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Screenless Teletherapy and Silent Telesupervision: Leveraging Technology for Innovative Service Delivery and Clinician Training in Speech-Language Pathology during the COVID-19 Era

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The COVID-19 pandemic has upended traditional models of education and health care. Despite having a well-established evidence base, videoconferencing and related technology (i.e., "teletechnology") were rarely utilized by most speech-language pathologists (SLPs) prior to March 2020. As operations were forced to move online, there was a rapid, unprecedented, and near-universal adoption of teletechnology for service delivery and clinical education. However, there was little time for program modification and training. Nine months later, we have settled into the transition and are able to reflect on the evidence base and benefits of operating through a new modality.

This report outlines a simple framework to demonstrate commonalities in SLP clinical supervision and early intervention service delivery, as well as the potential translation across therapeutic fields. We summarize the historical use of technology in SLP clinical supervision and service delivery, specifically, how it can be leveraged to support processes, outcomes, and access. Although SLPs are trained to serve the full range of clinical populations, we focus on their role in early intervention (i.e., services for children from birth to age five). We expand upon the current research evidence with practical discussions of quickly-developing anecdotal support for innovative practices, including "screenless coaching" and "silent supervision." Although there are significant benefits to teletechnology, we conclude by recognizing the limitations and discussing needs for future research. This review is written from the perspective of two experienced SLPs; however, the discussion is relevant to other therapeutic fields.

Introduction

Speech-language pathologists (SLPs) serve individuals across the lifespan, with diverse needs related to speech, language, social communication, cognition, feeding, and swallowing. As in the related fields of

counseling, teaching, occupational therapy, and physical therapy, supervised clinical experience is an integral component of SLP training. Graduate students must complete at least 400 hours of supervised experience, as well as a nine-month Clinical Fellowship, to be eligible for certification by the American Speech-Language and Hearing Association (ASHA).[1] In addition to ASHA certification, clinicians must also meet state licensure requirements in each state in which they practice.

Clinical Supervision

In traditional, in-person models of clinical supervision, the supervisor observes student-led sessions in real-time from the same room, a one-way mirror, or video feed. If in-session guidance is warranted, the supervisor must physically enter the room and interrupt the session. This model of direct supervision has been shown to be effective for developing trainee competency.[2] However, one limitation of traditional in-person supervision is that immediate feedback is not always possible due to time and scheduling demands. Trainees report that receiving structured and timely feedback after each session is imperative for their professional development,[3-5] and there is strong empirical support relating the effectiveness of feedback with its immediacy.[6]

Early Intervention

Speech or language impairment is the most prevalent disability category for young children. Of the 773,595 preschool-aged children who receive services under the Individuals with Disabilities Act,[7] 42.4% have primary needs in the areas of speech and language.[8] Over the last two decades, best practices for early intervention have shifted from client-centered to family-centered treatment.[9] Within a family-centered model, the SLP indirectly serves the child by building capacity within the family. Outcomes are best when intervention is delivered in the child's natural environment by their authentic interaction partners.[10] Therapists and caregivers collaboratively set goals and plan treatment, but caregivers are the primary implementers of intervention.[11] Parental self-efficacy—or a caregiver's feelings of competence and confidence in their ability to support their child's development[12]—is increasingly considered a key outcome of early intervention. Parental self-efficacy is positively related to their involvement in treatment and their relationship with the therapist.[13-15] Although SLPs consistently report adhering to best practice standards (i.e., using a family-centered model of care[16] and delivering service in home or school setting[8]), research involving direct observation tells a different story. In practice, SLPs often drive the encounters while caregivers take a backseat in treatment planning and implementation.[16-19]

Teletechnology

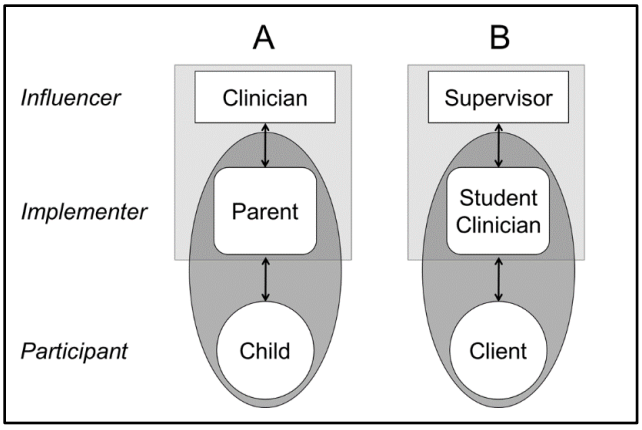
Even before high-speed internet became widely available, low-tech devices (e.g., landline phones) have been effectively used—as early as the 1950s—for distance supervision and treatment in diverse fields, including speech-language pathology, counseling, psychology, education, dentistry, and medicine.[20-24] Since the early 2000s, advances in videoconferencing and related technology (i.e., "teletechnology") have been used in speech-language pathology to enable therapy sessions no matter the distance between the client and the provider.[19,25-27] Using a widely available personal device with internet and video capability, such as a laptop or smartphone, the therapist and client are able to engage in the virtual equivalent of face-to-face therapy. We refer to this as "telepractice" in speech-language pathology, however readers from other fields may know telepractice by its synonyms: telehealth, telemedicine, teletherapy, and telerehabilitation. In 2005, ASHA approved telepractice as a viable service modality for providing speech language pathology services at a distance.[28] Telesupervision (also called distance supervision, e-supervision, or cyber supervision) was introduced around the same time as telepractice.[25-27,29-30] Through a videoconferencing platform, the supervisor observes student-led sessions and delivers feedback either

in real-time or following the session. Teletechnology has the potential to address some of the limitations of in-person arrangements, specifically the immediacy of feedback in clinical supervision and the adherence to family-centered models of care in early intervention. Before reviewing how teletechnology has been leveraged in speech-language pathology and related fields, we propose a simple conceptual framework to understand the relationships and processes at play in clinical supervision and intervention.

