

Recent Advances of Telepractice for Autism Spectrum Disorders in Speech and Language Pathology

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Abstract: Telepractice or teletherapy is defined as the means of service delivery via technology-based platforms that allow long-distance interventions across populations, age spans, and geographical locations. Specifically, telepractice capitalizes on communication technologies such as online modules, videoconferencing, and computerized software programs, in servicing populations with communication challenges. Notably, telepractice has emerged as a potentially effective, low-cost, and promising means of conducting and completing online assessment, diagnosis, and intervention sessions for individuals with autism spectrum disorders (ASD). Moreover, telepractice allows the inclusion of parents, caregivers, and educators as potential facilitators in supporting treatment delivery in populations with ASD. This thematic review article aims to highlight and acquaint practitioners and other stakeholders with relatively recent information regarding the advantages and disadvantages of the telepractice service delivery model in ASD. Furthermore, the emergence of the COVID-19 pandemic has impacted service delivery in the field of *Health Sciences* including speech and language pathology (SLP). Consequently, the need to avoid face-to-face therapy sessions, recommended to SLPs as to all health practitioners, resulted in the call for adaptation and adjustment of service telepractice. This paper attempts to answer this call by suggesting supplementing traditional diagnostic and therapy resources with training modules consisting of online materials and use of animated and specially designed programs in SLP intervention with individuals with ASD. Lastly, the paper includes a discussion of research findings in the field, a conclusion, and a take-home message.

Keywords: ASD, telepractice, tele-supervision, interventions, assessment

Introduction

In this thematic review, the authors aim to acquaint practitioners and other stakeholders with a relatively new intervention methodology based on telepractice in the service of rehabilitation of individuals with ASD, mainly a life-long condition with dynamic challenges impacting the affected individual's social-emotional, educational, and adaptive trajectories. The authors discuss ASD prevalence and some obstacles in its determination, heterogeneity of clinical profiles, and communication challenges associated with the disorder. Recent advances in innovative therapy practices in communication disorders have also included specific treatment targets to be implemented when assessing and treating individuals with ASD.¹ A keen interest in the assessment of innovative intervention practices has surfaced as a result of the COVID-19 pandemic.² In fact, discussion of such topics is ongoing due to the continued presence of the pandemic, and the heterogeneity of therapy protocols associated with and implemented in different geopolitical regions and different clinical settings.³ Clinical research findings underscore the importance of evidence-based practice (EBP) in ASD management including servicing bilingual and multilingual individuals in the face of their heterogeneous symptomatology. These present challenges or the *Achilles Heel* in clinical practice as often research outcomes do not reach the mainstream clinicians who find themselves in the *frontlines* of intervention with individuals presenting with communication disorders of varied etiologies, and their families.^{4,5}

In the current paper, the main goal is to present a concise thematic review, ie, a discussion of a specific clinical topic regarding recent advances in telepractice as implemented in the management of individuals with ASD. The authors provide ASD characteristics, terminology, and prevalence information as well as description of their clinical manifestations. The importance of early identification of ASD is discussed, and the need to support individuals and their families, and collaborate with other invested professionals is highlighted. Next, the paper emphasizes that the use of technological based intervention or *telemedicine* is accepted and practiced in health professions for decades. It serves as a model in how to reach individuals with health issues which would otherwise not get the care they need because of distance or scarcity of medical services. Recent advances in telepractice for populations with communication and mobility issues in remote and underserved areas are similarly served by various professions. The authors discuss research evidence showing the advantages in their use, while other studies point out the pitfalls or obstacles in the use of technological platforms. The authors support the use of telepractice in SLP practice as it provides an effective resource for families who do not have access to essential services for members of their families of any age with communication and/or mobility challenges. The authors highlight that the gap in sufficient numbers of well trained personnel in the use of telepractice technology or in the use of parents for intervention support is a serious obstacle for effective intervention. They suggest that this gap can be addressed by offering remote training with specifically structured modules, and accompanying materials and resources as a viable approach to addressing obstacles to effective telepractice-based intervention. In essence, the authors declare that telepractice in the service of ASD affected individuals is actually a necessity. In their *take-home message*, they note that the present sparsity of long-term efficacy evidence should not stand in the way of adopting these important resources to benefit families and children with ASD, its use is justified when applying the “*best evidence available at this time*” approach.

ASD Prevalence, Characteristics, and Associated Terminology

ASD is an umbrella term for a spectrum of conditions secondary to complex bio-neurobiological underpinnings. As such, the condition results in atypical brain circuitry which surfaces during infancy.^{6–8} The pathogenesis of ASD is triggered by complex mechanisms traced in-utero and in synergy with environmental and genetic factors.⁹ ASD impacts both children and families regardless of language, culture, and socioeconomic level, globally.^{10–14} The prevalence of ASD reported by the World Health Organization (WHO)¹⁵ is an average estimate of 1:160 individuals. However, in reality, ASD prevalence is higher in males compared to females with a ratio of 4:1. Although the global occurrence of ASD is difficult to estimate, the consensus converges towards a notable increase according to recent reports by the Centers for Disease Control and Prevention (CDC)¹⁶ indicating that in the United States alone, during 2016, around 1 in 54 children presented with a diagnosis of ASD in contrast with today’s indications to be 1:44. Moreover, prevalence has also been estimated to be 222 per 10,000 children worldwide.¹⁷ Nevertheless, there is a scarcity of ASD prevalence data from minority and remote populations, a topic that warrants further investigation as it remains mostly underexplored. The fact that low ASD prevalence is reported in some regions and within specific ethnic groups,⁴ underscores the need to increase awareness and screening in remote, underserved, and minority populations who might nonetheless present children with communication, and social and behavioral profiles consistent with presence of ASD. Notably, the WHO’s resolution on ASD according to the 67th World Health Assembly¹⁸ presents a resolution or plan in relation to a series of comprehensive and coordinated efforts for the management of ASD. This serious effort has been endorsed by more than 60 countries across the globe. Such actions form the springboard for the advancement of suitable and collective clinical diagnostic tools and checklists (eg, questionnaires) in an effort to develop homogeneous clinical assessment tools, albeit the heterogeneity of ASD symptomatology. This initiative on its own forms a paramount challenge for all professionals who are involved in the current task force (for further details see section 3 on intervention and assessment). Nonetheless, it is an encouraging endeavor, in the sense that the resolution seeks to collaborate with member states and stakeholders to strengthen national support and services to individuals with ASD.^{19,20}

