

A scoping review of telehealth in school-based health services:

Characteristics of telehealth use

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Abstract

Purpose To describe the use of telehealth by school-based health service providers.

Methods We searched five academic databases, followed by a manual search of the reference lists of included articles. Our inclusion criteria required that articles be peer-reviewed, in English, involve use of telehealth by a health professional, and integrate services into the kindergarten to grade 12 school setting. We published an *a priori* protocol on Open Science Framework. Two reviewers completed article selection, followed by one reviewer and one verifier completing data extraction. We extracted a description of the articles as well as for whom, what, where, when, why, and how telehealth services were provided.

Results We screened 6585 unique sources and included 70 articles. Articles were primarily empirical (77%), from the United States (67%), and published after 2017 (73%). Telehealth services in schools were most often provided by speech-language pathologists (40%) and psychologists (40%), and were provided to students with a range of health conditions and disabilities. Telehealth services included assessment, intervention, and consultation, and were provided primarily through videoconferencing. Telehealth services were utilized to address staffing shortages, serve rural communities, and to meet COVID-19 restrictions.

Conclusions Given the heterogeneous student population and geographically limited literature, we recommend additional research to determine in what specific situations telehealth can and should be implemented.

Keywords: telehealth, school, virtual, education

Context and Implications

Rationale for this study: Given recent pandemic-related school closures, a scoping review was warranted to explore telehealth service provision within schools.

Why the new findings matter: This scoping review included 70 studies, giving insights into what, where, when, how, and why telehealth is being used in school-based health services.

Implications for school health providers: The findings indicate that telehealth is frequently provided in schools using videoconferencing via readily available low- to mid-tech equipment. Providers need to consider their professional practice guidelines and relevant legislation when implementing telehealth services within the school setting because these vary by geographic area and discipline, and most of the reviewed research stemmed from the US and two health professions. Given the variation in student population of the included studies, health providers need to make clinical decisions for telehealth use on a case by case and based on the service (assessment, treatment, meeting) being provided.

Introduction

According to the United Nations Convention on the Rights of the Child, children have the right to education that optimizes their development of mental and physical abilities and skills (United Nations Human Rights Office of the High Commissioner, 1989). However, People for Education, an independent organization focused on supporting and advancing public education in Canada, found in their annual survey of 1244 schools in 70 of 72 school boards across Ontario that school principals have increasingly had to request special education students not attend some full days of school due to safety concerns (People for Education, 2018). Further, more recently they found that 93% of elementary schools and 81% of secondary schools had students waiting

for a special education assessment (People for Education, 2022). Psychologists were unavailable to 24% of elementary schools and 28% of secondary schools. Rural schools are impacted more and are less likely to have access to assessment services and psychologists than their urban counterparts. Concerns for access to special education supports are not unique to Ontario, Canada. In the United States, there is a school psychologist shortage in 49 of 50 states (National Association of School Psychologists, 2022). According to a recent survey of 297 school districts in the United States, special education, speech-language pathology (SLP), audiology, school psychology, school nursing, occupational therapy (OT), physical therapy (PT), and school social work (SW) are all experiencing staff shortages (American Association for Employment in Education, 2021). These reported shortages spanned nearly all categories of special education and support services, limiting children's access to the education and school-based health services that are within their rights.

Starting in March 2020 when COVID-19 was declared a global pandemic, schools in many areas of the world were closed to students for various amounts of time depending on level of community transmission (Hoffman & Miller, 2020; World Health Organization, 2020). In Ontario, Canada, schools were closed for 20 weeks between the beginning of the pandemic and May 15, 2021 (Gallagher-MacKay et al., 2021). Globally, as of September 2021, children have lost 1.8 trillion in-class hours of school (UNICEF, 2021). Additionally, 131 million children have missed 75% of their in-class learning between March 2020 and September 2021 (UNICEF, 2021). In addition to the existing school-based health services shortages, as the COVID-19 pandemic has continued, additional research is emerging about the negative impact of school closures on children's well-being, mental and physical health. This emerging research suggests that school-based health services may be increasingly in demand at a time when there is already

a shortage of providers. For example, in a Canadian survey conducted prior to the pandemic, 17% of youth aged 15 to 17 years reported their mental health as fair or poor (Statistics Canada, 2020). However, following the onset of the COVID-19 pandemic, 57% of 15 to 17 year-olds reported worsened mental health (Statistics Canada, 2020). Similarly, among parents of children with disabilities, more than 70% were very or extremely worried about their child's socialization, 63% were worried about their child's loneliness and isolation, and 59% were very or extremely concerned about their child's academic success (Government of Canada, 2020). Parents of children without disabilities also reported high levels of worry about their child's socialization, isolation, and loneliness. It has been recommended that schools receive additional funding to provide students with extra supports to ameliorate the health and education losses incurred during the pandemic (Gallagher-MacKay et al., 2021; Hoffman & Miller, 2020). Undoubtedly, such demands will place an additional strain on the availability of school-based health care providers.

