



Delivering Quality Allied Health Services to Children with Complex Disability via Telepractice: Lessons Learned from Four Case Studies

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Abstract

People with disabilities living in rural and remote areas often have insufficient access to the allied health services that they require. Telepractice has emerged as a promising solution, yet little is known about whether it is possible to deliver quality disability therapy services via technology or of the considerations required to achieve positive outcomes. Multiple case studies using mixed methods were conducted to achieve in-depth examination of the telepractice services received by four children with disabilities and their families living in rural and remote Australia. Data analysis indicated that telepractice services were highly acceptable to parents and teachers and supported children to achieve positive outcomes for a variety of functional goals related to speech-language pathology and occupational therapy. Findings indicated that quality telepractice can deliver services consistent with contemporary disability expectations. Of critical importance were the skills of allied health professionals to facilitate person-centred practice and strong therapeutic relationships with children, parents, and other stakeholders to achieve positive outcomes for children. Our findings indicate that telepractice is a legitimate option for therapy service delivery that has the potential to provide people with disabilities increased choice and control over the services they receive.

Keywords Telehealth · Allied health · Disabilities · Technology · Speech pathology · Occupational therapy

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Introduction

Allied health professionals (AHPs) such as speech-language pathologists (SLPs) and occupational therapists (OTs) play important roles in supporting people with disability (Dew et al. 2012). Yet, people living in rural and remote communities often do not receive the allied health services they need, leaving them vulnerable to poor long-term outcomes (Dew et al. 2013). In this paper, we conceptualise disability in line with the World Health Organization's International Classification of Functioning, Disability and Health framework, with its attention to disability as a complex phenomenon incorporating aspects of activity limitations and participation restrictions (World Health Organization 2001).

Telepractice has been defined as “the application of telecommunications technology to deliver clinical services at a distance by linking clinician to client, caregiver, or any person(s) responsible for delivering care to the client, for the purposes of assessment, intervention, consultation and/or supervision” (Speech Pathology Australia 2014, p. 4). Given the intractable challenges of delivering therapy services to small populations dispersed over large distances, telepractice has potential for spreading AHPs' reach in Australia (Dew et al. 2013) and internationally (Ferguson et al. 2018; Mohan et al. 2017) and has been proposed as a way to deliver supports under Australia's National Disability Insurance Scheme (NDIS) in rural and remote areas (National Disability Insurance Agency 2016). Telepractice is highly acceptable to consumers (Gardner et al. 2016; Lincoln et al. 2014). AHPs, particularly those without experience with telepractice, often hold more negative attitudes (Dunkley et al. 2010; May and Erickson 2014). AHPs' lack of uptake of telepractice has been attributed to various factors including organisational and policy barriers, clinician beliefs, and a lack of adequate training (May and Erickson 2014).

Evidence in favour of telepractice is mounting with suggestions it may be as effective as in-person services (Speyer et al. 2018). It appears to have promising utility for the provision of evidence-based interventions such as applied behaviour analysis for people with autism, although there is a need for further high quality research to establish efficacy (Ferguson et al. 2018). Despite growing evidence of its effectiveness, however, adoption of telepractice in allied health has been slow (Department of Health and Ageing 2011). AHPs express a range of concerns about the suitability of telepractice as a service delivery model outside research settings, including the potential impact on therapeutic relationships, possible safety implications of delivering services remotely, the willingness and capability of clients and their families to engage in telepractice services, and the effectiveness with which sensory needs and behaviour can be managed online, particularly for paediatric clients (Hines et al. 2015; May and Erickson 2014). Such concerns may be further exacerbated for practitioners working within a disability context, given the complex needs of people with disabilities and their families. In fact, beyond application of telepractice to delivery of structured intervention programs, there is limited evidence of utility with people with disabilities who require complex and multifaceted supports. Furthermore, contemporary disability practice endorses therapy embedded in everyday activities (Bundy et al. 2008) yet there is little information about achieving these principles via telepractice. Consequently, AHPs may be reluctant to adopt an unfamiliar service delivery model, particularly when working with people with disabilities.

Evidence is needed on how telepractice can be delivered to realise positive outcomes for people with disabilities. Although research studies incorporating experimental designs may provide important information regarding the overall effectiveness of interventions such as telepractice, they may not provide the rich, nuanced information required to inform decision making about real-world implementation and ways in which to overcome existing barriers to uptake (Greenhalgh et al. 2018). Alternative research designs, such as in-depth, mixed method case studies, are well-suited to gaining a deeper understanding of the complexities of health services, including the variety of inter-related factors that influence client outcomes (Greenhalgh and Papoutsi 2018). The objective of this study was therefore to use case study methodology to describe the experiences of children with disabilities and their families in rural and remote areas who received speech-language pathology and occupational therapy by telepractice. We conducted an in-depth analysis of individual cases of telepractice for disability services to understand the experiences of parents, teachers, and AHPs and to identify essential components of successful telepractice models.