Conceptual Framework

Although early intervention and clinical supervision clearly involve different populations, they share similar roles, processes, and aims. Our simple framework (Figure 1), based on the bioecological model of development,[31] delineates these relationships and the factors that affect them. This framework translates to any field that employs indirect therapeutic relationships in their clinical training or service delivery (e.g., OT, PT, and education).

Figure 1. Relationships between interaction partners in (A) parent coaching and (B) clinical supervisory models.



There are three roles in indirect therapeutic relationships: an ***influencer*** (e.g., clinician or supervisor), an ***implementer*** (e.g., caregiver(s) or student clinician), and a ***participant*** (e.g., child or other client; see figure 1). The participant is directly affected by the implementer, and the implementer is directly affected by the influencer (respectively represented by the dark gray circle and light gray square in Figure 1). The only interaction between the influencer and the participant is indirect, via the implementer. The competencies and internal states of respective interaction partners impact their contributions to the interaction. Likewise, the environment can have a facilitatory or inhibitory effect on the individuals and the success of the interaction. The vignette presented in Figure 2 illustrates an example of how individual-level and environmental factors impact the therapeutic interaction.

Figure 2. Therapeutic Framework in Action

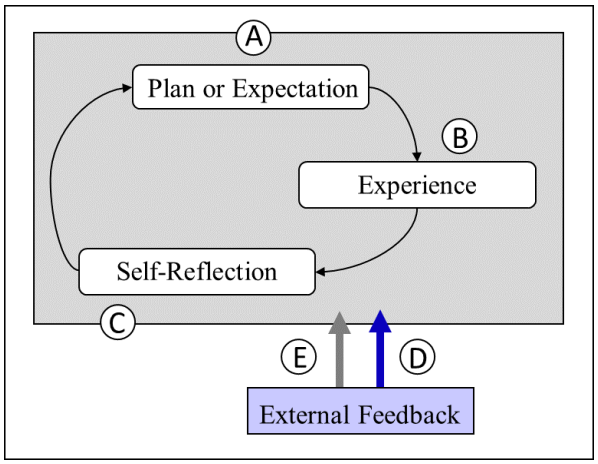
Sharice, a four-year-old with limited verbal ability due to Down Syndrome, is having a tough day. Her shoes are bothering her, she didn't sleep during her nap, and her baby sister is crying loudly. Sharice's mom has also had a hard day of working from home with two children. She has a headache and is getting annoyed that Sharice is dropping her building blocks, one-by-one, in a small gap behind her toy chest—Plunk. Plunk. Plunk.

Exasperated, she tells me (the SLP), "That's so loud! And she's just going to scream when she runs out of blocks. Why does she do this?!" I suggest, "Maybe she's tired and she finds the repetitive 'plunking' soothing..." Mom is silent for a moment and then nods, "Yeah, she barely napped at all today." When Mom preemptively moves to pull out the blocks, I stop her, "Hang on, let's wait and see if she asks for help…" As Mom predicted, Sharice starts to cry when she runs out of blocks—the ones on the floor are just out of her reach. I prompt, "Looks like you need help!" Mom repeats the phrase and models the sign for "help." Sharice is watching—She imitates the sign, and then Mom helps her retrieve the blocks.

Even though Sharice's mom (the *Implementer*) has a headache (her *internal state*) and her other child is crying (negative *environmental* factor), she is able to reframe her perspective of Sharice's "annoying" behavior. With a little guidance from the SLP (the *Influencer*), she now sees the child's behavior as a potential reflection of her own internal state. Rather than telling Sharice to stop or taking away the blocks, she waits for an opportunity to facilitate the child's use of language. Given this opportunity for practice, Sharice is more likely to use the "help" sign in the future (increased *Participant competency*) and her mom is more likely to 'look upstream' for an explanation of her child's behaviors (increased *Implementer competency*).

The ultimate goals of early intervention and clinical supervision are the same: to discontinue the need for influencer participation, leading to implementer independence and eventual participant autonomy.[9-10,32] In their role, implementers develop greater skill and independence through experience. Influencers support this development by sharing feedback and encouraging self-reflection during and after the therapeutic encounter. Figure 3 depicts the cyclical nature of these processes.

Figure 3. Process of implementer learning and development through cycles of experience, reflection, and feedback surrounding the therapeutic encounter.



The cycle begins with the implementer's plan or expectations (A), which are shaped by personal knowledge and experience, as well as guidance from the influencer. As the implementer engages in the interaction with the participant (B), their plan and expectations may be adjusted following self-reflection (C) and/or external feedback (D&E). In traditional in-person interactions, the influencer must interrupt

the interaction to deliver real-time feedback (D). Interruptions may inadvertently cause negative consequences such as decreased implementer confidence, reduced therapeutic alliance, or simply a disruption in the flow of the interaction.

With teletechnology, the influencer can provide the implementer with real-time feedback at any point in the cycle without participant awareness and with minimal disruption to the interaction (E). The influencer can deliver discrete audio feedback to the implementer by "turning off" their video feed and speaking directly to the implementer via headphones. In the context of early intervention, we refer to this as ***screenless teletherapy*** [33] because the child is unaware of the therapist's presence behind the computer screen. The influencer can also deliver discrete text-based feedback by "turning off" their video feed and sending a private text message to the implementer. In the context of clinical supervision, we refer to this as ***silent supervision*** because the student clinician can choose when to read the suggestions and the client is typically unaware of the frequency and nature of the influencer's participation.