Communication Skills, Challenges, and Clinical Manifestations of ASD

Individuals with ASD form a heterogeneous group. Symptoms of onset are diverse and long-term outcomes vary between individuals. Although early symptomatology and clinical characteristic of ASD are evident early in life (eg,

low social, poor eye gaze, and sparse joint attention skills) the actual diagnosis is often made later.^{21,22} ASD may impact on the typical course of communication and language development affecting social-emotional behaviors, that tend to hinder adaptive capacity and sensory modulation. In addition, ASD affects typical play skills, and often poses challenges to achieving lifelong literacy and academic abilities.^{23,24} Specifically, challenges presented by individuals with ASD may include all or some of the social-pragmatic deficits (eg, as low affect, poor eye contact, and low motivation to communicate) and aberrant behaviors such as repetitive gestures, obsessive preferences and circumscribed interests, and insistence on “sameness” (presence required to make the ASD diagnosis). They often have difficulty in activity transitions, posing a considerable problem in school. In addition, they tend to fixate on details and miss the main point, and are plagued with poor sensory integration skills and irregular sensory responsivity, making participation in leisure activities difficult if not impossible.²⁵ Communication skills in verbal children with ASD noted in research include echolalia, phonological errors, restricted semantic and syntactic skills, failed coherence in narrative ability, deficits in using language for social and pragmatic purposes, etc. Furthermore, for individuals with ASD who may be mainly non-verbal or minimally verbal, communication goals include alternative and augmentative channels.^{25–27} In cases where individuals do use verbal language, the output may include prosodic errors, phonological challenges, and speech patterns consistent with apraxia of speech.²⁸ Looking at ASD from a rehabilitation perspective, there is a need to adopt and adapt innovative methods for clinical practice vis-à-vis the understanding and managing of complex communication needs in ASD. This underlines the importance of increasing awareness among health and educational professionals relevant to an individual’s communication needs. A significant parameter affected by ASD is schooling and education.²⁹ The breadth and significance of the possible challenges affected individuals may face, calls for determining each child’s functional profile, preparing targeted educational and rehabilitation programs to address their specific needs, and providing the *least restrictive framework* for the child to successfully manage the long-term process of intervention and their changing needs over their life-time.³⁰

The Importance of ASD Identification

Children with ASD face multiple difficulties with social pragmatic issues in the communication spectrum and experience immense challenges in peer interactions.³¹ Numbers of children exhibit serious manifestations of ASD symptoms, ie, restricted interests and repetitive behaviors, use monotonous speech contours, and, on many occasions, engage in immediate and/or delayed echolalia.¹⁰ In contrast, some may exhibit remarkable strengths, including special skills in areas such as mathematics, arts, music, and sciences. Furthermore, they are known for their strengths in memory for details or long-term information such as dates, birthdays, etc. Along these lines, professionals and caregivers need to capitalize on such skills in the effort to develop the best intervention and long-term positive outcomes related to social communication skills and overall learning abilities.³²

Rehabilitation, health, social and educational practitioners along with national and local community leaders must be familiarized with clinical signs pertinent to the identification of ASD. Early identification is a key component to the successful management of ASD individuals across their lifespans. Timely identification and accurate diagnosis impact tremendously on long-term outcomes.³³ A multidisciplinary approach to ASD includes comprehensive assessments of standardized and non-standardized testing protocols supplemented by clinical observation scales. ASD is often in comorbidity with other neurodevelopmental disorders manifested as psychiatric challenges, intellectual impairment, sensory-motor issues, and self-injury.⁸ The detailed differential diagnosis for ASD allows the discernment of other accompanying conditions that warrant attention such as intellectual disability, language impairment, apraxia of speech, motor-kinesthetic deficits, psycho-emotional issues, attention deficit, and/or hyperactivity disorder, and many others. Management of ASD caseloads requires an *Interdisciplinary team* approach due to the multifaceted and diverse nature of the disorder.³⁴ Although signs of ASD can be manifested during infancy⁴ (eg, low social affect, lack of eye contact, lack of joint attention, reduced early vocalizations) the actual diagnosis is performed later in life.³⁵ ASD characteristics tend to change over time in tandem with their chronological age³⁶ and changing needs so that different tools and clinical observation protocols need to be implemented in consideration of the individual’s chronological age, as well as their linguistic and cultural backgrounds.

