Critical Review:
Effectiveness of Teletherapy in School-Aged Children with Speech and/or Language Disorders

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Abstract

This critical review examines the evidence that providing speech-language services to school-aged children via teletherapy is an adequate mode of service delivery. Studies reviewed included two within groups design studies, one mixed non-randomized clinical trial, one mixed randomized trial, one qualitative retrospective study, and one single group pre-posttest design study. Overall, the evidence gathered from this review is somewhat suggestive of the use of telehealth in speech-language intervention for school-aged children. Recommendations for future research and clinical implications are also discussed.

Introduction

At the beginning of the Covid-19 pandemic in spring 2020, an "instant" transition to an online world was made to maintain service delivery. Since then, school, work, and therapy are being conducted remotely, and the field of telecommunications is fast-growing. Throughout this paper terms such as telehealth, telemedicine and telepractice all refer to services offered through a virtual (i.e., online) platform. Terms such as in-person, face-to-face, side-by-side and on-site, all refer to the more 'traditional' notion of therapy, namely that which is conducted with a clinician in close proximity to the client. Telehealth has been successful for the delivery of speech language pathology (SLP) services for a variety of reasons and has provided health services to individuals and communities that do not usually have access to regular therapy.

More and more research on the efficacy of telemedicine has been conducted throughout the years, and due to the sharp increase of telemedicine services observed just in the last year, research on the topic can also be expected to increase significantly. A systematic review by Molini-Avejonas et al. (2015) found that telehealth service provision has recently increased, valid and reliable assessment results of many speech and language disorders can be obtained using it, and it provides services to broader populations when a limited number of qualified health professionals are available. In addition, there are also benefits of virtual speech and language services when it comes to the treatment of children in rural communities where SLPs may not be able to travel to in person. That is, even before the pandemic, regular and reliable access to speech-language services was something that was only possible–in certain areas–due to teletherapy (Wales et al., 2017).

Although many clinicians themselves have doubted the efficacy and legitimacy of teletherapy over time, Hines et al. (2015) found that clinicians with positive beliefs and attitudes towards this model of service delivery were more likely to recognize consistencies between teletherapy and face-to-face intervention.

With an increasing need for socially distant and/or online services, it becomes imperative to examine existing literature on the topic of speech-language telehealth, in order to determine whether it is an effective and reliable mode of service delivery.

Objectives

The primary objective of this paper is to critically analyze existing literature regarding the delivery of speech and/or language services to school-aged children by means of teletherapy. The secondary objective of the work presented is to discuss certain clinical implications of the papers hereby included as well as recommendations for future research.

Methods

Search Strategy

A variety of computerized databases were used to find topics of interest. These included Google Scholar, PubMed, Medline, PSYCInfo and ASHA publications. Included search terms were as follows: (telepractice OR teletherapy OR telehealth OR telemedicine) AND (speech OR language) AND (child). References lists of identified studies were used to find additional articles.

Selection Criteria

Only studies from the last 10 years (i.e., 2010-2020) that explored the efficacy of teletherapy for speech and/or language in school-aged children were included. The search was limited to articles written in English.

Data Collection

Results of this literature search yielded six articles congruent to the aforementioned selection criteria. Selected articles included two within groups design studies, one mixed non-randomized clinical trial, one mixed randomized clinical trial, one qualitative retrospective study, and one single-group pre-posttest design study.

Results

Grogan-Johnson et al. (2010) conducted a within groups design study that examined the efficacy of speech-language teletherapy when compared to traditional on-site therapy in school-aged children. Further, the acceptance of telehealth in the school environment was examined. Recruitment criteria were well described and included 38 participants ranging from 4 to 12 years of age, with 13 participants being female. Participants had either language, articulation and/or fluency disorders (i.e., the disorder variable was not controlled for), thus implying that the authors varied the treatment protocol. Telehealth and traditional therapy groups were randomly assigned, and participants completed 4 months of therapy in either the telehealth group or the conventional group, followed by 4 months of whichever mode they had not received. Virtual sessions took on a one-on-one format, whereas traditional therapy sessions occurred in groups of 2-4 students.