Teletechnology in Clinical Supervision and Early Intervention

Despite having over two decades of evidence, until recently, teletechnology was not widely used for treatment or clinical supervision in speech-language pathology. Prior to the COVID-19 pandemic, only about 10% of SLPs reported receiving telepractice training in graduate school,[34] and 5% provided services via telepractice (compared to more than 60% in May 2020).[35] ASHA standards[1] require SLP supervisors to complete professional development related to clinical supervision but there are few continuing education courses specific to telesupervision. Among SLPs familiar with telepractice, few reported experience supervising graduate student clinicians using teletechnology, and nearly all reported that additional training is required for telepractice.[36] Clearly, many SLPs likely felt underprepared and overwhelmed when COVID-19 forced an abrupt uptake of teletechnology. In a survey administered in May 2020, about 60% of SLPs reported challenges related to delivering clinical services via telepractice.[35] Although their challenges are not to be minimized, we know from the long line of research in this area that there are many benefits associated with telepractice and telesupervision. As therapists, students, and clients become more familiar with teletechnology, positive anecdotes are beginning to appear on blogs and in social media. Recent surveys indicate patient and provider satisfaction with telepractice across disciplines.[37-40] Below, we briefly summarize the literature and share innovations from our own supervisory and clinical practices.

Clinical Supervision

One benefit of telesupervision over in-person supervision is the ability to provide discrete, immediate feedback with minimal session interruption. In the earliest implementations of technology-aided supervision, supervisors observed students from a nearby location via one-way window or video feed and provided "play-by-play coaching"[41] through an earpiece or headset worn by the student (i.e., "bug-in-the-ear" or BIE feedback[24]). In terms of developing trainee competency, studies from the field of education indicate that BIE supervision is just as effective, if not more effective than delayed in-person feedback.[41-43] Trainees generally report satisfaction with BIE assisted training,[41-43] however, they also report that it can be difficult to simultaneously process competing auditory streams from the client and the supervisor.[23,42] Led by the fields of counseling, psychotherapy, education, and speech-language pathology, visual applications were developed to display text-based feedback on a monitor, tablet, cell phone, or smartwatch (i.e., "bug-in-the-eye" or BIEye feedback).[23,44-52] Controlled comparisons between BIEye and traditional in-person feedback have not yet been conducted in speech-language pathology, but there have been a handful of trials in psychology, education, and counseling.[47-48,51] Across fields,

BIEye supervision is reported as acceptable and feasible by supervisors, trainees, and clients,[47-50] yields comparable[48-50] or superior[51] therapeutic alliance, and comparable or superior trainee skill development.[47,50]

I (the first author) began to supervise graduate student clinicians using teletechnology in June 2020. I primarily used silent supervision, or telesupervision with feedback delivered in short text messages, to provide real-time BIEye feedback related to all aspects of the therapeutic encounter (e.g., praise for specific intervention techniques, suggestions for managing behaviors). The vignette presented in Figure 4 provides an example of silent supervision in action.

Figure 4. Silent Supervision in Action

A graduate clinician is working with Eric, a 22-year-old with a pragmatic language deficit secondary to autism. He has difficulty understanding social situations and participating in conversation. The clinician starts off the session with a solid plan. She's going to pull up pre-recorded videos of mock conversations to have Eric identify breakdowns in communication. She explained her rationale to me before the session—he has to be able to identify when things go wrong in an interaction before working on his own conversations in real time. Sounds great! In the first video example, there's a painfully long pause between conversational turns. The clinician stops the video and asks Eric, "Was this a good conversation or a bad one?" Eric gives a thumbs up. She responds, "Hmm, why do you think so?" He returns a blank stare. The activity is clearly too hard for Eric, but the clinician pushes through two more video examples. Rather than burst into the treatment room or wait to give feedback in a post-observation conference, I pull up the Chat box on Zoom to send a private message to the clinician—"Does he need visual support?" Without missing a beat, she brings up the Whiteboard feature and gives Eric the scaffolding he needs. Eric has no idea that I've interrupted, and the session continues on.

Although some messages were longer, particularly if the student requested clarification, I tried to follow recommendations from the BIEye literature,[48-49] keeping messages to ten words or less. Overall, students reported that they were able to read, process, and implement in-session feedback with little difficulty, and this is in line with previous research findings.[45] However, one student seemed to over-rely on the chat feedback and often read suggestions verbatim without displaying evidence of critical thinking. In response to this challenge, we developed an effective system in which I added a "?" before comments that were intended to be suggestions and might require more time to process, and an "*" before comments that were imperative to maintaining a successful session and could be read aloud verbatim. I initially anticipated that student clinicians would have long, unnatural pauses in the therapeutic encounter as they read text feedback. However, students quickly adapted and developed effective strategies with little direct instruction. Students reported only looking at the chat during natural pauses in the session and tried to display a "thinking face" rather than a "reading face" to keep the client engaged as they processed the feedback. If more time was needed to read the comments, students were forthright with clients, saying something like, "let's pause for just a minute." On average, these overt disruptions occurred fewer than one time per session and did not seem to impact the therapeutic relationship. If needed, supervisors should keep in mind other strategies, such as only providing feedback on a select number of target behaviors, to further reduce cognitive load and potential ambiguity.[50-52] Although I still met with students periodically for traditional post-observation conferences, students came into discussions with deeper reflections and more independent problem solving since they had already reflected on in-session feedback. In my experience, this hybrid approach required a considerable time investment from both parties but was still more manageable than holding long individual conferences after each session.

