(2)	24(6)	68(17)
		Tele-therapy	68(17)	16(4)	16(4)
9	Child progression throughout the sessions	Face-to-face	4(1)	36(9)	60(15)
		Tele-therapy	52(13)	40(10)	8(2)
10	Child attentiveness in sessions	Face-to-face	4(1)	28(7)	68(17)
		Tele-therapy	56(14)	36(9)	8(2)
11	Child interaction and participation with the clinician	Face-to-face	8(2)	20(5)	72(18)
		Tele-therapy	68(17)	32(8)	0(0)
12	Recommendation of service to others	Face-to-face	4(1)	12(3)	84(21)
		Tele-therapy	36(9)	48(12)	16(4)
13	Overall (average of all questions)	Face-to-face	4.66(1.16)	16.33(4.33)	79(19.75)
		Tele-therapy	35.66(8.91)	35.66(8.91)	28.66(7.17)

improvise on the lacunae in professional services during rehabilitation. The results of the present study found that the rate of the progress in the language outcomes were lower in tele-therapy than the face-to-face listening therapy (Table 1). In contrast, the report of Grogan-Johnson et al. [24] showed the speech and language progress made is similar between both the conditions.

Unlike the report that the satisfaction through tele-sessions is effective as conventional therapy sessions of Constantinescu [19], the present study highlights that though the parents are satisfied with the tele-therapy, the satisfaction, comfort and child's interaction were rated relatively higher for face-to-face therapy (Tables 2 and 3). This observation was true for both the age groups. While Grogan-Johnson et al. [24] reported no statistically significant differences between tele-intervention and in-person services in parent perceptions of confidence in supporting their child's language development, coaching and support practices, or in developing a positive parent-professional partnership, another study [25] report very high parental satisfaction rates (ranging from 90%–96%) in tele-intervention. While 96% of parents of children with speech and language disorder

Table 3. Responses to the Parent Satisfaction Questionnaire by participants in group II (3.1–5 years)

Sl. No	Questions	Conditions	Responses in %(n)		
			Disagree	Neutral	Agree
1	Satisfaction with the level of rapport/interaction	Face-to-face	0(0)	16(4)	84(21)
		Tele-therapy	16(4)	36(9)	48(12)
2	Rehabilitation efficacy	Face-to-face	0(0)	16(4)	84(21)
		Tele-therapy	12(3)	28(7)	60(15)
3	Overall satisfaction with the therapist	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	16(4)	52(13)	32(8)
4	Comfort while participating in the sessions	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	12(3)	28(7)	60(15)
5	Quality and delivery of the sessions	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	12(3)	32(8)	56(14)
6	Comfort in discussing family matters	Face-to-face	0(0)	24(6)	76(19)
		Tele-therapy	20(5)	28(7)	52(13)
7	Confidence in therapist in gaining an understanding of child's development	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	16(4)	32(8)	52(13)
8	Complete involvement of child in sessions	Face-to-face	0(0)	24(6)	76(19)
		Tele-therapy	36(9)	32(8)	32(8)
9	Child progression throughout the sessions	Face-to-face	0(0)	32(8)	68(17)
		Tele-therapy	16(5)	52(13)	32(8)
10	Child attentiveness in sessions	Face-to-face	0(0)	24(6)	76(19)
		Tele-therapy	40(10)	36(9)	24(6)
11	Child interaction and participation with the clinician	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	20(5)	52(13)	28(7)
12	Recommendation of service to others	Face-to-face	0(0)	20(5)	80(20)
		Tele-therapy	12(3)	52(13)	36(9)
13	Overall (average of all questions)	Face-to-face	0(0)	21.33(5.33)	78.66(19.66)
		Tele-therapy	19(4.83)	38.33(9.58)	42.66(14)