To accommodate for pandemic closures and restrictions, the World Health Organization recommended continued access to education through materials and technologies (World Health Organization, 2020). Technology was used not only by education staff but also by school-based health staff to continue to provide educational services. In a survey of school-based health providers, 8.3% used telehealth prior to COVID-19 as compared to 62.5% using telehealth by June 2020 (3 months into the pandemic) (Hermes et al., 2021). The public health restrictions of the COVID-19 pandemic caused difficulties for students to access typical education and school-based health services. Therefore, the exploration of telehealth use in schools is both timely and necessary to determine if access to school-based health services can be improved by using telehealth.

Telehealth in pediatric practice

Nickelson (1998) defined telehealth as “the use of telecommunications and information technology to provide access to health assessment, diagnosis, intervention, consultation, supervision, education, and information across distance” (p. 527). His definition is intentionally broad to be applicable to various health providers and useful for many clinical and administrative functions. Telehealth has been used in pediatric service delivery by a variety of health care professionals. Camden et al. (2020) completed a systematic review of 23 articles focusing on telehealth for children 0-12 years of age across the professions of PT, psychology, OT, SLP, social work, and dietetics. Their review determined that a variety of intervention approaches were used within telehealth (e.g., cognitive-behavioural therapy, parent coaching, web-based movement program), with services often addressing behaviour and parent skills. Consistent with this observation, another systematic review evaluated online parent-implemented home interventions for treating core symptoms and behaviour in children 0-18 years with neurodevelopmental disorders (Tan-MacNeill et al., 2021). In this review, although health provider discipline was not specified, the authors determined that parent led interventions are promising; however, high-quality evidence is limited. Yet another systematic review focused on the effectiveness of speech and language intervention for 4-to-12-year-old children delivered by telehealth using videoconferencing technology (Wales et al., 2017). This review included seven studies across school and clinic settings, concluding that the evidence for telehealth with this population is promising but limited. Finally, a scoping review conducted on telehealth use in pediatric OT with children 0-18 years of age (Önal et al., 2021) contained just three school-based rehabilitation studies of 22 included papers. Thus, while all of these reviews focused on children, none focused exclusively on children within the school setting. Further, all three of the existing

systematic reviews (Camden et al., 2020; Tan-MacNeill et al., 2021; Wales et al., 2017) included searches prior to the COVID-19 pandemic and the scoping review (Önal et al., 2021) included a search through April 2020 (one month into the declared pandemic). Therefore, exploration of the use of telehealth in school settings is warranted, especially considering the many lengthy school closures worldwide during the pandemic.

Telehealth in schools

Telehealth for students to access medical services has been increasing in schools over the last 15 years, such as in school-based health centres (SBHC) that integrate medical clinics within schools for children who otherwise may not have access to health care (Arenson et al., 2019; Love et al., 2019). A US study reported that telehealth use in SBHCs has increased from 7% to 19% between 2007 and 2017 (Love et al., 2019). Primarily, these services have focused on increasing access to medical care for students living in rural and low-income areas (Love et al., 2019; Price, 2017). Such medical care provided within schools may have indirect benefits to academic success but this is difficult to measure and has not been substantiated in research (Arenson et al., 2019)

In contrast to SBHCs, there has not been a similar shift towards increased use of telehealth in school-based services that are integrated into the school context as part of special education programming. For example, a survey of 27 OT providers and school administrators from the midwestern United States, published in 2019, reported that none of the respondents used telehealth in their practice, 57% were not sure if they would adopt telehealth in the future, and 14% were not likely to adopt telehealth (Rortvedt & Jacobs, 2019). Similarly, a 2019 international survey of 1133 pediatric PTs, including 19% of whom worked in schools or homes, found that only 4% used telehealth in their practice (Camden, 2019). In 2020, the American

