Critical Review: What is the efficacy of a telepractice service delivery model when compared to traditional on-site therapy for school-aged children receiving speech sound intervention (SSI)?

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Abstract

This critical review examines the current literature on telepractice as a service delivery model for speech sound intervention (SSI) for school-aged children (4-12 years). Study designs include a retrospective study, two pilot exploratory studies, and one randomized crossover study. The findings revealed a suggestive level of evidence for the efficacy of the telepractice service delivery model. Despite being promising, sound empirical evidence supporting the efficacy of telepractice as a SSI service delivery model is limited. Further investigation is required to support the current findings, and to investigate the applicability of telepractice in different disorder groups.

Introduction

Recent advances in technology have afforded the opportunity for increased incorporation of telepractice into Speech-Language Pathology (SLP) services. Telepractice is an appealing alternative to the conventional on-site service delivery model because it addresses accessibility challenges and barriers (e.g., costs and travel time) to underserviced populations, including those in rural and remote communities (SAC, 2006). Speech Language Pathologists (SLPs) have large geographically diverse caseloads, so telepractice not only allows SLPs to provide in-demand services to more individuals, but to also provide these services more often (SAC, 2006).

Currently in the literature there is research to support the feasibility of telepractice service delivery in various patient populations of Speech-Language Pathology. The potential of a telepractice service delivery model has also be shown in child and adult speech and language services related to the area of fluency, Autism Spectrum Disorder (ASD), aphasia, voice disorders, motor speech disorders (e.g., Childhood Apraxia of Speech), and head and neck cancer (Boisvert, 2012; Hall, Boisvert, & Steele, 2013; Lowe, O'brian, & Onslow, 2014; Rangarathnam,, McCullough, Pickett, Zraick, Tulunay-Ugur,& McCullough, 2015; Thomas, McCabe, Ballard, Lincoln, 2016; Waite, Theodoros, Russell, Cahill, 2010; Ward,, Sharma, Burns, Theodoros, & Russell, 2012; Ward, Wall, Burns, Cartmill, & Hill, 2017).

Despite the relatively large body of promising research across the field of Speech Language Pathology there is currently very little evidence regarding the efficacy of telepractice-delivered SSI. There is a high prevalence of speech sound disorders (SSDs) in children (about 1-15% in children from ages 3-7), which increase one's risk of later academic, social, and behavioral problems (Johnson, 2007; McCormack et al., 2009). About 90% of schoolboard SLPs regularly provide SSI to children on their caseload and from 2014-2018 SLPs' caseloads mainly consisted of kids with articulation impairments (ASHA, 2018). Considering the associated risks of SSDs and the prevalence of children requiring SSI on the average school-based SLP's caseload, it is imperative that this population have access to intervention. Various constraints, including funding, travel costs, accessibility, and caseload volume may limit access to this in-demand service. Telepractice is an especially compelling service delivery model for this population where access to SSI is critical.

There is currently very little evidence regarding the efficacy of the telepractice service delivery model for school-aged children (4-12 years) receiving SSI. This literature review is designed to evaluate the efficacy of telepractice-delivered SSI.

Objectives

The primary objective of this review is to critically analyze the current literature on the efficacy of SSP intervention delivered via telepractice.

Methods

Search Strategy

Online databases searched included the following: PubMed, CINHAL, and Speechbite. Search terms included: [child] AND [telehealth] AND [speech therapy]. References lists of identified studies were searched to find further relevant studies.

Selection Criteria

Studies that investigated the efficacy of telepractice-delivered SSP therapy in school-aged children were included. Studies that used a telepractice service delivery model that included both real time video and audio feeds provided between the participant and clinician were also included. Studies were limited to English only. There was no limitation to date of publication of study.

Data Collection

Search results generated four articles, including two pilot exploratory studies, one qualitative retrospective study, and one randomized crossover study. All the studies explored the efficacy of a telepractice service delivery model in comparison to a traditional in-person service delivery model in school aged-kids receiving SSI.