Methods

Research Design

A descriptive, multiple case study of telepractice services received by children with disabilities living in rural and remote Australia using mixed methods was conducted. This provided an opportunity to gain in-depth insights into real-world settings with different clients and evidence to support the personalisation of telepractice services.

Participant Recruitment

The study was approved by The University of Sydney Human Research Ethics Committee (Project number: 2016/483). Participants were recruited from the clients of a private practice managed by authors SD and SC who deliver occupational therapy and speech-language pathology services via telepractice. SD and SC each have over 20 years' experience in their respective disciplines and over five years' experience in telepractice.

Eligibility for children included: (a) aged 0–12 years; (b) living in a rural or remote community in Australia; (c) eligibility for an Individual Funded Package under NDIS; (d) identified goals and support needs that may be supported by an SLP and/or OT; (e) access to a computer or tablet with camera and microphone, and reliable internet connection; and (f) parental/legal guardian written informed consent. New referrals to the private practice of SD and SC were given an electronic flyer about the study. During therapy provision, SC and SD identified key stakeholders (e.g., therapy assistants, teachers) who supported participating children's therapy programs and invited them to participate. Parents and key stakeholders were given a verbal description about the research and a Participant Information Statement and invited to contact author MH to indicate their willingness to participate and complete the consent form.

Participants were four children (male: $n = 3$) aged between 5 years 1 month and 8 years 6 months at enrolment, their mothers, and one child's teacher. Participants lived in inner regional ($n = 1$), remote ($n = 1$) or very remote ($n = 2$) Australia, remoteness

areas as defined in the Australian Statistical Geography Standard (ASGS) (Australian Bureau of Statistics 2016). Each child had also been diagnosed with an autism spectrum disorder (ASD). Other demographic and clinical details are presented in Table 1.

Child 1 was aged 6 years 9 months at enrolment, was the eldest of three siblings, and lived with her parents in a very remote part of Australia. In addition to ASD, she had been diagnosed with global developmental delay and a chromosomal abnormality. Child 2 was 5 years and 2 months at enrolment, lived in inner regional Australia, and was the only child in his family. Child 3 was aged 5 years and 1 month, lived in remote Australia and was the youngest of three, his older siblings being teenagers. Child 4, aged 8 years 6 months, was the sole child of a mother and father living in very remote Australia.

Program Description

Following recruitment, SD and SC conducted an initial meeting with families via videoconference to discuss areas of concern, determine therapy goals, and collect information on children's initial levels of functioning. Discussion with parents and teachers informed the design of the telepractice model. Specific features of the service delivery model varied including the location of telepractice, participants attending telepractice sessions, and the number, duration, and frequency of sessions. Real-time, web-based videoconferencing connected AHPs from their practices to a web-cam equipped laptop or tablet in the child's preferred location.

Data Collection

Therapy Outcome Data On completion of a therapy episode of multiple sessions (defined as when the total number of therapy sessions negotiated with parents has been conducted or after 12 weeks, whichever occurred first), the AHP reviewed the child's progress with the family via telepractice to determine achievement of goals. Outcome measures were chosen according to individual needs and goals and included the Canadian Occupational Performance Measure (COPM) (Law et al. 2000). The COPM is a valid, reliable, and responsive individualized, criterion referenced outcome measure used routinely to measure rehabilitation outcomes with people with disabilities (Carswell et al. 2004). During the initial meeting with the AHP, parents identified priority areas that they wanted to focus on during the therapy episode. Parents then rated their child's current performance on the identified priority areas and their own satisfaction with their child's performance on a 10-point scale. These parental ratings were repeated at the conclusion of the therapy episode during a semi-structured interview with the AHP. An improvement of two or more points is considered clinically significant (Carswell et al. 2004).

Process Data Telepractice process data was collected routinely, including information on the duration and location of each occasion of service (OOS), presence of technological problems, rates of attendance, time spent by AHPs in essential but unbillable therapy support tasks (e.g., administration and preparation, trialing of videoconferencing platforms), and additional equipment and infrastructure costs.

Table 1 Clinical and demographic details of participants

Case	Participant	Gender	Age at enrolment	Diagnosis	AHP involvement	ASGS Remoteness Area (2016)	Family composition	Education level
1	Child (C1)	Female	6;9	ASD 22q11.21 duplication	OT	Very Remote Australia	Mother, father, three children	Primary school
	Parent (P1)	Female	35–44 years	N/A				Certificate level
2	Child (C2)	Male	5;2	ASD	OT	Inner Regional Australia	Mother, father, one child	Primary school
	Parent (P2)	Female	35–44 years	N/A				Postgraduate university
	Teacher (T2)	Female	45–54 years	N/A				Bachelor level
3	Child (C3)	Male	5;1	ASD	OT, SLP	Remote Australia	Mother, father, three children	Primary school
	Parent (P3)	Female	35–44 years	N/A				Bachelor level
4	Child (C4)	Male	8;6	ASD	OT	Very Remote Australia	Mother, father, one child	Home schooled
	Parent (P4)	Female	25–34 years					Certificate level

ASD Autism Spectrum Disorder, OT Occupational therapist, SLP Speech-language pathologist

Qualitative Data Information about experiences with telepractice was collected via interviews with parents, key stakeholders, and the two participating AHPs. Interviews were conducted via telephone by the first author who was not involved in program delivery and who had no previous contact with families. Interviews were semi-structured with a question guide including experiences with using the technology platforms, children's responses to telepractice, and the benefits and drawbacks of telepractice. Interviews were recorded using a digital voice recorder and transcribed verbatim.