Supporting Individuals with ASD

In order to effectively support ASD populations, practitioners need to work closely with families, and in cases where multidisciplinary teams are involved, collaboration with all members within the team is highly recommended. In addition, once ASD is diagnosed, it is of paramount importance that caregivers are offered pertinent information related to service availability in their community, design of appropriate intervention plans for the affected individual, and information on the developmental course of the condition, to note a few.³⁶ Since the presence of ASD in children is a great source of distress to families, caregivers need encouragement to seek professional advice and support to increase coping capacity with possible depression, disappointment, fear, guilt, helplessness, anger, grief, and other debilitating emotions. Addressing these issues early on was found to contribute to adjustment to this new life-long situation, and lead to gradual healing and acceptance of their lives with an affected member. For this reason caregiver support needs to be addressed as soon as possible after identification.³⁷

While ASD may be a life-long disorder, various therapy programs enhance children's acquisition of new abilities and also help them conquer several developmental obstacles.³⁸ Provision of services in the home setting by government agencies, may be available in geopolitical regions where socio-economic resources, awareness, and ASD management are high. As well, free charge programs in schools may also be offered to help meet their needs, and so improve their developmental trajectory. Emotional stamina allows the caregivers to support the child in an optimum way. In the case where children with ASD and their families reside in remote areas with no direct access to therapy centers, it is imperative that health-care professionals and rehabilitation practitioners reach out to these groups and provide them with the most recent intervention services.^{36,39}

Recent Advances in Telepractice Services in ASD

Today's technology focuses on enabling individuals with communication and immobility challenges to capitalize on remote technologically based therapeutic interventions in the form of direct therapy and/or consultation and alternative means of rehabilitation. Overall, this framework is referred to as *Teletherapy* or *Telepractice*.⁴⁰ The main goal of telepractice is to increase participation and improve the lives of disability affected individuals.⁴¹ In general, distance is a major obstacle for people with disabilities. Given the recent technology-based intervention resources, individuals with ASD can take advantage of such advances via the assistance and support of clinicians and caregivers.⁴² Telepractice thus provides an effective resource for families who do not have access to essential services for their children. Telepractice aims to bridge the communication gap which usually surfaces among patients, caregivers, and health professionals who are involved in the management of individuals with communication disorders as in ASD. The ultimate goal is to provide timely evaluation, appropriate intervention, and counseling for affected children and their families.^{42,43} Individuals who provide teletherapy require training in the use of specific platforms to offer a complete session that will consist of practice and creative programs via teletherapy, offering these individuals an additional route for rehabilitation along their learning journey.⁴⁴

The support of individuals with ASD, be it diagnostic or treatment preferably is based on available Evidence-Based Practice (EBP). The therapists/clinicians modify the environment to support certain skills and provide tasks while giving educators and therapists access to the appropriate platforms and software, so that the children transfer successful strategies, focusing on generalization.^{45,46} New technologies provide the potential to offer a timely and low-cost solution that focuses on ASD individuals mainly in remote areas.⁴⁷ The counseling services offered by teleconferencing provide the clinician as well as the individual with a level of comfort and a wider range of educated opinions motivated by "best practices" in terms of education and care of the individual.⁴⁸

Experts and clinicians as well as parents, or educators, can connect with the professional from a distance using telepractice online instruction, and videoconferencing. Researchers developed telepractice guidelines so practitioners may use effective diagnostic and therapeutic services for individuals with ASD.⁴⁶ Nevertheless, despite promising and fruitful grounds offered by telepractice, especially for the remote and underserved populations, this framework of practices is not without caveats. Boisvert et al⁴¹ eg, provided a systematic review regarding the pros and cons of telepractice with a particular focus on ASD. SLPs used numerous strategies to enhance the effectiveness of telepractice with ASD children and to *partner and collaborate with them, learn from each other and assist them in becoming true*

partners in this life-long venture. Since telepractice is a relatively new service delivery model in SLP practice that was spawned by Covid 19, the global health crisis with forced shut-downs for about 18 months, followed by resumption of face-to-face therapeutic intervention programs, and parents returning to work physically, are factors that limited the period of the telepractice experience.⁴¹ Consequently, the examination and successful implementation of long-term telepractice activities at home were hindered. Another limitation is the fact that the situation sprouted numbers of poorly trained and unqualified “so-called specialists” to operate and maximize the benefit of technology-based interventions. This was mainly due to the lack of trained student expertise needed to support and manage successfully the technology aspect of telepractice (cameras, sounds, connections, sharing screen, accessing a computer, etc).^{41,43} Apart from technical and timing factor issues, there remains a problem in the sense that available data regarding the long-term effects and usefulness of telepractice implementation remain underexplored due to the lack of long-term ongoing research required for validating outcomes. Nonetheless, some studies showed that telepractice was implemented successfully by therapists in diagnostic and therapeutic sessions. Moreover, the researchers concluded that various individuals such as parents,^{41,48} Applied Behaviour Analysts,⁴⁹ and educators were trained in delivering sessions to ASD affected individuals.¹

Another important aspect in minimizing geographical distance challenges is the use of internet-based technological resources.⁵⁰ Telepractice, in this article, is used as an umbrella term for the application of such *Internet-based* technologies for distance service delivery. The use of two-way communication equipment along with a secure platform is necessary for the virtual interactions between professionals (eg, researchers, speech-language pathologists, special educators) and participants. This form of telepractice allows for sharing of information and knowledge in specific topics or areas.⁵¹ Telepractice delivery mode can be synchronous, asynchronous, or a hybrid or a combination of the two.⁵⁰ Synchronous telepractice is performed in real-time and communication is interactive, resembling a traditional face-to-face experience. Asynchronous telepractice, in contrast, is not performed in real-time, but information or videos are shared and accessed by participants in their own time.⁵² In fact, service delivery through telepractice is supported by professional organizations, including the American Occupational Therapy Association and the American Speech-Language and Hearing Association (ASHA), as a substitute or additional mode of service delivery.⁵³ The advantages of utilizing telepractice for service delivery include, (a) improved access to service delivery for individuals in remote areas to match the opportunities given to individuals in urban areas⁵¹ and (b) improved cost and time efficiency for service delivery.⁴⁷

The current familiarity with the frequent use of computers and the internet in everyday life has created a familiar platform for the acceptance and effectiveness of using telepractice as an alternative or additional service delivery method for professionals within various areas including speech pathology ASD management,⁵⁴ social work, and education.⁵⁵ Interestingly, telepractice has been applied to parent-implemented therapies by various researchers to enhance their evidence-based interventions, it can therefore be considered as an appropriate medium for parent training and coaching in aiding the language and communication abilities of individuals with ASD as well as other developmental disabilities or delays. Researchers report positive feedback from parents as they described training programs via telepractice as convenient, practical, suitable, useful, less stressful, and tend to augment their understanding of evidence-based intervention methods.^{56,57}