Results

Coufal et al. (2018), conducted a qualitative retrospective research study to compare functional outcomes of speech sound production (SSP) therapy delivered by telepractice with traditional on-site therapy in school-aged children. Retrospective data collected yielded a sample size of 1759 students ages 6-9.5 years old (1331 and 428 students in a traditional and telepractice SSP treatment group, respectively) who met appropriate recruitment criteria. Outcome measures included ASHA's Functional Communication Measure (FCM) for SSP collected pre- and post-treatment., which measured overall functional ability. Appropriate statistical analyses were noted. This was the first study in this area of focus with such a large sample size.

Results of the study indicated that both groups were similar in age, length of therapy, initial FCM levels, and median-based FCM changes. Overall, results showed that there was no significant difference between change in functional outcomes between groups, indicating that telepractice is as effective as traditional therapy for SSP therapy. The participants were further divided into 5 initial FCM score groups and each compared between treatment groups. Results indicated there was no significant difference in median changes in all initial FCM groups. Specifically, participants with initial FCM scores of 1 and 2 all had 2 level FCM changes and participants with initial FCM scores of 3-5 all had 1 level of change, regardless of mode of SSP therapy delivery.

Overall, this study provides highly suggestive evidence that a telepractice service delivery model is as effective as traditional on-site therapy for SSI in school-aged kids.

Grogan-Johnson et al. (2010), conducted a pilot study to explore the efficacy of speech-language therapy provided by telemedicine with conventional on-site therapy in school-aged children as well as acceptance of telepractice in the school environment. Using well described recruitment criteria, 38 participants were included, ranging from ages 4-12 (13 females). Participants were randomly assigned to either telemedicine or traditional on-site speech-language therapy groups and completed 4 months of therapy then a consecutive 4 months of therapy by the other service model. A treatment protocol was not reported by the authors and it was implied that this varied, especially considering that disorder group was not controlled for, participants ranged from having articulation, language and/or fluency disorders, and telepractice sessions were usually 1-on-1 whereas on-site sessions were usually in groups of 2-4 students. Outcome measures included pre- mid- and post-treatment Goldman-Fristoe Test of Articulation – Second Edition (GFTA-2) scores, Individualized Education Plan (IEP) progress objective scale measurements (collected every 3 months), pre- and post-treatment National Outcomes Measurement System (NOMS)

speech sound production Functional Communication Measures (FCMs), and post-treatment satisfaction surveys specific for participants, parents, teachers, SLPs, e-helpers, and principals. Appropriate statistical tests were noted when included.

Results showed that that there was no significant difference between groups for GFTA-2 scores at all three measurement times, suggesting student progress was similar across treatment modalities. Although the two groups were significantly different in achieving mastery/ adequate progress for IEP objectives, the authors noted that this may have been because fewer objectives were targeted overall in the telepractice group due to various constraints, including the need for in-class data collection. Satisfaction surveys showed that students and parents were overwhelmingly satisfied with the telepractice service delivery model, SLPs, e-helpers, and principals were satisfied, but most teachers didn't know about the program. NOMS data revealed that over 50% of participants improved at least one FCM levels for intelligibility, speech sound production, and spoken language production. The NOMS data appeared to differ from the general population, although no statistical tests were completed.

Overall, this study provides somewhat equivocal evidence that telepractice is an effective service delivery model for providing speech-language therapy to school-aged kids when compared to conventional on-site therapy.

Grogan-Johnson et al. (2011), conducted a pilot study with 13 students from kindergarten up to grade 6 to explore whether a telehealth service delivery model be adequately implemented in a public-school setting and to determine the effectiveness of telepractice-delivered speech-language intervention compared to traditional, face-to-face intervention in school-aged children with Speech Sound Disorders (SSD). Well defined and relevant recruitment criteria was described. Participants were non-randomly assigned to either telepractice or traditional treatment groups where they received 30-77 SSD intervention sessions over approximately 7 months. Treatment protocol was unclear but was reported to follow a "traditional" approach to SSD therapy. Outcome measures included pre- and post-treatment GFTA-2 scores, pre-treatment baseline data collection, post-treatment SSP performance data, and quarterly SLP-completed progress reports. Authors reported 100% agreement with recorded scores and reported test results for the GFTA-2. Appropriate statistical tests were noted.

Overall, results showed positive student progress in both groups. There was no significant difference between groups for pre- and post-treatment GFTA-2 scores as well as overall score change. Significantly more students in the telepractice group 'mastered' SSD Individualised Education Plan (IEP) goals based on progress reports. Within-group analysis showed participants made significant improvements in GFTA-2 score. Both groups made similar average progress from baseline to post-therapy production performance, though no statistical data was provided.