Data Analysis

Therapy outcome data and process data were analysed descriptively using Microsoft Excel®, with the average length of session, total time spent by AHPs in and outside of billable OOS, and total additional costs calculated for each child.

Content analysis of interview transcripts generated an overall account of the therapy episode for each child. Transcripts were then analysed thematically. Initial codes were identified using line-by-line reading of transcripts, which were then assigned to broad categories. Comparing and contrasting data across participants highlighted commonalities and differences in perceptions and facilitated synthesis of categories into overarching themes relevant to the research questions. To enhance credibility, authors met periodically to inspect and discuss raw interview data to ensure that emerging interpretations were grounded in the data and reflected a consideration of multiple perspectives (Rice and Ezzy 2005). Author KB reviewed 40% of transcripts, confirming the analysis framework and reaching consensus on the themes. Participants were sent a summary of identified themes and invited to verify interpretations or add further information. No requests for changes were received.

Results

Telepractice process data are presented in Table 2 and therapy outcome data in Table 3. The following section contains a narrative description of the therapy episode for each child.

Child 1

Following diagnosis, the family of Child 1 was referred to telepractice services. As they had no previous experience with telepractice for allied health AHP 1 provided an initial trial to demonstrate telepractice. During initial assessment, it was determined that Child 1 had a speech and language delay and social, emotional, and motor planning difficulties. Parent 1 identified goals related to handwriting. As shown in Table 2, the first two sessions were held at the local public library. Frequent problems with connectivity were experienced during library-based sessions due to movement of the mobile device so AHP 1 recommended purchase of an iPad stand. The family continued to access therapy whilst on holidays, attending one telepractice session from a caravan.

Table 2 Occasions of service

	Child			
	1	2	3	4
Total occasions of service (OOS) – n	15	10	12	7
Complimentary initial telepractice trial	1	-	-	1
Therapy sessions with child	12	10	8	6
Consultation with educators/AHPs/parent	2	-	4	-
Number of OOS with problems with technology reported – n	4/15	2/10	4/12	1/7
Internet connectivity	1	1	3	1 ^b
Platform connectivity	1	1	1	-
Disconnection	1	-	-	-
Video	1	-	-	-
Location of OOS				
School	11	5	7	-
Family home	1	5	5	7
Public library	2	-	-	-
On holidays (caravan)	1	-	-	-
Adult who attended therapy session with child				
Parent	9/12	5/10	6/8 ^a	7
Educator (teacher, teacher's aide)	3/12	5/10	4/8	-
Sibling	-	-	4/8	-
Total time in billable OOS (min)	820	450	640	360
OT billable OOS	820	450	150	360
SLP billable OOS	-	-	580	-
Average length of session with child	61	45	61	60
Total time outside billable OOS (min)	615 (75)	340	640	260
(% of time in billable OOS)	315	(76)	(100)	(72)
Emailing family and/or school	85	195	290	85
Session preparation and administration	105	10	200	75
Equipment and resource research, purchase	-	45	65	45
Consultation with family	80	40	15	75
Consultation with educators	30	50	20	-
Correspondence with health professionals	-	-	50	-
Time spent troubleshooting technology in subsequently cancelled session	-	-	-	10
Additional costs	iPad stand Therapy resources	Nil	Nil	Nil

^a Total exceeds number of telepractice sessions with child as some sessions had multiple adults present

^b Necessitated session cancellation as all communications down in remote location

Subsequent sessions were held at Child 1's school. To establish school-based sessions, AHP 1 communicated with the school principal via videoconference and

Table 3 Goal achievement for children for whom COPM data was provided

Child	Goals	Pre-intervention		Post-intervention	
		Performance	Satisfaction	Performance	Satisfaction
1	Confidence in her overall handwriting ability	4–5/10	7/10	7/10	10/10
	Writing all lower case letters with correct letter formation	3/10	6/10	6–7/10	10/10
	Writing on the line	2/10	6/10	7/10	9/10
2	Improve play and turn taking skills	4/10	4/10	7/10	7/10
	Fine motor and handwriting performance	5/10	8/10	7.5/10	10/10
	Expressing emotions and managing emotions/ self-regulation	3/10	3/10	5/10	5/10
	Separation at school drop off	5/10	4/10	10/10	10/10
4	Child to understand anxiety and choose coping mechanisms	2/10	3/10	7/10	8/10
	Child to be able to make some choices as to how to respond to problems he experiences with school, swimming, golf etc.	2/10	2/10	7/10	9/10
	Child to develop play skills with peers (turn taking, reading the situation and solving conflict)	2/10	2/10	5/10	5/10

email regarding their preferred service delivery model. Sessions were supported either by the school principal or by Parent 1.