Numerous studies of SLP practice support the effectiveness of the implementation of telepractice in evaluation and treatment of ASD.⁴⁶ Interestingly, there is scientific evidence showing telepractice is equivalent to or even more effective than clinical face-to-face intervention.⁵⁸ Moreover, research concluded that inappropriate behaviors of children during sessions are reduced in the presence and assistance of caregivers/parents/guardians, making their role in teletherapy essential, and is further facilitated by the home environment familiarity, comfort, and feeling of security in the presence of their “significant” persons. To maximize session effectiveness, it is important to coach caregivers/parents/guardians in management of children’s behavior during telepractice sessions.⁴⁰ Another advantage is that telepractice facilitates ASD timely evaluation and intervention so that there is proper guidance and treatment in the social behavior, communication, and education, as well as improved speech and language outcomes in individuals receiving therapeutic intervention.⁵⁹

There is a marked disparity between the noted increase in the incidence of ASD individuals and the insufficient number of professionals (clinicians and therapists) to accommodate them, as shown by Boisvert et al⁴⁶ in an American study highlighting this factor as the main obstacle to *telepractice education*.⁴¹ In addition to the insufficient number of

teachers, support services in the child's real context (the home) do not meet parents' demands so they may turn their effort to online resources that provide a set of activities that allow parental involvement⁴⁵ but do not answer their children's educational needs. Although varied reasons impact intervention outcomes undertaken by either parents, educators, or therapists, the identified major factors are *intervention fidelity* and *implementation fidelity*.^{47,57} Conformity of implementation refers to the process and the guidance of people who contributed to this process, namely educators. Intervention fidelity referred to the procedure used by experts in the field of rehabilitation sciences to carry over treatment effectiveness. These two variables are necessary to maintain positive outcomes for children with ASD.⁶⁰ Parent led interventions were based on skills training in relation to young children with disabilities. Parents had the opportunity to be educated in this alternative way of communication by involving them in therapy.⁵⁰

The Necessity of Telepractice in Service Provision

Numerous service delivery models were targeted through research to help fill in the service-need gap, a recurrent issue in health care and education.⁶¹ In the field of medicine, decades of application of telemedicine was identified as a method to increase the range of service delivery of health-care providers.⁵⁷ Telemedicine is defined as the distance provision of health care, utilizing online technology and telecommunication. With the successful application of telemedicine, telehealth practice expanded to counseling, psychotherapy, and other services. In education, telepractice, using distance technology is in its infancy.⁶⁰ This treatment strategy does not differ from face-to-face therapy but the means of administration and approach are changed. As in traditional approaches, the therapist plans the treatment to answer the child's needs, observes, and offers feedback on the treatment including new interventions based on observation and evidence-based practice. Finally, special training sessions are provided to the caregivers guiding them in applying these new practices and goals set.^{43,56}

In sum, there are both advantages and disadvantages in the application of innovations. As noted earlier, intervention fidelity and implementation fidelity are vital in assuring positive outcomes for individuals with ASD.⁶² Various research studies showed that telemedicine could extend access to care at a distance. Similarly, access to specialists in autism is limited for children in rural areas and in medically underserved groups.^{49,56,57,63} Health professionals with expertise in ASD can utilize their clinical practice more effectively and extend their scope of intervention efficiently to remote communities than was possible years ago. It can also serve to increase service capacity while reducing the need to call on other specialists or preparing the time-consuming community-based practitioners and educators for evidence-based care provision.⁶⁴ Telemedicine allows for improved care coordination between the autism expert and the child's primary care provider. Additionally, it can decrease the rate of missed appointments incurred by the family.^{56,64} Recent database research by Baharav & Reiser confirms that telemedicine can provide access to essential services at reduced costs.⁵¹ Hence, telemedicine consultation provides decision support to the patient's local physician, while raising the physician's degree of familiarity and proficiency in managing more efficiently/capably patient care.⁵¹

Parent-implemented therapies focus on training the parent to be the primary therapy provider, as researchers have shown that parents can be successful interventionists.⁶⁵ These therapies have been identified as an appropriate means of participating in their child's intervention and building their ability to promote the development of children with Developmental Disorders (DD).⁶⁶ As previously mentioned, parent-implemented therapies are considered an evidence-based practice for young children with or at risk of ASD. Parent-implemented language and communication therapy programs train parents to apply naturalistic teaching strategies with their children in their natural environment, using play-based, or routine-based activities. Some taught strategies include verbal and gestural prompting, imitation, natural praise, and focused stimulation strategies to improve children's joint attention and social communication skills.⁴⁷ Teaching parents these skills through telepractice allows professionals and researchers to (a) be time-efficient in working with families, (b) provide consultation (ie, coaching) services to the family in the child's natural environment, and (c) provide parents in remote settings access to evidence-based practices. Various studies have shown that parents of children with ASD and DD reported that these training programs are possible, feasible, functional, appropriate, and effective in expanding knowledge for evidence-based intervention methods.^{58,59} Parents were also trained to use several communication teaching tactics. These varied from how to set up the environment, modeling, imitation, and time delay to responsive interaction tactics like expansion and turn-taking. The advantages of parents' utilization of these tactics were

evident across the studies that met standards or met standards with reservations (rigorous studies). Additionally, it was evident that parents were able to employ the tactics successfully across settings and routines. These strategies were presented in various therapy modules.^{48,60}