reported that tele-therapy was a handy alternative, 88% believed that face-to-face consultation is required after six months of tele-sessions [25]. There are studies that reported the parents satisfaction to be 76% with the online listening training and felt it was as comfortable as face-to-face therapy [13, 19]. Although in present study the overall parental satisfaction rating (Table 2) in face-to-face (79%) therapy was much higher than tele-therapy (28.66%), considering COVID-19 restrictions and other emotional reactions of parents during COVID-19 when tele-sessions were provided, the reduction in satisfaction ratings can be understood. The other reason could be better clinician-child interaction in face-to-face therapy. The children can have better rapport and bonding with the clinician, when they are physically available during therapy (as in case of face-to-face therapy). The clinicians are able to understand the needs, abilities and support skills for the child's development. This enables the child to cope with the set auditory goals and the activities during the therapy sessions. The clinicians are also able to monitor the responses efficiently. This bonding enables the parents to understand the activities and the listening strategies that are followed to elicit the response from the child better in face-to-face therapy.

Table 4. Results of Chi-square test and test of residuals between face-to-face and tele therapy across questions to the parents for Group I (0–3 y)

Questions	Chi-square test	Test of residuals (Tele, face-face)		
		Disagree	Neutral	Agree
Satisfaction with the level of rapport/interaction	27.04 p<0.001	NS p=0.23	p<0.001***	p<0.001***
Rehabilitation efficacy	13.63 p=0.001	NS p=0.11	NS p=0.07	p<0.001***
Overall satisfaction with the therapist	18.44 p<0.001	NS p=0.03	NS p=0.06	p<0.001***
Comfort while participating in the sessions	5.88 p=0.05	NS p=0.61	NS p=0.14	NS p=0.06
Quality and delivery of the sessions	8.14 p=0.02	NS p=0.61	NS p=0.38	NS p=0.24
Comfort in discussing family matters	6.21 p=0.04	NS p=0.38	NS p=0.02	p=0.01**
Confidence in therapist in gaining an understanding of child's development	11.03 p=0.01	p<0.001***	NS p=0.78	p<0.001***
Complete involvement of child in tele-sessions	20.29 p<0.001	p<0.001***	NS p=0.96	p<0.001***
Child progression throughout the tele-sessions	20.28 p<0.001	p<0.001***	NS p=0.84	p<0.001***
Child attentiveness in sessions	23.35 p<0.001	p<0.001***	NS p=0.84	p<0.001***
Child interaction and participation with the clinician	30.53 p<0.001	p<0.001***	NS p=0.61	p<0.001***
Recommendation of service to others	23.36 p<0.001	NS p=0.02	NS p=0.02	p<0.001***

NS; no significant differences
** significantly different at p<0.01, *** significant at p<0.001. Bonferroni correction for multiple pairwise comparison is 0.008 (0.05/6), rounded to 0.01)

In contrast the tele-intervention is highly conducive to parent coaching as the physical separation from the service provider or the clinician requires parents to carry out the intervention activities [26]. It has also been reported that 20.5% of the participant expected the tele-practice to be poorer [27]. According to Havenga et al., no significant difference was obtained between tele-intervention and conventional intervention in terms of communication performance of children and clinicians perspective, there was a significant differences were evident for parents' comfort level during the session and more beneficial experience in face-to-face session [12].

Based on the findings from categorical PCA (Figure 1), the following inferences about the parental satisfaction ratings between the therapy conditions (face-to face verses tele):

Segregation of Parental Satisfaction Ratings

The questions Q5, Q6, Q7, and Q8 in Appendix A were found to be influential in differentiating parental satisfaction ratings between tele-sessions and face-to-face sessions. These questions specifically related to aspects of clinician interaction with the child and family.

Table 5. Results of Chi-square test and test of residuals between face-to-face and tele-therapy across questions to the parents for group II (3.1- 5 y)