Regardless of how feedback is delivered (i.e., BIEye or post-teletherapy session conference) there is compelling support for telesupervision in terms of student perceptions and outcomes. In a comparison between virtual and in-person supervision for SLP trainees, Carlin et al.[53] reported that students in the telesupervision group perceived that they received adequate supervision, feedback, support, and communication. Students who receive telesupervision cite increased feelings of autonomy as well as ease and flexibility in scheduling observations with supervisors.[25] Studies in speech language pathology and related fields such as counseling also report positive outcomes related to student perception of supervisory working alliance and self-efficacy.[53-56]

Finally, telesupervision also offers a potential solution to a critical shortage of SLP supervisors[57-58] which is a disproportionate dilemma in certain geographic regions, especially rural settings and developing countries.[27,57,59] Telesupervision allows supervisors greater scheduling efficiency by eliminating travel time and costs associated with visiting off-site placements.[53] Using teletechnology, the supervisor is able to watch sessions in real-time from the same building, home, or even another country. The benefits of increased access also extend to seasoned SLPs. Speech-language pathology is a broad field, and expert consultation is often sought for unique or complex patients. Both seasoned SLPs and trainees can use teletechnology to connect with researchers and expert clinicians for case consultation.

Early Intervention

Although teletechnology was first implemented in sessions with adult clients, applications with school-aged children and early intervention populations soon followed. With older children, a direct therapy model is most common—caregivers may observe the session and help manage behaviors "on the ground," but the clinician is the primary implementer of intervention. For anyone who works in early intervention, the challenges of telehealth as applied to children younger than 5-years-old quickly became obvious as COVID-19 closures began. *The research says teletherapy works, but how does one keep a child in front of the screen long enough to teach them something? What if they don't respond to direct interactions from the therapist?* Although there is evidence that young children can learn from interactive screen time (e.g., video chatting), face-to-face interactions still provide superior learning outcomes for this population.[60-61] Further, given growing concern that media use interferes with cognitive and behavioral development,[62-64] and that a family-centered model is considered best practice for children younger than school-age,[9-10,] an indirect, parent coaching approach is most appropriate for telepractice with early intervention populations. Similar to in-person treatment, clinicians using telepractice work with families of young children through parent coaching, online training, and consultation.[65-67,76] Teletechnology adds helpful distance between the therapist and the child. This distance may facilitate greater fidelity to best practice guidelines (i.e., parent coaching rather than direct therapy with the child) and allow parents to develop more agency in the process.

There is largely positive support for parent-coaching implemented using teletechnology, both in terms of child outcomes and clinician and parent satisfaction.[65-71] For example, in a matched group design study conducted by Behl et al.,[69] young children with hearing impairments received intervention using a parent coaching model either in-person or using teletechnology. Both groups made significant improvements in language and auditory skills, with a slight advantage for the teletechnology treatment group. Therapists in the teletechnology group were rated as more responsive to the caregiver, and caregivers were more engaged than those in the in-person treatment group. Analyses were adjusted for number of sessions and session length; however, it is also worth noting that families in the teletechnology group were better able to adhere to the treatment schedule. In an uncontrolled investigation conducted by Kelso et al.,[72] parents reported that they appreciated that visits could occur even in situations that would prohibit in-person sessions (e.g., severe weather). Teletechnology saves travel time not only for providers and supervisors, but also for clients with access, mobility, or transportation challenges.

For all its benefits, telepractice is not without its limitations. Nearly all studies using teletechnology report some degree of participant frustration and interruptions in implementation due to internet connectivity or other technological issues.[37,73] Although intervention delivered via teletechnology yields positive child and parent outcomes, many families still prefer in-person therapy over telehealth services.[74] Despite positive child-level outcomes, parents who participated in the study conducted by Kelso et al.[72] reported that they were "somewhat satisfied" or "somewhat dissatisfied" with coaching delivered in virtual home visits. When asked to elaborate, one complaint was that it was uncomfortable to see themselves on camera. Alternative modalities, such as audio-only coaching (i.e., screenless teletherapy), may improve parent satisfaction but have not yet been studied in the context of telepractice early intervention.

Systematic comparisons of various coaching modalities (i.e., two-way video call, audio-only, or text-only) have not yet been conducted. Unlike silent supervision, in which visual-only feedback is thought to be superior to BIE auditory-only feedback,[23,42] in parent coaching, interpretation of competing auditory information is likely more feasible due to differences in participant characteristics. First, young children are highly mobile, so it would be difficult for the implementer to carry and attend to a device displaying text-based feedback. Second, there is less competition for dual-stream auditory processing given the limited verbal abilities of most children in early intervention. To date, there have been few published studies examining the combination of BIE and teletherapy techniques and to our knowledge, none specifically in the field of speech language pathology (see Artman-Meeker et al.[75] for an example from the behavior analytic literature).I (the second author) moved my early intervention private practice to telepractice in March 2020. I anticipated that if we attempted to implement parent coaching using two-way videoconferencing—in which therapist interacts with the parent but is still within the child's view on a computer screen—the child would vie for the therapist's attention and the opportunity to engage with the device. To eliminate this possibility, I opted to go "screenless." The vignette presented in Figure 5 provides an example of screenless teletherapy in action.

Figure 5. Screenless Teletherapy in Action

As Ray, a three-year-old with delayed language, enters the playroom, the laptop catches his eye. It's open, but there's nothing to see. The screen is dark. He keeps walking. I say to mom, "See if you can get in his way and playfully catch his eye." When mom moves in front of Ray, blocking his path, he looks up at her. "Move!" I say. "Move!" repeats mom. Ray just looks and continues walking. "We'll try it again," I say to mom. She blocks; Ray looks; Mom says, "move!" and after a pause, Ray says, "moo!" "Again!" I say, and they repeat the cycle, smiling and laughing with each other. Although I can see the room, my video is turned off, and Ray can't see me. He also can't hear me through the wireless headphones that mom is wearing. I'm coaching mom to use an evidence-based language elicitation strategy, "screenlessly" working on Ray's language goals, and Ray has just learned a new word.