In this study, outcome measures included: i) Individualized Education Plan (IEP) measurements along a progress objective scale (collected every 3 months), ii) pre- mid and post-intervention scores for the Goldman-Fristoe test of Articulation – Second Edition (GFTA-2) and iii) pre- and post-treatment speech sound production Functional Communication Measures (FCMs) according to the National Outcomes Measurement System (NOMS). Lastly, a survey was administered to participants, teachers, parents, e-helpers, principals and SLPs to measure satisfaction levels with telehealth. No significant differences between the groups were noted for the GFTA-2 scores nor from progress reports, at any of the three measurement times. This suggested that students made similar progress regardless of the treatment method. There was some variation regarding the IEP objectives that the students met, however, it was noted that the mastery/adequate level for these objectives may have been different due to a lower number of objectives being targeted in the telehealth condition than in the in-person group. The level of satisfaction with teletherapy was positive among parents, SLPs, e-helpers and principals, however, teachers were unaware of the program. According to the NOMS data collected, more than 50% of the students improved by one or more FCM levels with regards to intelligibility, speech sound production and language. NOMS data was only available for a small number of students so it should be interpreted with caution.

Overall, this study provides somewhat suggestive evidence that the delivery of speech therapy to school-aged children via telecommunications is an effective intervention model.

Grogan-Johnson et al. (2011) conducted a mixed non-Randomized Clinical Trial (RCT) to explore the efficacy of a school-based telehealth service delivery model for the treatment of Speech Sound Disorders (SSD) in school-aged children compared to face-to-face intervention. A sample of 13 students (11 males and 2 females, aged 6-11) met the study's inclusion criteria. Each participant was assigned to either Group 1 (telehealth intervention) or Group 2 (face-to-face intervention) in a non-randomized manner.

Participants received approximately 21-48 sessions between the fall of 2008 and the spring of 2009 (i.e., a period of 7-8 months). A 'traditional' approach to SSD intervention was implemented by the study's SLPs, however, no additional details on the topic were included. Three outcome measures were used to assess student progress during the project: i) pre- and post-intervention performance on the GFTA-2 ii) a comparison between pre-intervention baseline data and post-intervention production levels, and iii) changes observed by SLPs in quarterly progress reports (i.e., in the form of students' IEP speech goals). After reviewing all pre- and post-intervention test protocols to determine the reliability of the GFTA-2 results, 100% agreement was achieved. Results showed no significant differences in the age of participants from groups 1 and 2, nor in the duration or attendance rate of sessions. Both the telehealth and in-person groups showed significant improvements in their performance post-intervention, with no significant differences between the two groups. Similarly, changes in speech sound production from baseline to the treatment's completion showed similar amounts of progress in both groups. When the mastery of IEP goals of each group was analyzed, results revealed that while 84% of students in the telehealth condition had mastered their respective IEP goals, the same was true for only 46% of students in the face-to-face condition.

In short, this study's findings revealed similar outcomes when it came to telehealth vs. in-person intervention for children with SSDs and, as such, they serve as somewhat suggestive evidence for the efficacy of speech intervention via telepractice in this population.

Grogan-Johnson et al. (2013) conducted a mixed RCT study where in-person therapy was compared to teletherapy for the treatment of school-aged children with Speech Sound Impairments (SSI). A sample of 14 children aged 6 through 10 years old was selected for the study. Each child was randomly assigned to one of the two service delivery models (i.e., telehealth or in-person therapy). During a 5-week intervention program, participants received 30-minute sessions twice a week. The study's outcome measures included participants' scores on two subtests of the GFTA-2 (sounds-in-words and sounds-in-sentences) and listener ratings pre- and post-intervention, as well as treatment fidelity measures (using fidelity checks and verifying protocol was in place).

There were no significant differences on the raw and standard scores of GFTA-2 post-treatment. While authors did report a significant difference between the two groups in terms of the change in GFTA-2 scores from before and after the intervention, they did not mention the nature of this difference. Listener ratings were found to be statistically insignificant across time, thus suggesting that regardless of which intervention the children received, they all benefitted. Overall session fidelity was found to be high among clinicians, except when reviewing both clinicians' end-of-session goals and the low (32%) targeted number of productions for one clinician in particular.

This study presents somewhat suggestive evidence for why telehealth is an effective intervention option for school-aged children with speech-sound impairments.