Questions	Chi-square test	Test of residuals (Tele, face-face)		
		Agree	Neutral	Disagree
Satisfaction with the level of rapport/interaction	8.37 p=0.02	NS p=0.11	NS p=0.27	NS p=0.03
Rehabilitation efficacy	4.81 p=0.09	NS p=0.20	NS p=0.59	NS p=0.17
Overall satisfaction with the therapist	12.01 p=0.01	NS p=0.11	NS p=0.06	p<0.001***
Comfort while participating in the sessions	4.05 p=0.13	NS p=0.21	NS p=0.16	NS p=0.31
Quality and delivery of the sessions	4.75 p=0.09	NS p=0.21	NS p=0.63	NS p=0.19
Comfort in discussing family matters	6.20 p=0.05	NS p=0.20	NS p=0.63	NS p=0.19
Confidence in therapist in gaining an understanding of child's development	6.17 p=0.05	NS p=0.06	NS p=0.95	NS p=0.21
Complete involvement of child in tele-sessions	13.76 p=0.001	NS p=0.11	NS p=0.62	NS p=0.11
Child progression throughout the tele-sessions	8.43 p=0.05	p<0.001***	NS p=0.83	p<0.01**
Child attentiveness in sessions	17.36 p<0.001	NS p=0.11	NS p=0.36	NS p=0.05
Child interaction and participation with the clinician	10.08 p=0.01	p<0.001***	NS p=0.65	p<0.001***
Recommendation of service to others	10.73 p=0.01	NS p=0.20	NS p=0.06	p<0.01**

NS; no significant differences
** significantly different at p<0.01, *** significant at p<0.001. Bonferroni correction for multiple pairwise comparison is 0.008 (0.05/6), rounded to 0.01)

It suggests that the limitations of technology and the use of masks in tele-sessions affected the ease of reading facial and body expressions of the clinician, resulting in reduced comfort for the parents during interactions.

Age group differences

The discriminability between tele and face-to-face therapy sessions varied based on the age groups. group I, consisting of children aged 0–3 years, showed more apparent categorization (through questions Q5, Q6, Q7, and Q8) of the conditions compared to group II, consisting of children aged 3.1–5 years. This indicates that the satisfaction ratings were influenced by the interaction between the child's listening age and chronological age. group II, being older and potentially having a higher listening age, showed less discrimination between the two types of sessions, suggesting they were more engaged and attentive to the clinician during tele-sessions. The advantages of tele-practice, such as reduced travel burden and improved accessibility to remote listening therapy services, along with increased attention of the child (owing to their age) might have outweighed the drawbacks in this older age group (group