Unlike traditional videoconferencing configurations, the therapist's video is not displayed to the parent or child via computer screen during screenless teletherapy.[33] Instead, teletechnology is used solely to provide the therapist with a visual of the room and of the parent-child dyad. Wireless headphones and cell phone technology enable BIE feedback and allow for two-way communication between the therapist and the parent without the child's awareness of the therapist's presence. Anecdotally, parents have reported feeling more empowered, in control, and less stressed about their children's communication and behavior after engaging in screenless teletherapy. Intuitively, it makes sense that parents would experience improved self-efficacy as they spend more time directly interacting with their child and less time watching an "expert" help their child. In terms of the child's response, I have observed fewer disruptive behaviors from children with this format compared to parent coaching using a two-way video feed. In-session data

related to children's speech, language, and behavior have been equivalent—and in many cases superior to—in-person or teletherapy parent coaching using two-way video feed. Finally, another benefit of using telepractice with this population has been improved access to the family culture. Perhaps because a physical visitor is not coming into the house, families seem to feel more relaxed and less pressured to artificially adjust their behavior based on the presence of the clinician.

In addition to being an effective method of service delivery, teletechnology creates other benefits related to improved access and efficiency. Similar to the benefits discussed in relation to telesupervision, teletechnology can increase access to therapy services for those who live in rural, remote, or otherwise underserved areas.[19,67,76-77] Telepractice also allows for optimization of frequency and intensity of service delivery. Typical in-person speech-language pathology sessions are 30-60 minutes, once to twice per week. Shorter and more frequent sessions—which would not be feasible with in-person service delivery—are easily accomplished using telepractice (e.g., 10-minute parent coaching provided multiple times per week[78]). There is some support for cost savings associated with early intervention delivered via teletechnology compared to in-person formats,[67,79] however systematic cost analysis with more diverse populations and broader demographic regions is needed.

Limitations of Teletechnology

The benefits of teletechnology in early intervention service delivery and clinical training are abundant, though not without limitations. From a methodological standpoint, much of the research in this area is qualitative, relies on convenience sampling, or lacks proper experimental controls. More comparisons between in-person and teletechnology-aided intervention are needed, especially in the form of randomized controlled studies. There is a strong foundation of support for the use of BIE[24,42-43] and BIEye[23, 44-51] feedback within in-person sessions. However, it is possible that certain populations or intervention targets might be better addressed through teletechnology using visual-only or auditory-only coaching. More research is needed to compare feedback methods and compare costs associated with in-person versus teletechnology-aided sessions. In terms of client perceptions and experiences using teletechnology, some stakeholders may believe that services delivered via teletechnology are substandard to in-person care.[72-80] Buy-in is a necessary component of any intervention. Given the widespread use of teletechnology due to the COVID-19 pandemic, it is possible that attitudes toward effectiveness of teletherapy will continue to improve with increased familiarity and use.

In terms of social validity, challenges persist related to access, training, regulations, and privacy. Although 85% of households within developed countries have internet access at home, staggeringly disproportionate access negatively impacts families with lower incomes, people who live in nonmetropolitan areas, and those who live in developing countries.[81-82] Even for those with access to personal computers and high-speed internet, frustrating technological glitches are an inevitable side effect of teletechnology.[37,73] In terms of student training, technological glitches can be a critical problem given that students are legally and ethically required to have a certain amount of direct oversight by an experienced clinician.[1] Likewise, restrictions due to state licensure laws and health insurance reimbursement for teletherapy sessions complicate practical applications of service delivery using teletechnology. Many states prohibit clinicians from supervising or treating without a license for each state in which they and their clients reside. Some emergency interstate compacts have been enacted;[83] however, laws lag behind the practical needs of those on the ground. Clinicians must also be aware of privacy regulations and ensure that services are delivered through a platform that meets privacy standards. The functionality of free HIPAA compliant platforms (e.g., Doxy.me) can be limited, and more sophisticated platforms with secure versions (e.g., Zoom) are cost-prohibitive for many practitioners.

Although teletechnology has been used effectively in the field of speech-language pathology for decades, most practitioners did not have the training and experience needed to make a rapid shift to teletechnology when necessitated by COVID-19. Access to continuing education—particularly in the area of telesupervision—is needed for practitioners to develop confidence and competency with a new modality.

Conclusion

It is only in the past two decades or so that advances in technology have made its accessibility and use in daily routines feasible at scale and at distance. For all its tragedies, COVID-19 has quickly changed the landscape of telepractice. With widespread and near-universal adoption of teletechnology have come innovations in early intervention service delivery and clinical supervision. As the pandemic persists, comfort and ease of use of teletechnology is only likely to improve among all stakeholders. It is increasingly clear that we, as a society, are not going "back to normal." We are establishing a "new normal" in which teletechnology has a permanent place in intervention and clinical training.

Disclosures and Conflicts of Interest

Ms. Beiting is the Co-Editor-in-Chief of CommonHealth. The authors have no other conflicts of interest.