Speech-Language-Hearing Association's (ASHA's) SLP workload and case management study reported that school-based SLPs were spending a mean of just 0.1 hours per week on telepractice (American Speech-Language-Hearing Association, 2020) and telepractice was not addressed in their 2022 survey (American Speech-Language-Hearing Association, 2022). Indeed, the school setting may provide unique challenges to the use of telehealth, including a need to involve educators, decreased parent presence, and the school environment itself (Haeder et al., 2022). Health providers need to form a relationship with educators because they often control the student's schedule (Haeder et al., 2022). Decreased parent presence can hinder obtaining health care consent and can limit family input into goals and treatment planning (Haeder et al., 2022). Finally, the school environment can be limiting in space and resources for health providers (Haeder et al., 2022; Murphy et al., 2021a). Given these potential barriers to implementation of telehealth within the school system, use of this approach needs to be further explored.

Current review

To increase knowledge about telehealth use in school-based health services, this review will use scoping review methodology (Arksey & O'Malley, 2005; Levac et al., 2010). Specifically, we aim to examine the range of literature, summarize the literature, and identify gaps for future research pertaining to telehealth practices within school. Our scoping review question is: How do health professionals use telehealth in the delivery of school-based health services in kindergarten to grade 12 schools?

Methods

We used the *JBIManual for Evidence Synthesis* (Peters, Godfrey, et al., 2020) along with updated guidance from Joanna Briggs Institute (JBI) collaborators (Peters et al., 2021; Peters, Marnie, et al., 2020) to guide the methods for our scoping review. We also followed the

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist and Explanation (Tricco et al., 2018). As recommended, we developed and published a protocol prior to initiating the study search (Knobl et al., 2021). A search of the literature using several databases indicated that no similar protocol was registered pertaining to this topic. All deviations to the protocol are addressed and explained in the current methods.

Inclusion criteria

Scoping review methodology utilizes a population, concept, and context framework for the core elements of the review question and to guide the search strategy and inclusion criteria (Peters, Godfrey, et al., 2020). We defined the population as any regulated health care professional (e.g., nurse, OT, PT, psychologist, SLP) or person supervised by a regulated health professional (e.g., health professional students, health paraprofessionals). We focused on the concept of telehealth, which we defined as the use of technology for the delivery of health care services either synchronously or asynchronously, including assessment, intervention, consultation, team or family meetings, family coaching/training, etc. (Nickelson, 1998). Finally, we were interested in the context of the kindergarten to grade 12 school system. Our research team iteratively refined the definition of this context during study selection, modifying it from the original protocol for clarity and interpretability. Our final definition stipulated that the services must be integrated into a school setting and that these services were to provide access to the educational curriculum, including the skills needed to learn within the structure and organization of schools. Furthermore, if the source included an additional setting (e.g., daycare or preschool), then at least some of the data had to be reported separately by setting for the source to be included.

We included sources in English and available through our university library or open-source material. Additionally, we included only peer-reviewed sources to ensure a minimum quality standard since critical appraisal is not completed as part of scoping review procedures (Peters, Marnie, et al., 2020). Furthermore, both empirical and non-empirical studies were included because both source types could contribute to answering the review question. Grey literature was not included due to feasibility of conducting an inclusive and reproducible search. We placed no limits on year of publication because earlier sources of evidence are believed to provide valuable information pertaining to how telehealth has been used to provide clinical services.

Search strategy

We developed our search strategy in consultation with a university health sciences librarian. The search strategy included synonyms and alternative wording for the concept of telehealth, the population of health professionals, and the context of the school. Within each database, keywords were used to identify relevant subject and subheadings. The search strategy was piloted in the databases and iteratively revised in each database until the review team and librarian determined that all necessary search terms were included. We executed the search most recently on January 18, 2024 in five academic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Embase, Education Resources Information Center (ERIC), MEDLINE, and APA PsycInfo. Table 1 shows the search terms used. A sample search in MEDLINE is included in Supplementary File 1. Additionally, we reviewed the reference lists of all included sources for additional relevant sources of evidence.