Considerable amounts of time were spent by AHP 1 outside of billable OOS and equaled 75% of time spent in billable OOS. This time was spent predominantly emailing the family and school (e.g., to schedule appointments, send videoconferencing links and session plans) and in purchasing therapy resources. At the end of the therapy episode, Child 1 demonstrated substantial improvements for all goals (see Table 3).

Child 2

Child 2 had previously received in-person occupational therapy services but the AHP had moved out of the area. The closest therapy service was approximately one hour away. During the initial assessment, it was identified that Child 2 had social and emotional difficulties, incontinence, and difficulties with motor planning and coordination. The first four sessions were conducted in the family's home. Child 2 was initially reluctant to participate, repeatedly moving away from the computer. AHP 1 worked with Parent 2 to support his engagement by using visual schedules and incorporating his interests into activities.

Subsequent sessions were held at school. AHP 1 spent considerable time outside billable OOS (see Table 3) developing positive working relationships with educators and negotiating their involvement. Five school-based sessions were conducted, supported by a teacher and teacher's aide. There were difficulties with connectivity to the videoconferencing platform during one session, which were overcome by using an audio-only call.

During a final therapy session held at the family home, Child 2's progress was reviewed with improvements in all goals using COPM. Toileting continued to be an issue.

Child 3

Child 3 received initial diagnosis at a local, government-based service and secured funding to access further therapy. Parent 3 was provided with a list of service providers which included SC. At this time, Child 3's AHP resigned and his access to in-person therapy at the local service ceased. Parent 3 contacted AHP 2 to commence telepractice.

At the initial assessment, he presented as highly verbal but used very stereotypical speech and displayed significant difficulties with comprehension and attention. Parent 3 identified her main goal was to support Child 3's preparation for school. Therapy activities focused on improving Child 3's ability to follow directions, use sentence structures of increasing complexity, to respond to simple wh- questions, and supporting Parent 3 to use language stimulation techniques. Four sessions were conducted in the family home, attended by Child 3's mother and one or both of his older siblings. Sibling involvement helped Parent 3 juggle multiple commitments as a mother working full-time and undertaking further studies and supported her use of the technology.

When Child 3 commenced formal schooling, school-based sessions were introduced. Four school-based sessions were conducted, supported by a teacher and/or teacher's aide. Slow internet speed was experienced during three school-based sessions. In response, AHP 2 avoided activities requiring screen sharing by emailing pen-and-paper activities to the teacher's aide and using objects such as books and puppets as the basis for activities. AHP 2 later made direct contact with a staff member who provided information technology support at the school and permanently resolved these issues. Child 3 began to experience toileting issues at school which greatly concerned his family. AHP 2 facilitated referral to AHP 1 who consulted with the family and educators, identified support needs, and developed an intervention plan.

Combined, AHP 1 and 2 spent as much time outside of billable OOS as in billable OOS (see Table 2). Most time spent outside billable OOS involved emailing family and/or educators (e.g., emailing session summaries and scheduling appointments) and in session preparation and administration (e.g., setting up client log-ins for web-based applications). The increased involvement of a wider team, including multiple AHPs, educators, and family members, appeared to contribute to this increase in non-billable time.

The COPM was not used with Child 3. Relevant participation and functional communication goals included sentence structure use, social interaction, and expression of feelings. Positive impacts on participants were reported by both AHP 2 and Parent 3. Parent 3 also reported increased confidence in her use of language stimulation techniques with her son.

Child 4

Child 4 had been diagnosed with ASD several years prior and had since worked with OTs both in-person and via telepractice when living in other areas. Prior to enrolment, Parent 4 sought psychology support to help her son manage social and anxiety issues but had been unable to locate supports. She contacted AHP 1 to enquire about the

availability of psychology services, who explained OTs' scope of practice and the support she could offer to address these issues. Given the lack of alternative options, Parent 4's knowledge of the breadth of OT practice, and after receiving a telepractice trial, she agreed to commence therapy with AHP 1. Child 1 presented with social and emotional difficulties, sensory processing differences, and gross and fine motor planning difficulties. He demonstrated very literal interpretation of language and had difficulty formulating complex text types such as narratives. In addition to those listed in Table 3, therapy goals included improving Child 4's response to making mistakes and increasing his recognition of teasing and sarcasm in peers.