Suggested Combining Specific Modules with Strategies in Future Studies

The advantages in combining treatment modules with specific strategies are (a) augment the response variation (ie, more words or initiations) of children's communicative abilities, (b) help analyze the relation between parent actions and interaction, (c) assist generalization and preservation of communicative abilities in natural settings, and (d) explain how these abilities can be taught by means of natural change. In contrast, a disadvantage of combined modules could be determining which of the two, the specific approach or the strategy, contributes more to the efficiency of the intervention.^{41,48,56,58}

While Wong et al⁶⁷ found that parent-driven therapies had positive results in children's language and communication abilities, it is difficult to accredit the outcomes directly to parent-enforced therapies without enough proof for implementation and intervention fidelity. It is therefore imperative that both implementation and intervention fidelity are assessed as they affect the outcomes for children with disabilities and their families.⁵⁷

Discussion

ASD Assessments and Diagnosis via Telepractice

Telepractice is a means of improving the diagnostic course in children on the spectrum of ASD. A number of studies are in progress with the ultimate goal of evaluating the achievement of this therapeutic intervention and its functionality with affected children.⁵⁰ Voniati et al study⁵⁶ supports telepractice as an effective and reliable means of providing services to people with autism. It can, as noted in other studies, improve the quality-of-service delivery by addressing the distance challenge in intervening and evaluating people with low or no access to services. Studies showed that *telecommuting* may address some obstacles to intervention such as time, money, and distance, and provide education for children with ASD.⁵² Furthermore, teletherapy use can help eliminate unequal access to clinical treatment facilities for children with ASD.⁶⁸ In addition, evaluation through electronic means has facilitated organizing counseling for parents. It was shown that parent education resulted in improved family situation at home as it helped reduce the family's stress level.⁶⁹

In fact, numerous research studies and tests were performed on the reliability of assessment and treatment of ASD with the use of telepractice showing positive results and encouragement for the use of technological interventions.^{56,59,61} At present, ASD children who show ASD high risk on screening tools, are frequently referred to tertiary assessment centers with typically long waiting lists for further assessment (which may take several years) to verify a diagnosis of ASD and so miss the window of essential early treatment. In the absence of a diagnosis, children are typically provided with non-specific developmental services rather than targeted treatment.⁷⁰ These problems pose significant challenges to clinicians providing care to linguistically diverse, rural, and traditionally underserved families that are under tremendous stress as gaining access to tertiary care services may be a formidable obstacle. Up to 40% of children and families from low-resource communities have difficulty accessing these diagnostic services, despite presence of universal screening programs.^{71,72} These underline the necessity for innovative approaches for ASD screening, assessment, and diagnostic decision-making that can improve early detection and treatment, particularly for families who are challenged by distance and lack of resources that provide a full diagnostic evaluation in their geographical location. In spite of intrinsic difficulties in comprehending service delivery, clinical impact, and financial reimbursement, various "successful" telemedicine models across a variety of medical and psychiatric conditions showed the economic benefits of this service.^{51,52}

Small, but increasing literature regarding ASD telepractice, shows the feasibility and probable value of telepractice-supported and delivered behavioral therapy services.^{58,59,64,73} On the other hand, until recently, systematic review studies assessing the validity of the possible perceived clinical value of diagnosing ASD in young children via telemedicine, from the clinician's or family's viewpoint were not yet available.⁷⁴⁻⁷⁶

Conclusion

The current paper focuses on research advances in the rehabilitation and service provision for individuals with ASD with the main focus on incorporating telepractice. Despite the disadvantages regarding the full implementation of telepractice across the globe, its impact and usefulness provide a springboard for further research that will provide promising results.

To date, telepractice, teletherapy, telemedicine, and all telehealth programs were shown to have a great impact on the well-being of ASD individuals and their families. Further research is needed with a focus on constructing parent and professional questionnaires and interviews to identify the actual benefits and disadvantages according to different stakeholder experiences, and explore the future use of telepractice as a supplement to the conventional therapeutic program delivery so to maximize the intervention benefits to families and their children with ASD. Various telepractice models allow for: direct assessment or intervention with clients, training of caregivers or inexperienced therapists, consultation, staff training, and professional development. Ethical intervention standards need to be reached and enforced prior to the use of any teletherapy model, to this end, specific consent forms for data protection need to be designed and applied prior to any teletherapy endeavor. Research data provide growing evidence for the variability of the results from teletherapy regarding intervention, assessment, and training used, thus proving the versatility of telepractice. In addition, it can provide an economic and sustainable approach both financially and in time spent as positive outcomes are obtained within a short time of implementation, and therefore should be further investigated. Lastly, the efficacy of incorporating complete training modules to strengthen the intervention skills of caregivers and professionals who are newcomers to telepractice need investigation to provide feedback on the elements that require tweaking or replacing with more effective elements.

The Take Home Message

Unlike telemedicine, the field of telepractice use in rehabilitation of ASD in SLP practice is in its infancy and has meager evidence for the long-term efficiency of intervention; however, studies highlighted here have shown the benefits. Using “best evidence available at this time” approach, SLPs may focus on its confirmed benefits, albeit the challenges that need ironing out. The approach merits support from clinicians who would like to *even out the playing field* for access to rehabilitation services as experienced by remote and low-income communities with families dedicated to the well-being of loved ones with ASD who have no time to waste as it is an urgent matter.