References

1. American Speech-Language-Hearing Association [ASHA]. 2020 Standards and Implementation Procedures for the Certificate of Clinical Competence in Speech-Language Pathology. ASHA [Internet]. 2020 Jan 1 [cited 2020 Oct 1]:[about 12 p.]. Available from: https://www.asha.org/Certification/2020-SLP-Certification-Standards/.
2. Sheepway L, Lincoln M, Togher L. An international study of clinical education practices in speech-language pathology. International Journal of Speech-Language Pathology. 2011; 13(2): 174-185.
3. Carter MD, Carter M, Randolph C, Backes L, Noll K, Cole L. Graduate student perceptions regarding common speech-language pathology supervisory practices. Perspectives of the ASHA Special Interest Groups. 2017; 2(11): 48-59.
4. Ho DW, Whitehill T. Clinical supervision of speech-language pathology students: Comparison of two models of feedback. International Journal of Speech-Language Pathology. 2009; 11(3): 244-255.
5. Taylor K, White E, Kaplan R, O'Rourke CM. The Supervisory Process in Speech-Language Pathology: Graduate Students' Perspective. Perspectives on Administration and Supervision. 2012; 22(2): 47-54.
6. Hattie J, Timperley H. The power of feedback. Review of Educational Research. 2007; 77(1): 81-112.
7. Individuals with Disabilities Education Improvement Act [IDEA] of 2004, 20 U.S.C. § 1400 et seq. 2004.
8. U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs. 41st Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act. [Internet]. 2019 Feb [cited 2020 Oct 1]:1-336. Available from: https://sites.ed.gov/idea/files/41st-arc-for-idea.pdf.
9. American Speech-Language-Hearing Association [ASHA]. Roles and responsibilities of speech language pathologists in early intervention: Guidelines. ASHA [Internet]. 2008 [cited 2020 Oct 1]:[about 90 p.]. Available from: www.asha.org/policy.
10. Rush DD, Shelden ML. The Early Childhood Coaching Handbook. Brookes Publishing Company. Baltimore, MD; 2011.
11. Brown JA. Coaching in Parent-Implemented Early Communication Interventions: Understanding and Overcoming Individual-Level Implementation Barriers. Perspectives of the ASHA Special Interest Groups. 2016;1(1):144-153.
12. Jones TL, Prinz RJ. Potential roles of parental self-efficacy in parent and child adjustment: A review. Clinical Psychology Review. 2005 May 1; 25(3): 341-363.
13. Guimond AB, Wilcox MJ, Lamorey SG. The early intervention parenting self-Efficacy Scale (EIPSES) scale construction and initial psychometric evidence. Journal of Early Intervention. 2008 Sep; 30(4): 295-320.
14. Hughes-Scholes CH, Gavidia-Payne S. Early Childhood Intervention Program Quality: Examining Family-Centered Practice, Parental Self-Efficacy and Child and Family Outcomes. Early Childhood Education Journal. 2019 Nov 1; 47(6): 719-29.
15. Popp TK, You HK. Family involvement in early intervention service planning: Links to parental satisfaction and self-efficacy. Journal of Early Childhood Research. 2016 Sep; 14(3): 333-46.
16. Peterson CA, Luze GJ, Eshbaugh EM, Jeon HJ, Kantz KR. Enhancing parent-child interactions through home visiting: Promising practice or unfulfilled promise? Journal of Early Intervention. 2007; 29(2): 119-140.

17. Bailey DB, Hebbeler K, Scarborough A, Spiker D, Mallik S. First experiences with early intervention: A national perspective. Pediatrics. 2004; 113(4): 887-896.
18. Fleming JL, Sawyer LB, Campbell PH. Early intervention providers' perspectives about implementing participation-based practices. Topics in Early Childhood Special Education. 2011; 30(4): 233-244.
19. Olsen S, Fiechtl B, Rule S. An Evaluation of Virtual Home Visits in Early Intervention: Feasibility of" Virtual Intervention." Volta Review. 2012 Dec 1; 112(3).
20. Boylston WH, Tuma JM. Training of Mental Health Professionals Through the Use of the" Bug in the Ear." American Journal of Psychiatry. 1972 Jul; 129(1): 92-5.
21. Domoto PK, Weinstein P, Getz T. A pilot study using remote broadcasting equipment to provide instruction in pedodontics. Journal of Dental Education. 1979 Oct; 43(11): 599-601.
22. Hunt DD. 'Bug-in-the-ear'technique for teaching interview skills. Academic Medicine. 1980 Nov 1; 55(11): 964-6.
23. Klitzke MJ, Lombardo TW. A" Bug-in-the-Eye" Can Be Better Than a" Bug-in-the-Ear" A Teleprompter Technique for On-Line Therapy Skills Training. Behavior Modification. 1991 Jan; 15(1): 113-7.
24. Korner IN, Brown WH. The mechanical third ear. Journal of Consulting Psychology. 1952 Feb; 16(1): 81.
25. Dudding CC, Justice LM. An e-supervision model: Videoconferencing as a clinical training tool. Communication Disorders Quarterly. 2004 Jun; 25(3): 145-51.
26. Hallett TL. The impact of technology on teaching, clinical practice, and research. The ASHA Leader. 2002 Jun 11; 7(11): 4-13.
27. Fairweather GC, Lincoln MA, Ramsden R. Speech-language pathology teletherapy in rural and remote educational settings: Decreasing service inequities. International Journal of Speech-Language Pathology. 2016 Nov 1; 18(6): 592-602.
28. American Speech-Language-Hearing-Association [ASHA]. Speech-language pathologists providing clinical services via telepractice: Position statement. Available from: www.asha.org/policy.
29. Carlin CH, Milam JL, Carlin EL, Owen A. Promising practices in e-supervision: Exploring graduate speech-language pathology interns' perceptions. International Journal of Telerehabilitation. 2012; 4(2): 25.
30. Wood JA, Miller TW, Hargrove DS. Clinical supervision in rural settings: A telehealth model. Professional Psychology: Research and Practice. 2005 Apr; 36(2): 173.
31. Bronfenbrenner U, Morris PA. The bioecological model of human development. Handbook of Child Psychology. 2007 Jun 1; 1.
32. Anderson JL. The supervisory process in speech-language pathology and audiology. Ear and Hearing. 1988 Aug 1; 9(4): 223.
33. Nicolet G. 'Screenless' telepractice for toddlers. ASHA Leader Live. [Internet]. 2020 Aug 12 [cited 2020 Oct 1]:[about 2 p.]. Available from: https://leader.pubs.asha.org/do/10.1044/2020-0812-screenless-telepractice/full/.
34. American Speech-Language-Hearing Association [ASHA]. 2016 SIG 18 telepractice services survey results. ASHA [Internet]. 2016 [cited 2020 Oct 1]. Available from: https://www.asha.org/uploadedFiles/ASHA/Practice_Portal/Professional_Issues/Telepractice/2016-Telepractice-Survey.pdf.
35. American Speech-Language-Hearing Association [ASHA]. COVID-19 Tracker Survey. ASHA [Internet]. 2020 [cited 2020 Oct 1]. Available from: https://www.asha.org/research/memberdata/covid-19-tracker-survey/.
36. Grillo EU. Results of a survey offering clinical insights into speech-language pathology telepractice methods. International Journal of Telerehabilitation. 2017; 9(2): 25.
37. Tenforde AS, Borgstrom H, Polich G, Steere H, Davis IS, Cotton K, O'Donnell M, Silver JK. Outpatient Physical, Occupational, and Speech Therapy Synchronous Telemedicine: A Survey Study