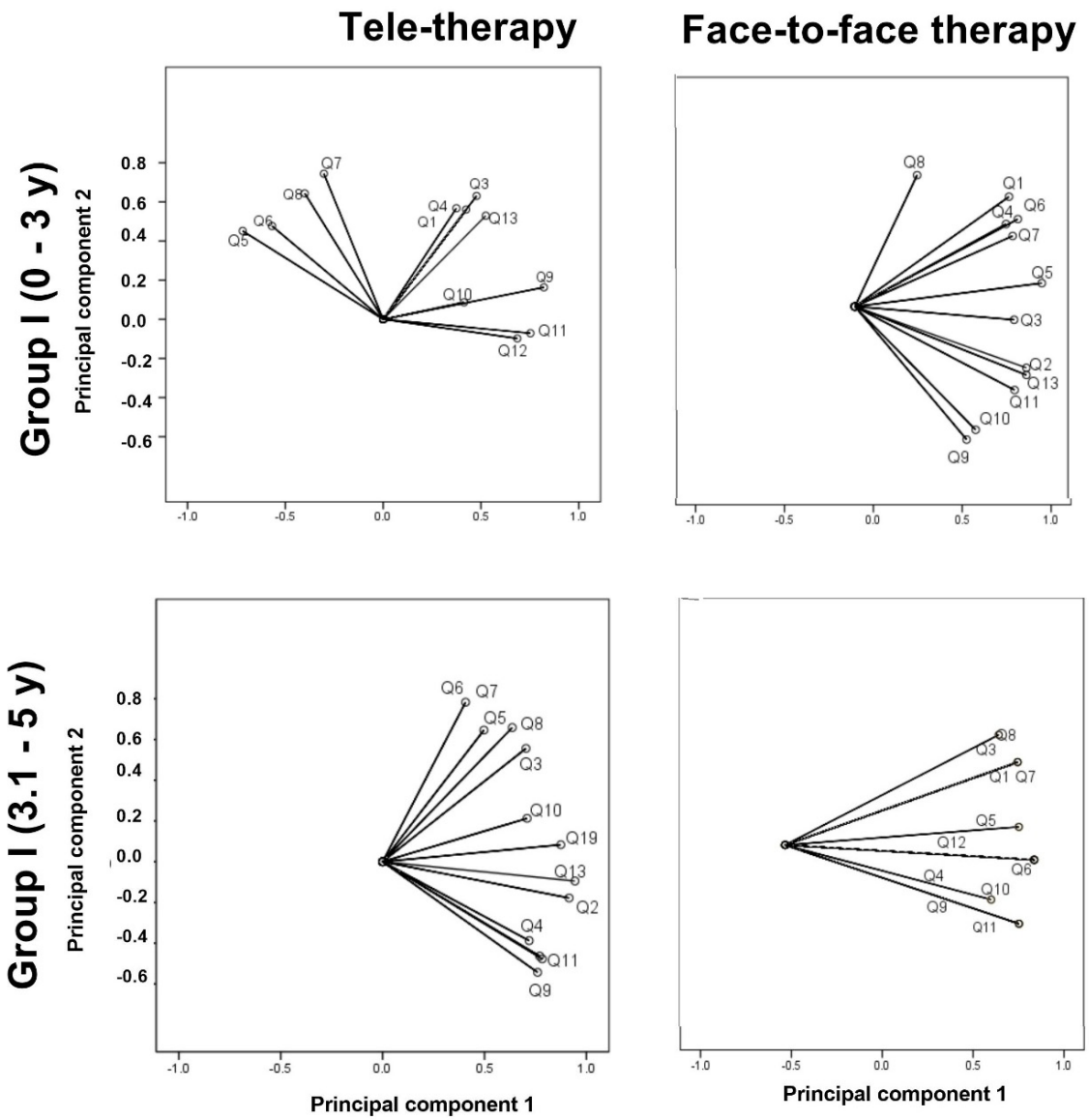

Figure 1. Component loadings for each question in tele and face-to-face therapy conditions for the two age groups. For the question legends see Appendix A.

II), resulting in a reduced gap in satisfaction ratings compared to group I.

Although, tele-listening therapy sessions has unparalleled benefits especially during pandemic in rural places and facilitates continual education of hearing-impaired children without physical interactions and travel, it should be noted that cultural factors and individual preferences can indeed influence parental satisfaction in therapy sessions. Therapists have to be aware of cultural variations and adapt their approach accordingly to ensure effective communication and understanding. While some cultures may prioritize direct one-to-one physical communication, others may value indirect methods including learning from other parental groups. Cultural beliefs and attitudes towards therapy can also vary. In some cultures, seeking therapy may be stigmatized, while in others, it may be more accepted or encouraged. Understanding these cultural perspectives can help therapists address any concerns or misconceptions and build trust with the families. In addition, being sensitive to the family's language preferences can help therapist to provide appropriate therapy materials, resources, and instructions in the family's native language, or utilizing interpreters when necessary, can enhance comprehension and engagement during tele-therapy sessions. Open dialogue and ongoing communication with the parents can help

identify and address any cultural or personal factors that may influence their satisfaction and optimize the therapy process accordingly. Future research can focus on addressing profiling the impact of such cultural and personal attitudes on parental satisfaction ratings of tele-therapy sessions.

Conclusion

Overall, the findings of the study indicate that the clinician's interaction with the child and family, influenced by technological limitations and age-related factors, played a significant role in parental satisfaction ratings for tele-auditory therapy sessions. The benefits and drawbacks of tele-practice varied across different age groups, highlighting the importance of considering age-related factors and adapting the therapy approach accordingly.

Although the tele-therapy session are effective means in the service delivery during pandemics, they are not an alternate choice for face-to-face therapy. A keen observation of the factors that might hinder the parents' satisfaction and prognosis of child in tele-therapy must be attended to improve the acceptance rates of this viable alternate to face-face therapy. Also, training the professionals for understanding the outcomes and satisfaction measures of tele-service delivery is essential to better understand its practicality. The efficacy across different age groups, socio-economic status, rural connectivity should be studied in more systematic manner.