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References

1. Cason J, Cohn ER. Telepractice: an overview and best practices. *Perspect Augment Alter Commun*. 2014;23(1):4–17. doi:10.1044/aac23.1.4
2. Edwards-Gaither L. Cultural considerations for telepractice: an introduction for speech-language pathologists. *Perspect ASHA Special Interest Group*. 2018;3(18):13–20. doi:10.1044/persp3.SIG18.13
3. Guiberson M, Atkins J. Speech-language pathologists' preparation, practices, and perspectives on serving culturally and linguistically diverse children. *Commun Disord Q*. 2012;33(3):169–180. doi:10.1177/1525740110384132
4. Gillon G, Hyter Y, Fernandes FD, et al. International survey of speech-language pathologists' practices in working with children with autism spectrum disorder. *Folia Phoniatrica Et Logopaedica*. 2017;69(1–2):8–19. doi:10.1159/000479063
5. Law J, McKean C, Murphy CA, Thordardottir E, editors. *Managing Children with Developmental Language Disorder: Theory and Practice Across Europe and Beyond*. Routledge; 2019.
6. Baron-Cohen S, Lombardo MV, Auyeung B, Ashwin E, Chakrabarti B, Knickmeyer R. Why are autism spectrum conditions more prevalent in males? *PLoS Biol*. 2011;9(6):e1001081. doi:10.1371/journal.pbio.1001081
7. Petinou K, Minaidou D. Neurobiological bases of autism spectrum disorders and implications for early intervention: a brief overview. *Folia Phoniatrica Et Logopaedica*. 2017;69(1–2):38–42. doi:10.1159/000479181
8. Tager-Flusberg H. Risk factors associated with language in autism spectrum disorder: clues to underlying mechanisms. *J Speech Lang Hear Res*. 2016;59(1):143–154. doi:10.1044/2015_JSLHR-L-15-0146

9. Masini E, Loi E, Vega-Benedetti AF, et al. An overview of the main genetic, epigenetic and environmental factors involved in autism spectrum disorder focusing on synaptic activity. *Int J Mol Sci.* **2020**;21(21):8290. doi:10.3390/ijms21218290
10. American Psychiatric Association DS, American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5.* Washington, DC: American psychiatric association; **2013**.
11. Doernberg E, Hollander E. Neurodevelopmental disorders (ASD and ADHD): dsm-5, icd-10, and icd-11. *CNS Spectr.* **2016**;21(4):295–299. doi:10.1017/S1092852916000262
12. McBain RK, Cantor JH, Kofner A, Stein BD, Yu H. State insurance mandates and the workforce for children with autism. *Pediatrics.* **2020**;146(4):117–126. doi:10.1016/0006-2944(75)90147-7
13. Salomone E, Pacione L, Shire S, Brown FL, Reichow B, Servili C. Development of the WHO caregiver skills training program for developmental disorders or delays. *Front Psychiatry.* **2019**;11(10):769. doi:10.3389/fpsy.2019.00769
14. World Health Organization. ASD fact sheet newsroom; **2019**. Available from: <https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders>. Accessed October 7, 2022.
15. Hus Y, Segal O. Challenges surrounding the diagnosis of autism in children. *Neuropsychiatr Dis Treat.* **2021**;17:3509. doi:10.2147/NDT.S282569
16. Center for Disease Control and Prevention. Understanding health literacy (CDC); **2019**. Available from: <https://www.cdc.gov/healthliteracy/learn/Understanding.html>. Accessed February 1, 2022.
17. Centers for Disease Control and Prevention. Culture & health literacy: tools for cross-cultural communication and language access can help organizations address health literacy and improve communication effectiveness; **2020**. Available from: <https://www.cdc.gov/healthliteracy/culture.html>. Accessed February 1, 2022.
18. Elsabbagh M, Divan G, Koh Y-J; World Health Assembly resolution WHA67.8. Comprehensive and coordinated efforts for the Mayada et al. Global prevalence of autism and other pervasive developmental disorders. *Autism Res.* **2012**;5(3):160–179. doi:10.1002/aur.239
19. Hobson H, Petty S. Moving forwards not backwards: heterogeneity in autism spectrum disorders. *Mol Psychiatry.* **2021**;16:1–2.
20. Chen S, Xiong J, Chen B, et al. Autism spectrum disorder and comorbid neurodevelopmental disorders (ASD-NDDs): clinical and genetic profile of a pediatric cohort. *Clinica Chimica Acta.* **2022**;1(524):179–186. doi:10.1016/j.cca.2021.11.014