Table 1. Search Strategy

	Terms (searched as keywords and MeSH when available)
Concept (Terms combined with OR)	Telehealth Telepractice Teletherapy Telerehab* Telemedicine Telepsychiatry Telepsychology Telecounselling Telenursing Virtual Care
	AND
Context (Terms combined with OR)	School* k-12 k-8 k-6 Student* Elementary school* Secondary school* Middle school* Primary school* High school* School health service* Distance learn* Virtual learn* Virtual education Distance education
	AND
Population (Terms combined with OR)	Health professional* Occupational therap* Physiotherap*/physical therap* Speech language patholog*/therap* Dietician* Psycholog* Psychotherap* Social work* Nurs* Rehab* Support service* Health service Health personnel School health service* Allied health

Sources of evidence screening and selection

Following search execution, the first author removed duplicates automatically using EndNote online, followed by a manual visual screening in EndNote online, and finally automatically in Covidence (Veritas Health Innovation, 2022). Once all sources of evidence were identified, we used the inclusion criteria to screen the titles and abstracts of sources using Covidence software (Veritas Health Innovation, 2022). This process first began with the team of five reviewers (first five authors) training on the inclusion criteria to ensure all team members understood the criteria as defined. During training, reviewers independently reviewed titles and abstracts for 10 randomly selected sources and discussed decisions to exclude or include. Following this, the team completed two rounds of piloting the inclusion criteria. Each round consisted of independent review of titles and abstracts for 25 sources, with reviewers needing to achieve greater than 80% agreement per the criteria set in the protocol (Peters, Godfrey, et al., 2020). After each round of piloting, the primary author and one additional researcher (second, third, fourth, or fifth author) reviewed each source with all disagreements discussed between the two disagreeing reviewers over virtual meeting to determine consensus. During screening, criteria were modified to include peer reviewed publications only, excluding commentaries and editorials.

Following title and abstract screening, the review team undertook a similar procedure for full-text review, also within Covidence (Veritas Health Innovation, 2022). The team of five reviewers trained on five sources followed by two rounds of piloting with 10 sources in each round. Training involved all reviewers making an inclusion or exclusion decision and discussing reasons for the decision during a virtual meeting. Pre-established agreement for commencing full text review was established at 80% as per the protocol (Peters, Godfrey, et al., 2020; Tricco et

al., 2018). Following achievement of this standard, full text review began with the primary author and one additional reviewer (second, third, fourth, or fifth author) reviewing all sources (Peters, Godfrey, et al., 2020). All disagreements were resolved by consensus over virtual meetings. Two modifications to the inclusion criteria were made following piloting at the full-text stage. First, we added specific exclusion criteria to parallel our inclusion criteria for telehealth and health provider (i.e., exclude if not telehealth and exclude if not a regulated health professional). Second, we added the stipulation to our inclusion criteria for the context that information needed to be presented separately for kindergarten to grade 12 if another setting was included in the source (e.g., childcare). If data were combined across settings (e.g., k-12 combined with daycare), then the source was excluded. One final iterative update to the exclusion criteria included excluding protocol papers as these do not include information about current telehealth usage. The final inclusion and exclusion criteria for source selection is available in Supplementary File 2.

Data extraction

The primary author developed the data extraction chart, which was included in the protocol and is presented in Supplementary File 3. Data extraction was performed within Covidence systematic review software (Veritas Health Innovation, 2022). Four team members (first thru fourth authors) familiarized themselves with the data extraction process by extracting data from three articles (Peters, Godfrey, et al., 2020). Once familiarized, the primary author (EK) extracted data and one additional reviewer (second, third, or fourth author) verified with all disagreements resolved through consensus (Peters, Godfrey, et al., 2020). The data extraction chart included categories to describe characteristics of the included articles, such as year, country, and study design type (Peters, Godfrey, et al., 2020) as well as to describe the

characteristics of the telehealth (e.g., who provided the telehealth and to whom, what technology was used, and why was telehealth used). Extractions included population, concept, and context data consistent with the inclusion criteria and objectives for the review. Table 2 shows the categories to which data were extracted.

Table 2. Data Extraction Categories

Article characteristics	year; country; research question; aim/purpose; empirical; study design; sample size, type, years of experience, age, grade, gender, diagnosis; comparison group; outcome measures; findings
Telehealth characteristics	technology used; hardware; software; timing; new to setting; prior or during COVID; model of delivery, model of school service delivery; service delivery format; number, length, and frequency of sessions; health professional; with whom telehealth is used; student's grade, age, diagnosis, and gender; telehealth helper; type of school; where used; student goals addressed; when used; where documented; health professionals' employment status