As mentioned earlier in the paper, teletherapy makes services accessible for people living in rural communities who do not have face-to-face access to health care professionals. **Sutherland et al. (2016)** conducted a within groups design study where they looked at whether language assessments administered online yielded the same results as those administered face-to-face. In their study, multiple variables were studied: i) number of successful completed sessions, ii) standardized language assessment scores, iii) behavioral observations made by SLPs, and iv) parent's perceptions of telehealth. The two variables of interest to the proposed research question are the feasibility and reliability of face-to-face sessions versus teletherapy sessions.

There were 23 children (five female, 18 male), ranging in age between 8 and 12 years who participated in the study. Participants had a known suspected language impairment and reading difficulties and had been referred to a specialist reading center. Only children who had been assessed with the Clinical Evaluation of Language Fundamentals – Fourth Edition (CELF-4) within the last 6 months were excluded from the study. Three SLPs agreed to participate in the project as part of their regular work and they were all experienced in administering the CELF-4. All participants completed four core subtests of the CELF-4 via telehealth, while 2 subtests were completed in-person. The face-to-face subtests were completed either before or after the telehealth subtests, depending on the scheduling of the sessions. There was no randomized counterbalanced delivery order. The level of agreement amongst the core language scores and the raw scores of the four subtests administered were analyzed, however, no clear difference in assessors or changes in variance were noted. There was a strong correlation between the two conditions (teletherapy and in-person therapy), suggesting that telehealth is a viable option for the administration of language assessments to school-aged children.

Overall, the intent of this research article was to examine the feasibility and reliability of conducting standardized language assessments with school-aged children who have a language impairment via teletherapy. Although the authors reported a strong correlation between the two conditions, the small sample size and the fact that there was no true control group or randomized counterbalance delivery order of the conditions make the findings of the current paper somewhat suggestive of the accuracy of assessments conducted via teletherapy.

To compare the efficacy of speech therapy delivered via telepractice with that of traditional therapy, **Coufal et al. (2018)** conducted a qualitative retrospective study. The study compared the outcome of Speech Sound Production (SSP) treatment in school-aged children with SSDs when treatment was administered via teletherapy to the outcomes of traditional intervention. A total of 1,759 children aged 6.5-9 years old (1,331 cases in the traditional service delivery group and 428 cases in the telepractice condition) met the study's inclusion criteria. ASHA's FCM for SSP was used as an outcome measure in this study, allowing for comparison between traditional and telepractice service delivery groups' performance pre- and post-treatment.

Group distributions using the subjects' age and treatment duration criteria were compared to ensure both groups' similarities across both variables (i.e., age and treatment length). Descriptive statistics showed the initial two groups were similarly distributed across the age and length of treatment criteria. Additionally, participants from each of the study's two conditions (i.e., face-to-face and telepractice) were further divided into 5 FCM groups according to their corresponding

initial severity levels. Finally, the change in score between participants' initial and final FCM scores were calculated and used as the study's dependent variable to compare pre- and post-treatment results across the studies' two conditions. Results showed that the five subgroups had similar score distributions and comparable medians and interquartile ranges within initial FCM levels. No significant differences were found between the groups in terms of age range and treatment length, nor were there significant differences in the two groups' initial FCM levels or FCM median changes. Results showed comparable SSP improvements in both telepractice and traditional intervention groups.

In short, this study's findings serve as highly suggestive evidence that telepractice is an adequate alternative to in-person modes of service delivery for the treatment of speech sound disorders in children.

Pamplona and Ysunza (2020) conducted a single group pre-posttest study to determine whether speech and language services delivered via telepractice ere effective in the improvement of speech performance in Children with Cleft Palate (CCP). A sample of 45 participants aged 4 to 12 years old and their families were recruited according to a set of pre-established criteria. No information about the patients' gender was included.