21. Hume K, Steinbrenner JR, Odom SL, et al. Evidence-based practices for children, youth, and young adults with autism: third generation review. *J Autism Dev Disord.* **2021**;51(11):4013–4032. doi:10.1007/s10803-020-04844-2
22. Dallman AR, Artis J, Watson L, Wright S. Systematic review of disparities and differences in the access and use of allied health services amongst children with autism spectrum disorders. *J Autism Dev Disord.* **2021**;51(4):1316–1330. doi:10.1007/s10803-020-04608-y
23. Keen D, Adams D, Simpson K. Teacher ratings of academic skills and academic enablers of children on the autism spectrum. *Int J Incl Educ.* **2021**;4:1–7. doi:10.1080/13603116.2021.1881626
24. Zaidman-Zait A, Mirenda P, Szatmari P, et al. Profiles and predictors of academic and social school functioning among children with autism spectrum disorder. *J Clin Child Adolesc Psychol.* **2021**;50(5):656–668. doi:10.1080/15374416.2020.1750021
25. Hus Y, Petinou K, Segal O. The many facets of ASD in children, youth, and young adults. *Folia Phoniatrica Et Logopaedica.* **2021**;73(3):161–163. doi:10.1159/000516048
26. Westby C. Autism as a Problem of Context Blindness. *Word Mouth.* **2017**;28(5):8–12.
27. Westerveld MF, Paynter J, Adams D. Brief report: associations between autism characteristics, written and spoken communication skills, and social interaction skills in preschool-age children on the autism spectrum. *J Autism Dev Disord.* **2021**;51(12):4692–4697. doi:10.1007/s10803-021-04889-x
28. Paul R, Wilson KP. Assessing speech, language, and communication in autism spectrum disorders. In: *Assessment of Autism Spectrum Disorders*. New York: The Guilford Press; **2009**:171–208.
29. Paul R, Chawarska K, Cicchetti D, Volkmar F. Language outcomes of toddlers with autism spectrum disorders: a two year follow-up. *Autism Res.* **2008**;1(2):97–107. doi:10.1002/aur.12
30. Chiarotti F, Venerosi A. Epidemiology of autism spectrum disorders: a review of worldwide prevalence estimates since 2014. *Brain Sci.* **2020**;10(5):274. doi:10.3390/brainsci10050274
31. Frith U. *Autism: A Very Short Introduction*. Oxford University Press; **2008**.
32. Ospina MB, Krebs Seida J, Clark B, et al. Behavioural and developmental interventions for autism spectrum disorder: a clinical systematic review. *PLoS One.* **2008**;13(11):e3755. doi:10.1371/journal.pone.0003755
33. Zwaigenbaum L, Bryson S, Garon N. Early identification of autism spectrum disorders. *Behav Brain Res.* **2013**;251:133–146. doi:10.1016/j.bbr.2013.04.004
34. Gerds J, Mancini J, Fox E, et al. Interdisciplinary team evaluation: an effective method for the diagnostic assessment of autism spectrum disorder. *J Dev Behav Pediatr.* **2018**;39(4):271–281. doi:10.1097/DBP.0000000000000549
35. Petinou K, Christopoulou M. Autism Spectrum Disorders (ASD) and health care services for underserved populations. *Public Health.* **2022**;17(4):1436.
36. Porayska-Pomsta K, Frauenberger C, Pain H, et al. Developing technology for autism: an interdisciplinary approach. *Pers Ubiquitous Comput.* **2012**;16(2):117–127. doi:10.1007/s00779-011-0384-2
37. Lai WW, Oei TP. Coping in parents and caregivers of children with autism spectrum disorders (ASD): a review. *Rev J Autism Dev Disord.* **2014**;1(3):207–224. doi:10.1007/s40489-014-0021-x
38. DesChamps TD, Ibañez LV, Edmunds SR, Dick CC, Stone WL. Parenting stress in caregivers of young children with ASD concerns prior to a formal diagnosis. *Autism Res.* **2020**;13(1):82–92. doi:10.1002/aur.2213
39. Rogers SJ, Vismara L, Wagner AL, McCormick C, Young G, Ozonoff S. Autism treatment in the first year of life: a pilot study of infant start, a parent-implemented intervention for symptomatic infants. *J Autism Dev Disord.* **2014**;44(12):2981–2995. doi:10.1007/s10803-014-2202-y
40. Luiselli JK, Cannon BO, Ellis JT, Sisson RW. Home-based behavioral intervention for young children with autism/pervasive developmental disorder: a preliminary evaluation of outcome in relation to child age and intensity of service delivery. *Autism.* **2000**;4(4):426–438. doi:10.1177/1362361300004004007
41. Boisvert M, Lang R, Andrianopoulos M, Boscardin ML. Telepractice in the assessment and treatment of individuals with autism spectrum disorders: a systematic review. *Dev Neurorehabil.* **2010**;13(6):423–432. doi:10.3109/17518423.2010.499889