Analysis and presentation of results

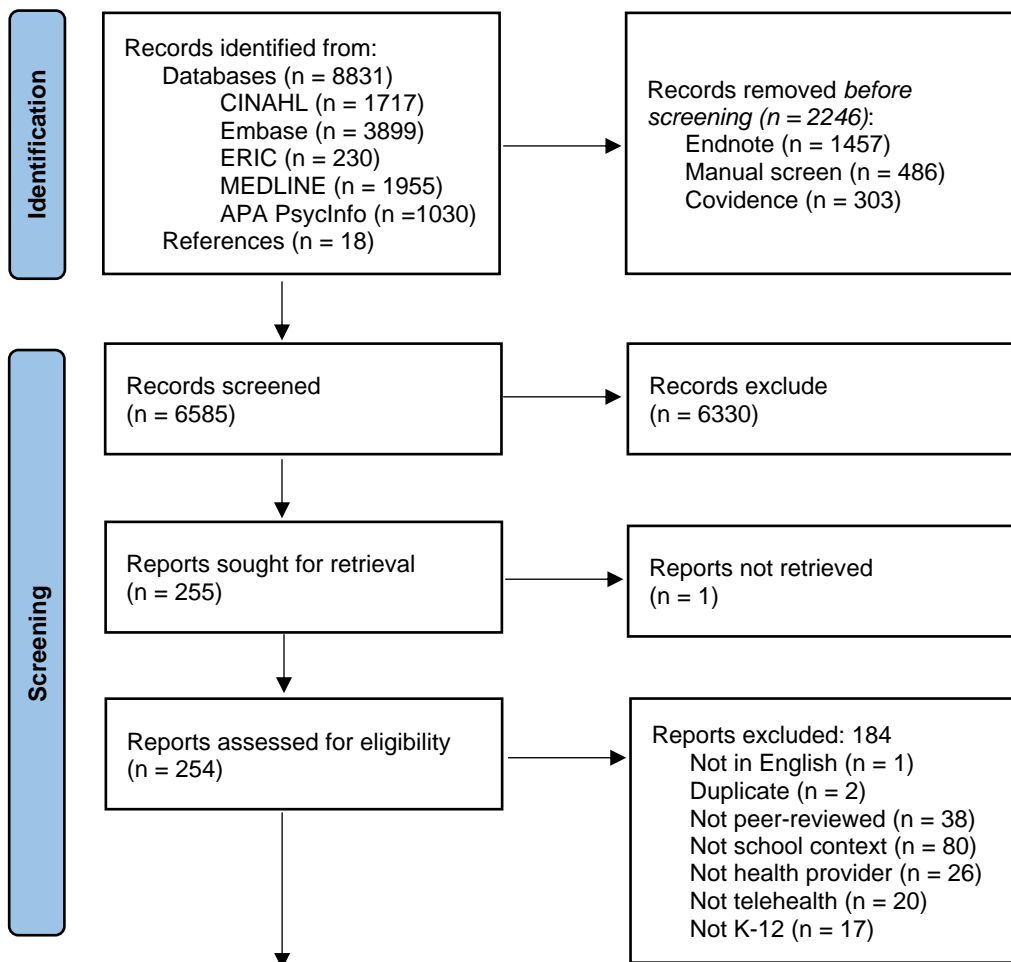
As recommended, we used content analysis, which is a method of condensing large amounts of information from documents into categories to describe a phenomenon (Elo & Kyngas, 2008; Peters, Godfrey, et al., 2020). We used a deductive content analysis, where a data extraction framework is created prior to data extraction (Elo & Kyngas, 2008; Peters, Godfrey, et al., 2020). Using the data extraction chart, all relevant data that fit the categories was selected from the included articles, with the researchers revisiting the review question throughout the process (Elo & Kyngas, 2008). The results are presented in tables and charts as well as frequency counts and are described in relation to the review objectives.

Results

Search results and inclusion of sources of evidence

As shown in figure 1, the search across five academic databases and the references of included articles yielded 6585 unique sources after duplicates were removed. Following title and abstract screening, 254 sources were located for full text review. Of these, 70 sources met the inclusion criteria and were retained for data extraction. For title and abstract screening, reviewers completed two rounds of piloting using 25 sources for each round, resulting in 92% and 94% agreement between reviewers, respectively. The second round of piloting was undertaken for reviewers to gain additional experience and confidence in making inclusion decisions. For inclusion at full text, the review team completed two rounds of piloting with 10 sources per round. The first round produced poor agreement (43%), but the team attained 87% agreement on the second round.