of Patient Satisfaction with Virtual Visits During the COVID-19 Pandemic. American Journal of Physical Medicine & Rehabilitation. 2020 Aug 16.
38. Miller MJ, Pak SS, Keller DR, Barnes DE. Evaluation of Pragmatic Telehealth Physical Therapy Implementation During the COVID-19 Pandemic. Physical Therapy. 2020 Oct 19.
39. Connolly SL, Miller CJ, Lindsay JA, Bauer MS. A systematic review of providers' attitudes toward telemental health via videoconferencing. Clinical Psychology: Science and Practice. 2020 Jan 6: e12311.
40. Aggarwal K, Patel R, Ravi R. Uptake of telepractice among speech-language therapists following COVID-19 pandemic in India. Speech, Language and Hearing. 2020 Sep 25: 1-7.
41. Rock ML, Gregg M, Thead BK, Acker SE, Gable RA, Zigmond NP. Can you hear me now? Evaluation of an online wireless technology to provide real-time feedback to special education teachers-in-training. Teacher Education and Special Education. 2009 Feb; 32(1): 64-82.
42. Schaefer JM, Ottley JR. Evaluating immediate feedback via bug-in-ear as an evidence-based practice for professional development. Journal of Special Education Technology. 2018 Dec; 33(4): 247-58.
43. Scheeler MC, McKinnon K, Stout J. Effects of immediate feedback delivered via webcam and bug-in-ear technology on preservice teacher performance. Teacher Education and Special Education. 2012 Feb; 35(1): 77-90.
44. Machuca R, Johnson T, Moro RR. Tablet-assisted live supervision: Eye-bug supervision. Vistas Online. 2016.
45. Rousmaniere T, Frederickson J. Internet-based one-way-mirror supervision for advanced psychotherapy training. The Clinical Supervisor. 2013 Jan 1; 32(1): 40-55.
46. Scott CG, Becker TM, Simpson KO. The Effect of Real-Time Feedback Using a Smartwatch on the Clinical Behavior of Novice Student Clinicians. Perspectives of the ASHA Special Interest Groups. 2017 Jan 1; 2(11): 79-90.
47. Carmel A, Villatte JL, Rosenthal MZ, Chalker S, Comtois KA. Applying technological approaches to clinical supervision in dialectical behavior therapy: A randomized feasibility trial of the bug-in-the-eye (BITE) model. Cognitive and Behavioral Practice. 2016 May 1; 23(2): 221-9.
48. Probst T, Jakob M, Kaufmann YM, Müller-Neng JM, Bohus M, Weck F. Patients' and therapists' experiences of general change mechanisms during bug-in-the-eye and delayed video-based supervised cognitive-behavioral therapy. A randomized controlled trial. Journal of Clinical Psychology. 2018 Apr; 74(4): 509-22.
49. Scherl CR, Haley J. Computer monitor supervision: A clinical note. The American Journal of Family Therapy. 2000 Jul 1; 28(3): 275-82.
50. Vezer E. Bug-in-the-eye supervision: A critical review. Training and Education in Professional Psychology. 2020 Mar 16.
51. Weck F, Jakob M, Neng JM, Höfling V, Grikscheit F, Bohus M. The effects of bug-in-the-eye supervision on therapeutic alliance and therapist competence in cognitive-behavioural therapy: A randomized controlled trial. Clinical Psychology & Psychotherapy. 2016 Sep; 23(5): 386-96.
52. Coninx N, Kreijns K, Jochems W. The use of keywords for delivering immediate performance feedback on teacher competence development. European Journal of Teacher Education. 2013 May 1; 36(2): 164-82.
53. Carlin CH, Boarman K, Carlin E, Inselmann K. The use of e-supervision to support speech-language pathology graduate students during student teaching practica. International Journal of Telerehabilitation. 2013; 5(2): 21.
54. Abbass A, Arthey S, Elliott J, Fedak T, Nowoweiski D, Markovski J, Nowoweiski S. Web-conference supervision for advanced psychotherapy training: A practical guide. Psychotherapy. 2011 Jun; 48(2): 109.
55. Inman AG, Bashian H, Pendse AC, Luu LP. Publication trends in telesupervision: A content analysis study. The Clinical Supervisor. 2019 Jan 2; 38(1): 97-115.