All sessions were held in the family home. One problem with technology was reported; one session was cancelled due to all internet and telephone communications in the remote location being offline. Time spent outside billable OOS was equal to 72% of that spent in billable OOS. AHP 1 supported the family to purchase and access a web-based program used to support Child 4's therapy program and directly communicated with publishers regarding hardcopy resources. Most unbillable time was spent emailing family, in administration, and session preparation.

Child 4 made gains across all goals measured using COPM. Parent 4 also reported improvements in her son's responses to making mistakes and recognition of teasing and sarcasm.

Participant Interviews

Telepractice was highly acceptable to parents and the teacher. Descriptions reflected a belief in the legitimacy of telepractice as a service delivery model and its alignment with contemporary, best practice approaches. Five interrelated themes supported this overarching perception: (a) the journey to acceptance of telepractice; (b) consistency with person-centred practice; (c) the relationship-based nature of telepractice; (d) the role of technology as a vehicle for service delivery; and (e) skilled AHPs.

Journey to Acceptance of Telepractice

Parents described their experience with telepractice as a process that strengthened their belief in its suitability for their child and family. Parents of three children had no prior experience with telepractice for therapy and were uncertain what it would involve and whether it would work. However, all were motivated to try it because there were few alternatives. The parents and teacher became enthusiastic when they saw children respond positively, being engaged in activities and achieving goals. Although Parent 2 was unsure whether telepractice would suit her son, after describing her son's successful engagement in activities, Parent 2 said: "I actually think it was really, really good... I think he's actually getting lot more out of it now even though it's teleconference as opposed to face-to-face." All parents indicated they would continue with telepractice beyond the study period and would recommend it to others. Child 2's teacher had recommended telepractice to other educators.

The key factor that supported parents' acceptance was the access it facilitated to timely and regular therapy without costs associated with travel. This contrasted markedly with past therapy experiences which were noted for their lack of regularity, timeliness, and in some cases, disability expertise. AHPs highlighted the intensity of service provision enabled by telepractice as critical. In commenting on factors that

supported Child 1's therapy, AHP 1 remarked: "We had so much connection and contact with the family in a short period of time, and certainly only enabled by telepractice. They couldn't have got that intensity without it."

Regular therapy access helped parents build confidence and feel supported. Parent 1 appreciated that telepractice provided an opportunity to engage with AHPs over an extended period of time. She described the impact of ongoing access to AHP support:

It has actually been a relief because it is not me trying to guess what needs to happen, the feedback of having an expert say this is how she is going, this is what you need. . . . To have somebody actually build a relationship with [my child] over three or four months and say this is what she actually needs. [P1]

Factors that facilitated acceptance included use of a 'proof of concept' phase. With Child 1 and 4, AHP 1 provided a telepractice trial where she explained how sessions were conducted, gave parents an opportunity to practice using technology, and demonstrated coaching and how she could successfully engage their child. Child 2's teacher valued the consultation with SD to discuss the design of the school-based telepractice model in line with available resources and their preferred model of intervention support. This necessitated significant investment by AHP 1:

Getting that over the line probably took about four hours of work in terms of trying to establish a connection, having long, lengthy phone calls about how it might work, explaining and educating. Then trying to negotiate times because everyone's time-poor when they're in the education system, as to how that might work in trying to keep it short and sharp, so it's not a massive never-ending, ongoing commitment. [AHP1]

Consistent with Person-Centred Practice

Parents described how selection of location, time, and people involved were driven by person-centred considerations. For example, parents and AHPs selected telepractice components to provide the best learning conditions for children. Parents 1 and 4 commented on the value of holding sessions in a familiar and comfortable environment for children with autism:

Being in his home environment, not having the stresses of getting to an appointment or being in an unfamiliar space, put him in a relaxed frame to better receive help with anxiety because he wasn't at a heightened state of anxiety to start with. [P4]

In other cases, locations were selected to align with therapy goals at a time that optimised children's energy levels, to gain access to required technology, and facilitated engagement with educators. Child 2's teacher described the value of school-based sessions:

He has all his stakeholders in one setting and he doesn't have to leave it, so he was very relaxed. All the resources are there too, so that's another thing. I suppose [AHP 1]'s also working with us as well, so to me it's a win-win. . . . I think the benefit is definitely that I'm there with him. [T2]

Parents commented on the ease with which sessions fit with their everyday routines, eliminating the need for travel and decreasing pressures faced by families who juggled competing responsibilities. Telepractice appeared to enable flexibility that otherwise may have been lost with in-person services:

Given that I'm facing three small people, because [Child 1] is actually my eldest child and my youngest is now 18 months, doing it in my own time in my own environment was absolutely wonderful. [P1]

Telepractice models were adjusted over time in response to changing child and family needs. AHP 1 explained that the public library was chosen as the initial location for telepractice for Child 1 as it was a familiar environment to the family. Later, as there was a clearer understanding of Child 1's needs, sessions were shifted to the school. AHP 1 remarked: "We made a start and then the other plans kind of fell into place."