Figure 1. PRISMA Flow Chart for Source Selection



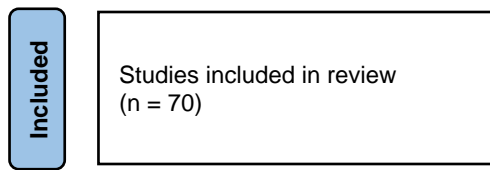


Figure 1 Alt Text: Flow chart depicting five vertical boxes representing steps towards article inclusion with 4 boxes to the right representing reasons for exclusion at each

Source characteristics

Consistent with JBI guidelines (Peters, Godfrey, et al., 2020), table 3 includes a summary of each included evidence source and provides information to justify its inclusion and relevance to the review question. The author, year of publication, country of article, research question/purpose, article type and study design, rationale for using telehealth, regulated health professional, telehealth delivery mode, telehealth participants, and school type are provided for each included article.

Table 3. Summary of included articles.

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Abbott-Gaffney and Jacobs (2020), United States	What are the perceived and experienced benefits and barriers to telehealth use by OTs?	Empirical, Mixed Methods Quasi-experimental, participatory action research design	Not reported	OT	Telehealth, mode not specified	Not reported	School, type not specified
Berger et al. (2023), Australia	What practices do school-based mental health professionals use and recommend?	Empirical, Mixed Methods	COVID-19	Psychologist; Counsellors; Social workers	Videoconferencing; telephone; email; website; online database; online videos	Student; Parent; Teacher	School, type not specified
Bice-Urbach and Kratochwill (2016), United States	Examine student outcomes of teleconsultation for behavioural interventions and its acceptability and feasibility by teachers	Empirical, Quantitative Randomized multiple-baseline across participants	Serve rural and remote communities	School psychology students	Videoconferencing	Student; Teacher	Public
Bloomfield et al. (2020), United States	Explore feasibility, effectiveness, and acceptability of teleconsultation with teachers and paraprofessionals for	Empirical, Quantitative Multi element design across	Serve rural and remote communities	Psychologist; School psychology students	Videoconferencing	Student; Teacher; Paraprofessionals	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Boisvert et al. (2012), United States	functional analysis in remote areas Discuss indirect and direct telepractice SLP and present two cases as evidence	test and control conditions Empirical, Quantitative Single subject repeated measures case study	Limited staff and/or resources	SLP Student supervised by SLP	Videoconferencing; Screen sharing	Student	Rural school
Boisvert and Hall (2019), United States	Discuss combined onsite and telepractice for maximizing time and managing workload for school professionals	Empirical, Qualitative Survey	Serve rural and remote communities	SLP/SLT	Videoconferencing; Email; Website	Student; SLP Assistant	Public
Bolden & Grogan-Johnson (2022), United States	Provide a framework for delivering telepractice for language impairments	Non-Empirical	COVID-19	SLP	Telehealth, mode not specified	Student	School, type not specified
Bradford et al. (2018), Australia	Explore implementation needs of SLP telehealth program	Empirical, Qualitative Interpretive Description	Serve rural and remote communities	SLP	Videoconferencing	Student	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Brunson McClain et al. (2021), United States	Discuss framework for school psychologists' conducting autism evaluations during COVID-19	Non-empirical	COVID-19	Psychologist	Telehealth, mode not specified	Student; Parent; Teacher	School, type not specified
Cox (1998), United States	Improve health status of adolescents through school-based telehealth	Non-empirical	Serve rural and remote communities	Nurse; Medicine, Nutrition and Social Work	Videoconferencing; Email; Website	Student; Teacher	Public
Cox et al. (2000), United States	Explore use of technology to improve health status of students	Non-empirical	Serve rural and remote communities	Nurse; Doctor, Sports medicine specialist, Physician assistant	Videoconferencing; Email; Website	Student; Parent; Teacher; Health staff	School, type not specified
Craig et al. (2023), United Arab Emirates, Serbia, Northern Ireland	Use of telehealth functional analysis and functional communication training	Empirical, Quantitative Multi-element design	Access to specialists	Behaviour analyst	Videoconferencing; recorded videos	Student; interventionists	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Criss (2013)(Criss, 2013), United States	Not reported	Empirical, Quantitative Pre-post study	Virtual school	OT	Videoconferencing	Student; Parent	Public; Charter; Virtual
Crutchley and Campbell (2010), United States	Determine satisfaction with speech therapy telepractice of parents/guardians, teachers, and administrators	Empirical, Quantitative Study design, type not reported	Serve rural and remote communities	SLP/SLT	Videoconferencing; Telephone; Email	Student; Parent; Teacher	Public