56. Reese RJ, Aldarondo F, Anderson CR, Lee SJ, Miller TW, Burton D. Telehealth in clinical supervision: A comparison of supervision formats. Journal of Telemedicine and Telecare. 2009 Oct 8; 15(7): 356-361.
57. McAllister L. Issues and innovations in clinical education. Advances in Speech Language Pathology. 2005 Sep 1; 7(3): 138-48.
58. American Speech-Language-Hearing-Association [ASHA]. Supply and demand resource list for speech-language pathologists. www.asha.org. https://www.asha.org/siteassets/uploadedFiles/Supply-Demand-SLP.pdf. Published 2020. Accessed December 1, 2020.
59. Rule DW, Kelchner LN. International Telesupervision: The Clinical Fellowship Experience. Perspectives of the ASHA Special Interest Groups. 2017 Jan 1; 2(11): 73-8.
60. Myers LJ, LeWitt RB, Gallo RE, Maselli NM. Baby FaceTime: Can toddlers learn from online video chat? Developmental Science. 2017 Jul; 20(4): e12430.
61. Roseberry S, Hirsh-Pasek K, Golinkoff RM. Skype me! Socially contingent interactions help toddlers learn language. Child Development. 2014 May; 85(3): 956-70.
62. Hutton JS, Dudley J, Horowitz-Kraus T, DeWitt T, Holland SK. Associations between screen-based media use and brain white matter integrity in preschool-aged children. JAMA Pediatrics. 2020 Jan 1; 174(1): e193869.
63. Horowitz-Kraus T, Hutton JS. Brain connectivity in children is increased by the time they spend reading books and decreased by the length of exposure to screen-based media. Acta Paediatrica. 2018 Apr; 107(4): 685-93.
64. Zivan M, Bar S, Jing X, Hutton J, Farah R, Horowitz-Kraus T. Screen-exposure and altered brain activation related to attention in preschool children: An EEG study. Trends in Neuroscience and Education. 2019 Dec 1; 17: 100117.
65. 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. Journal of Early Intervention. 2016 Mar; 38(1): 3-23.
66. Hao Y, Franco JH, Sundarrajan M, Chen Y. A Pilot Study Comparing Tele-Therapy and In-Person Therapy: Perspectives from Parent-Mediated Intervention for Children with Autism Spectrum Disorders. Journal of Autism and Developmental Disorders. 2020 May 6.
67. Cason J. A pilot telerehabilitation program: Delivering early intervention services to rural families. International Journal of Telerehabilitation. 2009; 1(1): 29.
68. Akemoglu Y, Muharib R, Meadan H. A Systematic and Quality Review of Parent-Implemented Language and Communication Interventions Conducted via Telepractice. Journal of Behavioral Education. 2020 Jun 1: 1-35.
69. Behl DD, Blaiser K, Cook G, Barrett T, Callow-Heusser C, Brooks BM, Dawson P, Quigley S, White KR. A multisite study evaluating the benefits of early intervention via telepractice. Infants & Young Children. 2017 Apr 1; 30(2): 147-61.
70. Simacek J, Dimian AF, McComas JJ. Communication intervention for young children with severe neurodevelopmental disabilities via telehealth. Journal of Autism and Developmental Disorders. 2017 Mar 1; 47(3): 744-67.
71. Vismara LA, McCormick CE, Wagner AL, Monlux K, Nadhan A, Young GS. Telehealth parent training in the Early Start Denver Model: Results from a randomized controlled study. Focus on Autism and Other Developmental Disabilities. 2018 Jun; 33(2): 67-79.
72. Kelso GL, Fiechtl BJ, Olsen ST, Rule S. The feasibility of virtual home visits to provide early intervention: A pilot study. Infants & Young Children. 2009 Oct 1; 22(4): 332-40.
73. Boisvert M, Lang R, Andrianopoulos M, Boscardin ML. Telepractice in the assessment and treatment of individuals with autism spectrum disorders: A systematic review. Developmental Neurorehabilitation. 2010 Dec 1; 13(6): 423-32.

74. Yang HW, Burke M, Isaacs S, Rios K, Schraml-Block K, Aleman-Tovar J, Tompkins J, Swartz R. Family perspectives toward using telehealth in early intervention. Journal of Developmental and Physical Disabilities. 2020 May 11.
75. Artman-Meeker K, Rosenberg N, Badgett N, Yang X, Penney A. The effects of bug-in-ear coaching on pre-service behavior analysts' use of functional communication training. Behavior Analysis in Practice. 2017 Sep 1; 10(3): 228-41.
76. 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. Communication Disorders Quarterly. 2017 Aug; 38(4): 242-54.
77. Sutherland R, Trembath D, Roberts J. Telehealth and autism: A systematic search and review of the literature. International Journal of Speech-Language Pathology. 2018 May 4; 20(3): 324-36.
78. Peter B, Potter N, Davis J, Donenfeld-Peled I, Finestack L, Stoel-Gammon C, Lien K, Bruce L, Vose C, Eng L, Yokoyama H. Toward a paradigm shift from deficit-based to proactive speech and language treatment: Randomized pilot trial of the Babble Boot Camp in infants with classic galactosemia. F1000Research. 2019 Sep 5; 8(271): 271.
79. Blaiser KM, Behl D, Callow-Heusser C, White KR. Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. International Journal of Telerehabilitation. 2013; 5(2): 3.
80. Cole, B., Pickard, K., & Stredler-Brown, A. (2019). Report on the use of telehealth in early intervention in Colorado: Strengths and challenges with telehealth as a service delivery method. International Journal of Telerehabilitation, 11(1), 33.
81. International Telecommunication Union. Measuring digital development: Facts and figures 2019. ITU Publications [Internet]. 2019. [cited 2020 Dec 1]; 1-15. Available from: https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf.
82. Hampton K, Fernandez L, Robertson C, Bauer JM. Broadband and student performance gaps. Available at SSRN 3614074. 2020 Mar 3.
83. American Speech-Language-Hearing Association [ASHA]. 2019 SLP health care survey: Survey summary report: Number and type of responses. ASHA [Internet]. 2019 [cited 2020 Oct 1]; 1-63. Available from: https://www.asha.org/siteassets/uploadedFiles/2019-SLP-HC-Survey-Summary-Report.pdf. Published 2019. Accessed on October 1, 2020.

Statement of Contributions

Ms. Beiting and Ms. Nicolet jointly conceived of the topic, reviewed the literature, and wrote the manuscript.