Relationship-Based Nature of Telepractice

Parents and teachers were unanimous that effective therapeutic relationships with children had developed. Two parents noted that their children more readily engaged because they were in a comfortable, familiar environment:

She embraced therapy via Skype beautifully. Probably even a little bit better than face to face, because she was in her own environment. . . . I can see how different cases, doing it in your own home and in an environment the child is comfortable with would be absolutely precious. [P1]

Some parents noted that their child had a natural interest in computer-based activities which supported engagement. AHP 1 commented that some simple videoconferencing functions were inherently motivating to children:

Some things are amazing—being able to hand the mouse [control] over is really engaging for a child, for a child to be able to control and put marks on a resource that you're screen sharing. . . . There's nothing like a child being able to beat you at noughts and crosses while still learning social skills online. It's really engaging. [AHP1]

AHPs tailored their approach to successfully engage children, incorporating real objects and physical activities, children's interests, visual schedules, and rest breaks. Parent 2, whose son was initially difficult to engage in therapy, emphasised this:

The first couple of sessions it was bit hard because he obviously could disappear out of the room where we had the computer and everything set up if he didn't want to engage. But then we found that after those first couple sessions and with what [AHP 1] was doing, we both had our visual schedule and everything, that he was actually quite engaged. [P2]

Strong therapeutic relationships were described as a critical factor as AHPs needed to work closely with parents and/or teachers to conduct therapy. AHPs collaborated with parents and teachers to set up activities, prepare therapy resources, and coach them to utilise therapy techniques. AHP 1 described how her therapeutic relationship with Parent 1 enabled her to target handwriting goals effectively. This required her to monitor the child's hands and posture, which was difficult to achieve via a single webcam:

[Parent 1] was my eyes and my feedback mechanism for looking at [Child 1]'s fine motor skills. . . . Quite often, [Parent 1] would be taking photos of [Child 1] whilst we were in the middle of the session, texting them to me so I could exactly see her handwriting. We were texting simultaneously to videoing. Sometimes I think [Parent 1] might have taken a video of her and texted that, so text whilst we were videoing at the same time. That was really effective. [AHP1]

Strong therapeutic relationships between AHPs and parents or teachers were essential for overcoming problems with technology as they worked together to devise workarounds, such as using different technology platforms or by coaching parents to implement therapy. Relationships were reinforced by regular email and telephone communication, providing parents with a sense of closeness despite being remote to AHPs:

Good communication is really important, especially with a child with complex needs. . . . We all need to take quite a consistent approach and it's not just the mum or it's not just the learning support assistant that needs to know about what we're doing and what our goals are. [AHP2]

Technology as a Vehicle for Service Delivery

Participants' descriptions did not focus on evaluations of the reliability of technology but focused on the quality of the overall therapy service, with technology simply described as the vehicle used to deliver therapy. When asked about the technology, Parent 3 replied: "Fantastic. Oh my god, without this technology I wouldn't get this kind of help." Parents reported that the technology was easy to use; although most did not believe they had advanced technical skills, they were able to develop basic proficiency and confidence with support from AHPs.

AHPs reported that they did not believe they had advanced skills with technology but were self-taught and had learned how to use available technology as required. Proficiency with technology enabled them to respond flexibly when confronted with technology problems. AHPs were familiar with a range of technologies, which allowed them to use a combination of tools such as email, software applications, instant messages, videos, and photographs.

Participants did not consider occasional glitches with technology as absolute obstacles. Instead, AHPs worked with parents and educators to identify solutions and implement alternatives. These included using different videoconferencing platforms suited to low bandwidth conditions or the use of therapy activities that were not reliant on technology.

Being remote, you don't always have the best internet. Sometimes the internet will slow quite a bit so that can cause problems. . . . You're having to be a bit more patient. [P4]

Skilled AHPs

Strong professional skills were described as essential for quality telepractice. Rather than comprising a unique set of competencies, the professional skills routinely highlighted were common to those required for in-person services. Participants highly regarded AHPs' clinical skills:

She's a lot more attuned to my son and what his needs are and what his goals are. . . . I think she's actually, compared to his previous OT, a lot more in tune with him and what will benefit him. Which I think is great. [P2]

Besides clinical reasoning, participants highlighted the importance of communication, collaboration, problem solving, preparedness, and flexibility. Communication and collaboration skills were described as a cornerstone of telepractice as they enabled AHPs to develop strong therapeutic relationships. Clear communication processes and effective collaboration supported the involvement of the wider team involved in the child's care and helped AHPs negotiate school involvement. Parent 3 valued AHP 2's regular communication with her when she was unable to attend sessions:

She's a great communicator and sends every detail to me. And if I cannot attend the session in the school, she sends all the details to me, especially what was done in the sessions, and she writes it down by email. [P3]

AHPs informed parents and educators of planned therapy activities well in advance, providing enough time to gather required resources, toys, and equipment. AHPs described the importance of preparation to support the smooth running of sessions, spending time outside billable OOS preparing and uploading electronic resources and testing internet speeds and videoconferencing platforms to avert later problems. Preparedness and flexibility enabled AHPs to change their approach when needed, implementing back-up plans as required to engage children in therapy tasks or overcome issues with technology.