42. Howells K, Sivaratnam C, May T, Lindor E, McGillivray J, Rinehart N. Efficacy of group-based organised physical activity participation for social outcomes in children with autism spectrum disorder: a systematic review and meta-analysis. *J Autism Dev Disord.* 2019;49(8):3290–3308. doi:10.1007/s10803-019-04050-9
43. Jonsson U, Olsson NC, Coco C, et al. Long-term social skills group training for children and adolescents with autism spectrum disorder: a randomized controlled trial. *Eur Child Adolesc Psychiatry.* 2019;28(2):189–201. doi:10.1007/s00787-018-1161-9
44. Cangi ME, Yaşa İC, Işildar A. Preferences of speech and language therapists for telepractice in the COVID-19 pandemic and factors affecting their acceptance of the delivery model. *Eur J Res.* 2021;7(6):645–657. doi:10.18621/eurj.854706
45. Douglas SN, Dunkel-Jackson SM, Bagawan A, Sun T. Five tips for implementing telepractice interventions with family members of young children with autism spectrum disorder. *Perspect ASHA Special Interest Group.* 2022;22:1.
46. Boisvert M, Hall N, Andrianopoulos M, Chaclas J. The multi-faceted implementation of telepractice to service individuals with autism. *Int J Telerehabilitation.* 2012;4(2):11. doi:10.5195/ijt.2012.6104
47. Sutherland R, Trembath D, Roberts J. Telehealth and autism: a systematic search and review of the literature. *Int J Speech Lang Pathol.* 2018;20(3):324–336. doi:10.1080/17549507.2018.1465123
48. Akemoglu Y, Muharib R, Meadan H. A systematic and quality review of parent-implemented language and communication interventions conducted via telepractice. *J Behav Educ.* 2020;29(2):282–316. doi:10.1007/s10864-019-09356-3
49. Neely L, Rispoli M, Gerow S, Hong ER. Preparing interventionists via telepractice in incidental teaching for children with autism. *J Behav Educ.* 2016;25(4):393–416. doi:10.1007/s10864-016-9250-7
50. Hall-Mills S, Johnson L, Gross M, Latham D, Everhart N. Providing telepractice in schools during a pandemic: the experiences and perspectives of speech-language pathologists. *Lang Speech Hear Serv Sch.* 2021;10:1–7.
51. Baharav E, Reiser C. Using telepractice in parent training in early autism. *Telemed e-Health.* 2010;16(6):727–731. doi:10.1089/tmj.2010.0029
52. Lindgren S, Wacker D, Suess A, et al. Telehealth and autism: treating challenging behavior at lower cost. *Pediatrics.* 2016;137:S167–75. doi:10.1542/peds.2015-2851O
53. Knutsen J, Wolfe A, Burke BL, Hepburn S, Lindgren S, Coury D. A systematic review of telemedicine in autism spectrum disorders. *Rev J Autism Dev Disord.* 2016;3(4):330–344. doi:10.1007/s40489-016-0086-9
54. Heitzman-Powell LS, Buzhardt J, Rusinko LC, Miller TM. Formative evaluation of an ABA outreach training program for parents of children with autism in remote areas. *Focus Autism Other Dev Disabl.* 2014;29(1):23–38. doi:10.1177/1088357613504992
55. Wainer A, Ingersoll B. Intervention fidelity: an essential component for understanding ASD parent training research and practice. *Clin Psychol.* 2013;20(3):335.
56. Voniati L, Kilili-Lesta M, Christopoulou M. Speech-language therapy clinical services, student education, and practical training in the time of COVID-19: the rise of telepractice, telesupervision, and distance learning in Cyprus. *Perspect ASHA Special Interest Group.* 2021;6(4):955–963. doi:10.1044/2021_PERSP-21-00022
57. Hay-Hansson AW, Eldevik S. Training discrete trials teaching skills using videoconference. *Res Autism Spectr Disord.* 2013;7(11):1300–1309. doi:10.1016/j.rasd.2013.07.022
58. Neely L, Rispoli M, Gerow S, Hong ER, Hagan-Burke S. Fidelity outcomes for autism-focused interventionists coached via telepractice: a systematic literature review. *J Dev Phys Disabil.* 2017;29(6):849–874. doi:10.1007/s10882-017-9550-4
59. Snodgrass MR, Chung MY, Biller MF, Appel KE, Meadan H, Halle JW. Telepractice in speech–language therapy: the use of online technologies for parent training and coaching. *Commun Disord Q.* 2017;38(4):242–254. doi:10.1177/1525740116680424
60. Grogan-Johnson S, Alvares R, Rowan L, Creaghead N. A pilot study comparing the effectiveness of speech language therapy provided by telemedicine with conventional on-site therapy. *J Telemed Telecare.* 2010;16(3):134–139. doi:10.1258/jtt.2009.090608
61. Meadan H, Snodgrass MR, Meyer LE, Fisher KW, Chung MY, Halle JW. Internet-based parent-implemented intervention for young children with autism: a pilot study. *J Early Interv.* 2016;38(1):3–23. doi:10.1177/1053815116630327
62. Vismara LA, McCormick C, Young GS, Nadhan A, Monlux K. Preliminary findings of a telehealth approach to parent training in autism. *J Autism Dev Disord.* 2013;43(12):2953–2969. doi:10.1007/s10803-013-1841-8
63. Wainer AL, Ingersoll BR. Increasing access to an ASD imitation intervention via a telehealth parent training program. *J Autism Dev Disord.* 2015;45(12):3877–3890. doi:10.1007/s10803-014-2186-7
64. Ferguson J, Craig EA, Dounavi K. Telehealth as a model for providing behavior analytic interventions to individuals with autism spectrum disorder: a systematic review. *J Autism Dev Disord.* 2019;49(2):582–616. doi:10.1007/s10803-018-3724-5
65. Wattanawongwan S, Ganz JB, Pierson L, Yllades V, Liao CY, Ura SK. Communication intervention implementation via telepractice parent coaching: parent implementation outcomes. *J Spec Educ Technol.* 2020;27:0162643420950026.
66. Leslie DL, Iskandarani K, Dick AW, et al. The effects of Medicaid home and community-based services waivers on unmet needs among children with an autism spectrum disorder. *Med Care.* 2017;55(1):57. doi:10.1097/MLR.0000000000000621
67. Wong CS. A play and joint attention intervention for teachers of young children with autism: a randomized controlled pilot study. *Autism.* 2013;17(3):340–357. doi:10.1177/1362361312474723
68. Nelson EL, Palsbo S. Challenges in telemedicine equivalence studies. *Eval Program Plann.* 2006;29(4):419–425. doi:10.1016/j.evalprogplan.2006.02.001
69. Barton EE, Fettig A. Parent-implemented interventions for young children with disabilities: a review of fidelity features. *J Early Interv.* 2013;35(2):194–219. doi:10.1177/1053815113504625
70. Kogan MD, Strickland BB, Blumberg SJ, Singh GK, Perrin JM, van Dyck PC. A national profile of the health care experiences and family impact of autism spectrum disorder among children in the United States, 2005–2006. *Pediatrics.* 2008;122(6):e1149–58. doi:10.1542/peds.2008-1057
71. Burke MM, Goldman SE. Identifying the associated factors of mediation and due process in families of students with an autism spectrum disorder. *J Autism Dev Disord.* 2015;45(5):1345–1353. doi:10.1007/s10803-014-2294-4
72. Rankin JA, Paisley CA, Tomeny TS, Eldred SW. Fathers of youth with autism spectrum disorder: a systematic review of the impact of fathers' involvement on youth, families, and intervention. *Clin Child Fam Psychol Rev.* 2019;22(4):458–477. doi:10.1007/s10567-019-00294-0
73. Hampton LH, Kaiser A. Intervention effects on spoken-language outcomes for children with autism: a systematic review and meta-analysis. *J Intellect Disabil Res.* 2016;60(5):444–463. doi:10.1111/jir.12283

74. Biggs EE, Therrien MC, Snodgrass MR, Douglas SN. Voices from the field: strategies for effective telepractice for children with autism who use augmentative and alternative communication. *Perspect ASHA Special Interest Group*. 2022;7(2):324–337. doi:10.1044/2021_PERSP-21-00229
75. Iacono T, Trembath D, Erickson S. The role of augmentative and alternative communication for children with autism: current status and future trends. *Neuropsychiatr Dis Treat*. 2016;12:2349. doi:10.2147/NDT.S95967
76. Ingersoll B, Berger NI. Parent engagement with a telehealth-based parent-mediated intervention program for children with autism spectrum disorders: predictors of program use and parent outcomes. *J Med Internet Res*. 2015;17(10):e4913.

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