Overall, this study provides suggestive evidence that students with SSDs make similar gains in SSI regardless of a telepractice service delivery model and traditional on-site therapy.

Grogan-Johnson et al. (2013), conducted a randomized parallel design study to determine if participants would make similar progress in telepractice-delivered SSI when compared to on-site service model. Participants included 14 children ages 6-10, who met detailed and pertinent recruitment criteria. Participants were randomly assigned to either telepractice or on-site treatment groups and each received two 30-minutes session per week over a 5-week summer intervention program. Outcome measures included GFTA-2 (sounds-in-words and sounds-in-sentences subtests) scores, listener ratings, and treatment fidelity. Acceptable Intra- and interrater reliability were reported, and appropriate statistical analyses were noted.

Results revealed no significant differences between groups for post-treatment GFTA raw and standard scores, mean pre-treatment listener ratings, and mean amount of overall change in listener ratings. Participant progress notes verified the listener rating changes. There was a significant different in pre- and post-treatment GFTA score change between groups, although the authors did not

specify which group made more gains. Treatment fidelity was generally high for clinicians, except for end-of-session goal review for both clinicians, and targeted number of productions for one clinician (only 32%). Clinicians used more cueing during telepractice than on-site. Minimal technical-related issues were reported.

Overall, this study provides suggestive evidence that telepractice-delivered SSI is as effective as traditional on-site intervention in school-aged kids.

Discussion

With the in-depth research on telepractice in various areas of speech language pathology, there is currently no detailed research that looks specifically at its efficacy in the delivery of speech sound intervention in a school setting. The current literature review explored the efficacy of a telepractice service delivery model compared to on-site therapy for school-aged children receiving SSI. The review consisted of two pilot studies, one retrospective study, and one randomized parallel study.

Three out of the four were authored by a small team of researchers led by the same head researcher. Over the course of their studies, the authors refined their methods which provided stronger validity and reliability in the results of their final study. However, the evidence was based on studies with small sample sizes where independent variables like disorder group, gender, socioeconomic status, type and amount and type of speech sound production cues were not controlled for. The fourth study did have a significantly larger sample size, which was the first of its kind in this area of research, and it did use a common functional outcome to compare groups, which increased the ecological validity of the study. However, since it was retrospective in nature, there was a lack of reporting for methodologies from the third-party databases, which reduced the overall reliability and validity of the study.

Overall, there is suggestive evidence that telepractice is an effective service delivery model when compared to on-site therapy in school-aged children receiving SSI. Children made similar, positive gains in both standardized and non-standardized functional SSI outcomes typically used in a school setting regardless of the service delivery model (Grogan-Johnson et al., 2013 & Coufal et al., 2018). The telepractice service delivery model was easy to implement into the school setting as the required equipment and personnel was already easily accessible and the few technological challenges that occurred were easy to troubleshoot (Grogan-Johnson et al., 2013). Generally, those involved in telepractice were satisfied with the structure. However, there was a lack of collaboration with teachers and inability to integrate SSI into the more naturalistic classroom setting through the telepractice service delivery model (Grogan-Johnson et al., 2011), which raises concerns about its applicability in typical school settings.

Future Research Considerations

Further research is suggested given the limited evidence in the current literature. In order to improve the level of evidence in future research, the following recommendations should be considered:

1. Increase the sample size of the studies to strengthen results;
2. Include a long-term follow-up after the completion of treatment to evaluate maintenance of skills;
3. Investigate the efficacy of a telepractice service delivery model in regard to different speech sound intervention programs and different communication disorder groups;
4. Explore potential solutions to address the reduced collaboration with teachers and reduced incorporation in classrooms.

Clinical Implications

As discussed, there is currently limited strong evidence of the efficacy of telepractice when compared to on-site therapy in school-aged children receiving SSI. Telepractice is an appealing alternative service delivery model to traditional on-site therapy that addresses SLP service shortages. These studies illustrate that students make similar, positive progress in SSI

regardless of service delivery model. Telepractice is widely accepted by users and can be integrated seamlessly into a typical school setting.

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