Discussion

In this study, we examined four instances of telepractice for allied health therapy services delivered to children with disabilities in rural and remote areas. In each example, telepractice services were highly acceptable to parents and/or teachers and each child demonstrated improvements in specific, functional goals. These findings suggest that quality allied health services can be provided via telepractice. The foremost benefit emphasised by parents was the access to a consistent therapy service and expert support. Indeed, telepractice appears to be a viable way to provide people with disability and their families real choices about the services they receive, consistent with principles which underpin contemporary disability services (Laragy 2010), including Australia's NDIS (NDIS 2015).

Our findings provide evidence that telepractice can be a legitimate service delivery model for disability therapy services. Neither insufficient technology nor lack of proficiency with technology were insurmountable barriers. The telepractice services examined in the present study were consistent with contemporary disability practice, reflecting relationship-based, person-centred approaches employing collaborative coaching techniques that developed parents' and teachers' capacities to meet children's learning and support needs (Early Childhood Intervention Australia 2016). The flexible selection of telepractice components, such as the time and location of sessions, appeared to be particularly important for ensuring services were person-centred. Tailoring telepractice models to the individual's needs to avoid a 'one-size-fits-all' approach to service delivery may be a key consideration for maximising therapy effectiveness (Bundy et al. 2008).

Skilled AHPs critically examined technology options, selected technologies based on their fit with therapy goals and children's and families' needs, and proactively identified and addressed any gaps in their competencies with technology. These same professional and clinical skills enabled AHPs to overcome any challenges that arose from being remote to children and families, communicating and collaborating with parents, teachers, and others to successfully bridge any apparent gaps. Our findings suggest that the skills required for quality telepractice are not unique but are largely consistent with those required for quality in-person therapy services. Preparation of AHPs for telepractice should support clinicians to identify existing clinical and professional skills and understand how these translate to online settings (Hines et al. 2015).

This study provides foundational evidence of the potential of telepractice through an in-depth examination of four cases. Further research is required to investigate the feasibility of telepractice when working with children across a wider range of situations, including type and severity of disability, support needs, specific therapy interventions, and individual goals. It would be useful to understand the utility of hybrid telepractice models which incorporate in-person sessions, outreach services, and/or involvement with allied health assistants, to ascertain the contexts within which these may promote enhanced outcomes. Such research could expand the evidence of the potential for telepractice to equalise access to therapy for people living with disability in rural and remote areas.

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Compliance with Ethical Standards

Funding auDA Foundation grant awarded to the University of Sydney. The funding body had no input into study design, data collection, or interpretation of findings.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Authors SD and SC are allied health professionals who deliver telepractice services as part of their private practice. The children and their families described in this paper were clients of SD and SC, and SD and SC received payment for the services they provided as part of this study.

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References

- Australian Bureau of Statistics. (2016). *Australian statistical geography standard (ASGS): Volume 5 - remoteness structure, July 2016 (cat. no. 1270.0.55.005)*. Retrieved 25 September 2018 from <http://www.abs.gov.au/websitedbs/D3310114.nsf/home/remoteness+structure> .
- Bundy, A., Hemsley, B., Brentnall, J., & Marshall, E. (2008). *Therapy services in the disability sector: literature review*. Sydney: NSW Department of Ageing, Disability and Home Care.
- Carswell, A., McColl, M. A., Baptiste, S., Law, M., Polatajko, H., & Pollock, N. (2004). The Canadian occupational performance measure: A research and clinical literature review. *Canadian Journal of Occupational Therapy, 71*(4), 210–222. <https://doi.org/10.1177/000841740407100406>.
- Department of Health and Ageing. (2011). *The eHealth readiness of Australia's allied health sector*. Retrieved from www.health.gov.au/internet/publications/publishing.nsf/Content/ehealth-readiness-allied-toc
- Dew, A., Veitch, C., Lincoln, M., Brentnall, J., Bulkeley, K., Gallego, G., ... Griffiths, S. (2012). The need for new models for delivery of therapy intervention to people with a disability in rural and remote areas of Australia. *Journal of Intellectual & Developmental Disability, 37*(1), 50–53. <https://doi.org/10.3109/13668250.2011.644269>
- Dew, A., Bulkeley, K., Veitch, C., Bundy, A., Gallego, G., Lincoln, M., ... Griffiths, S. (2013). Addressing the barriers to accessing therapy services in rural and remote areas. *Disability and Rehabilitation, 35*(18), 1564–1570. doi:<https://doi.org/10.3109/09638288.2012.720346>
- Dunkley, C., Pattie, L., Wilson, L., & McAllister, L. (2010). A comparison of rural speech-language pathologists' and residents' access to and attitudes towards the use of technology for speech-language pathology service delivery. *International Journal of Speech-Language Pathology, 12*(4), 333–343. <https://doi.org/10.3109/17549500903456607>.
- Early Childhood Intervention Australia. (2016). National guidelines for best practice in early childhood intervention. Retrieved 7 February 2019 from <https://www.ecia.org.au/Portals/4/Resources/Other%20Resources/ECIA-National-Best-Practice-Guidelines.pdf?ver=2018-06-05-172656-123> .
- Ferguson, J., Craig, E. A., & Dounavi, K. (2018). Telehealth as a model for providing behaviour analytic interventions to individuals with Autism Spectrum Disorder: a systematic review. *Journal of Autism and Developmental Disorders, 48*(10), 3724–3745. <https://doi.org/10.1007/s10803-018-3724-5>.
- Gardner, K., Bundy, A., & Dew, A. (2016). Perspectives of rural carers on benefits and barriers of receiving occupational therapy via Information and communication technologies. *Australian Occupational Therapy Journal, 63*(2), 117–122. <https://doi.org/10.1111/1440-1630.12256>.