Ethical Considerations

Compliance with ethical guidelines

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation. These guidelines adhered to the standards of the Helsinki declaration [21]. Ethical approval for this study was obtained from the ethics review committee before recruitment (CRN/AP1153/2021-22). Information related to the participants was kept confidential to protect their privacy. Informed consent was obtained from all the participants using the google forms.

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Authors' contributions

KVN: Study design, Statistical analysis, interpretation of the results, and drafting the manuscript; ND: Study design, supervision, and critical revision of the manuscript; AV, SAM: Data collection and drafting the manuscript; JS: Study design and supervision.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A.

Survey on parental satisfaction on tele and face-to-face listening therapy during COVID-19 pandemic

Instructions: this questionnaire will have two Sections-Section A will have questions related to tele-therapy and Section B will have questions related to face-to-face therapy.

Section A: questionnaire related to efficacy of tele-therapy

I. Demographic information related to client before tele-session:

1. What is the listening age of the child before the tele-session?
2. What is the listening age of the child after the tele-session?
3. What is the receptive and expressive age of the child before and after the tele-session?
4. How many sessions did your child receive through tele-service?

II. Questions to the parents: (Kindly mark tick (√) appropriately)

Sl. No	Questions	Disagree	Neutral	Agree
1.	Do you feel satisfied with the level of interaction/rapport with the tele-therapist?			
2.	Do you think the treatment efficacy is higher in tele-therapy than in onsite practice?			
3.	Are you overall satisfied with tele-programme?			
4.	How comfortable is your child when participating in the tele-sessions for listening therapy?			
5.	Do you feel that the quality and delivery of tele-therapy are consistent from week to week?			
6.	Are you comfortable discussing family involvement in tele-therapy?			
7.	Are you confident that your therapist is gaining understanding of your child's development and progress via the tele-sessions?			
8.	Was your child completely involved during the tele-sessions?			
9.	Do you think that your child has progressed during tele-sessions?			
10.	Do you think your child was attentive during tele-sessions?			
11.	Was your child interactive during the tele-sessions with the clinician?			
12.	Would you recommend this service/therapy for listening to someone else in a similar situation to yourself?			
13.	Do you think the sound quality was manageable during the tele-sessions?			
14.	Do you think the video quality was manageable during the sessions?			
15.	Did you experience technical difficulties that require troubleshooting during the sessions quite often?			
16.	Was it easy for you to use the equipment for tele-sessions?			
17.	Were you comfortable when you first started using the equipment for tele-sessions?			
18.	Are you comfortable now while using the equipment?			
19.	Would you recommend this service of tele-therapy for listening to someone else in a similar situation to yourself?			
20.	Are tele-sessions a better alternative than travelling regularly to receive face-to-face listening sessions?			

Section B: questionnaire related to efficacy of face-to-face listening therapy

I. Demographic information related to client before tele-session:

1. What is the listening age of the child before the face-to-face listening therapy?
2. What is the listening age of the child after the face-to-face listening therapy session?
3. What is the receptive and expressive age of the child before and after the face-to-face listening therapy session?
4. How many sessions did your child receive through face-to-face listening therapy service?

II. Questions to the parents: (Kindly mark tick (√) appropriately)

Sl. No	Questions	Disagree	Neutral	Agree
1.	Do you feel satisfied with the level of interaction/rapport with the therapist in face-to-face therapy?			
2.	Do you think the treatment efficacy is higher in face-to-face than in tele-therapy?			
3.	Are you overall satisfied with the in face-to-face therapy programme?			
4.	How comfortable are you when participating in the in face-to-face sessions?			
5.	Do you feel that the quality and delivery of the in face-to-face therapy are consistent from week to week?			
6.	Are you comfortable discussing family involvement in therapy in face-to-face sessions?			
7.	Are you confident that your therapist is gaining adequate understanding of your child's development and progress via in face-to-face sessions?			
8.	Was your child completely involved during in face-to-face sessions?			
9.	Do you think that your child has progressed during in face-to-face sessions?			
10.	Do you think your child was attentive during in face-to-face sessions?			
11.	Was your child interactive during the in face-to-face sessions with the clinician?			
12.	Would you recommend the face-to-face listening therapy service to someone else in a similar situation to yourself?			