Before the study's onset, each patient's place and manner of articulation had been evaluated in-person, using the Spanish version of the GFTA. In addition to this initial in-person assessment, patients' articulation placement was re-evaluated online, pre- and post-intervention. Patients' advances in articulation were measured by a scale that was validated in-house, and that assessed the severity of each patient's compensatory articulation (i.e., compensatory errors that are secondary to Velopharyngeal Insufficiency (VI) and affect speech intelligibility). This clinical scale categorized the degree of severity of compensatory articulation (CA) in each child in one of eight different levels (i.e., ranging from *Constant CA = score of 0*, to *Appropriate articulation = score of 7*). To detect each patient's CA and their corresponding phonological system rules, a 20-minute-long verbal (online) interaction between the patient and a trained SLP was recorded. Recordings were transcribed verbatim and analyzed for the presence and severity of CA. The reliability of the CA severity evaluation was assessed through a blind procedure involving independent analyses by two trained SLPs with experience in the treatment of CCP with VI and CA. Telepractice intervention was delivered over the course of one month in a group format. The initial sample was divided into groups of 5-6 patients based on initial CA severity, age and level of linguistic organization. All children received one teletherapy session, which followed the principles of the Whole Language Model and one virtual singing choir session aimed at practicing articulation placement through singing with music. Both of these sessions were conducted weekly by an SLP via ZOOM.US. Treatment protocols involved storybook reading and singing and varied according to each group's needs, both of which were used to reinforce articulation placement, manner and voicing of the target sounds. Results showed a statistically significant difference between the pre- and post-intervention samples and all patients were observed to have advanced 1-3 levels of severity of CA by the end of the telepractice intervention period. No additional details about the study's statistical analyses or results were provided.

The lack of patients' demographic information (i.e., other than their age), the absence of a control group, and the homogeneity of the sample used are all significant limitations of the present study. Therefore, this study's findings serve as equivocal evidence that speech and language pathology interventions via telepractice are an effective mode of service delivery for the improvement of speech in children with cleft palate.

Discussion

The selection of articles analyzed in the present review explored the delivery of speech-language services to school-aged children via telecommunications. As can be expected with novel and rapidly evolving service delivery models, the existing literature on telehealth is limited when compared to other areas in the SLP field.

Six different articles were reviewed in this paper however, it should be noted that three of these were authored by the same head researcher (Grogan-Johnson et al. (2010); Grogan-Johnson et al. (2011); Grogan-Johnson et al. (2013)). Although the researcher's methods of study were refined to improve reliability and validity, all of the studies had limited sample sizes (i.e., between 13 to 38 participants) which increases the margin of error and reduces the studies' power. Although retrospective in nature, the findings of Coufal et al.'s (2018) study present a much broader view of the topic at hand, namely showing that speech teletherapy and traditional forms of speech therapy led to similar outcomes in school-aged children across many participants. It was interesting to come across research with a focus on teletherapy for the treatment of specific populations such as children with cleft palate, as this further highlights the versatility of virtual modes of

service delivery. Due to the sudden increase in virtual access to healthcare and the preliminary positive data on speech-language teletherapy specifically, one can only expect clinicians and clients to increasingly rely on virtual assessment and intervention methods from now onwards.

All in all, the current review demonstrates somewhat suggestive evidence for the efficacy of teletherapy in the treatment of school-aged children with speech and/or language disorders. In most of the studies presented, children in the teletherapy group made similar gains to those made by children receiving traditional therapy. Furthermore, those involved in teletherapy models of service delivery were satisfied with its practicality and overall effectiveness.

Clinical Implications

As previously mentioned, limited evidence exists to support telehealth as a viable method of speech intervention in school-aged children with speech and/or language disorders. Overall, the studies showed that children receiving speech-language telehealth intervention made similar progress to those receiving face-to-face intervention. Moreover, some of the presented articles examined the perspectives of clinicians, principals, SLPs and parents when it came to telehealth, and generally showed high levels of satisfaction across all groups.

Future research into the topic is required, as existing literature is very limited. Having reviewed the above mentioned studies, recommendations for the research of speech-language telehealth may include: i) strengthening results of studies by increasing the sample size ii) conducting more comparative studies (i.e., studies that include an 'intervention' control group) as opposed to relying on single group designs, iii) raising awareness about teletherapy among teachers, parents, SLPs and any others involved in a child's circle of care and iv) following up long-term with children who have received teletherapy as a way to determine whether skills have been maintained over time. Finally, increasing the population/disorder groups in which teletherapy can be offered would be extremely beneficial.

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