- Greenhalgh, T., & Papoutsi, C. (2018). Studying complexity in health services research: desperately seeking an overdue paradigm shift. *BMC Medicine*, *16*(1), 95. <https://doi.org/10.1186/s12916-018-1089-4>.
- Greenhalgh, T., Shaw, S., Wherton, J., Vijayaraghavan, S., Morris, J., Bhattacharya, S., ... Hodkinson, I. (2018). Real-world implementation of video outpatient consultations at macro, meso, and micro levels: mixed-method study. *Journal of Medical Internet Research*, *20*(4), e150. <https://doi.org/10.2196/jmir.9897>
- Hines, M., Lincoln, M., Ramsden, R., Martinovich, J., & Fairweather, C. (2015). Speech pathologists' perspectives on transitioning to telepractice: What factors promote acceptance? *Journal of Telemedicine and Telecare*, *21*(8), 469–473. <https://doi.org/10.1177/1357633X15604555>.
- Laragy, C. (2010). Snapshot of flexible funding outcomes in four countries. *Health & Social Care in the Community*, *18*(2), 129–138. <https://doi.org/10.1111/j.1365-2524.2009.00880.x>.
- Law, M., Baptiste, S., Carswell, A., McColl, M., Polatajko, H., & Pollock, N. (2000). *Canadian occupational performance measure*. Toronto: CAOT Publications, ACE.
- Lincoln, M., Hines, M., Fairweather, C., Ramsden, R., & Martinovich, J. (2014). Multiple stakeholder perspectives on teletherapy delivery of speech pathology services in rural schools: a preliminary, qualitative investigation. *International Journal of Telerehabilitation*, *6*(2), 65–74. <https://doi.org/10.5195/IJT.2014.6155>.
- May, J., & Erickson, S. (2014). Telehealth: why not? Perspectives of speech-language pathologists not engaging in telehealth. *Journal of Clinical Practice in Speech-Language Pathology*, *16*(3), 147–151.
- Mohan, H. S., Anjum, A., & Rao, P. K. (2017). A survey of telepractice in speech-language pathology and audiology in India. *International Journal of Telerehabilitation*, *9*(2), 69–80. <https://doi.org/10.5195/ijt.2017.6233>.
- National Disability Insurance Agency. (2016). Rural and remote strategy 2016–2019. Retrieved 7 February 2019 from <https://www.ndis.gov.au/about-us/strategies/rural-and-remote-strategy> .
- National Disability Insurance Scheme (NDIS). (2015). Integrated market, sector and workforce strategy. Retrieved 16 November 2015 from https://www.dss.gov.au/sites/default/files/documents/07_2015/ndis_integrated_market_sector_and_workforce_strategy_june_2015.pdf .
- Rice, P., & Ezzy, D. (2005). *Qualitative research methods: A health focus (2nd ed.)*. South. Melbourne: Oxford University Press.
- Speech Pathology Australia. (2014). Telepractice in speech pathology position statement. Retrieved 7 February 2019 from https://www.speechpathologyaustralia.org.au/SPAweb/Members/Position_Statements/SPAweb/Members/Position_Statements/Position_Statements.aspx?hkey=b1a46941-246c-4609-bacc-1c1b5c52d19d.
- Speyer, R., Denman, D., Wilkes-Gillan, S., Chen, Y.-W., Bogaardt, H., Kim, J.-H., ... Cordier, R. (2018). Effects of telehealth by allied health professionals and nurses in rural and remote areas: a systematic review and meta-analysis. *Journal of Rehabilitation Medicine*, *50*(3), 225–235. <https://doi.org/10.2340/16501977-2297>
- World Health Organization. (2001). *International classification of functioning, disability and health: ICF*. Geneva: World Health Organization.