Daftary (2021), United States	Explore experiences of school social workers during implementation of social emotional telehealth services in K-12 public schools during COVID-19	Empirical, Qualitative Exploratory	COVID-19	School social workers	Videoconferencing; Telephone; Email; Texts	Student; Parent	Public
Drabarek et al. (2022), Australia	Acceptability of Telehealth Approach to Got It! Program per caregivers and clinicians	Empirical Qualitative, Realist theoretical framework	Serve rural and remote communities	OT; Psychologist; Social Workers	Videoconferencing	Parents; Grandparents	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Erickson et al. (2021), Australia	Investigate the perceptions and experiences of SLPs involved in the implementation of Lidcombe Program using telepractice	Empirical, Qualitative Pilot Study	Limited staff and/or resources	SLP/SLT	Videoconferencing	Student; Parent	School, type not specified
Fairweather et al. (2017), Australia	Investigate school executive staff and therapy assistants' views of SLP telehealth in rural schools	Empirical, Qualitative Post-intervention	Serve rural and remote communities	SLP/SLT	Videoconferencing; Email	Student	Public
Farmer et al. (2020), United States	Discuss measurement, equity, legal, and ethical issues with teleassessment	Non-empirical	COVID-19	Psychologist	Videoconferencing	Student	Public
Fischer, Bloomfield, et al. (2019), United States	Demonstrate effectiveness and acceptability of telepresence robot problem-solving consultation on student compliance in remote schools	Empirical, Quantitative Single-case, nonconcurrent multiple baseline	Serve rural and remote communities	Psychologist, psychology student	Videoconferencing	Student; Teacher	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Fischer, Collier-Meek, et al. (2017), United States	Evaluate the effectiveness of videoconferencing and face-to-face problem identification interviews	Empirical, Quantitative Analogue research	Limited staff and/or resources	School psychology students	Videoconferencing	Teacher	Public
Fischer et al. (2016), United States	Evaluate teachers' acceptability of videoconferencing for consultation	Empirical, Quantitative 2x2 mixed factorial design	Limited staff and/or resources	School psychology students	Videoconferencing	Teacher	Public
Fischer, Dart, et al. (2019), United States	Compare in-vivo with videoconferencing systematic direct observation	Empirical, Quantitative Study design, type not reported	Limited staff and/or resources	Psychologist; School psychology students	Videoconferencing	Student	Public; Specialized school for children diagnosed with autism spectrum disorder
Fischer, Dart, et al. (2017), United States	Examine the treatment integrity, effectiveness, and acceptability of school-based behavioural interventions delivered through tele-communication	Empirical, Quantitative Non Concurrent Multiple Baseline	Limited staff and/or resources	School psychology students	Videoconferencing; Digital video recordings	Teacher	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Fischer et al. (2018), United States	Describe videoconferencing software, features, and capabilities, and how they may meet the needs of school teleconsultation	Empirical, Quantitative Systematic Review	Limited staff and/or resources	Psychologist; review included studies using psychology, education, human services, medicine, or psychiatry	Videoconferencing	Teacher	Application to school setting
Frederick et al. (2020), United States	Describe remote behaviour support program during school closures	Non-empirical	COVID-19	Behaviour Analyst; behaviour technician, behaviour interventionist (BI), or instructional assistant supervised by behaviour analyst	Videoconferencing; Telephone; Video-based modules	Student; Parent	Public
Gabel et al. (2013), United States	Compare descriptive and outcome data from SLP intervention by telepractice with in-person data	Empirical, Quantitative Study design, type not reported	Not Reported	SLP/SLT	Videoconferencing	Student	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Gallagher (2004), United States	Complete medical evaluations with educational implications, develop website with educationally relevant medical and developmental conditions, and delivery medically-based PT and OT	Empirical, Quantitative Study design, type not reported	Reduce student time away from school	OT; PT; Psychologist; Developmental pediatricians	Website; Video clips, Web based supervision, Online evaluations	Student; Parent; Teacher	Public; Schools on federal property with high percentage of military students (most over 90%)
Green et al. (2023), United Kingdom	Evaluate digital anxiety intervention	Empirical, Mixed Methods Case series	Improved access for parents	Psychologist	Telephone; website; mobile game application	Student; Parent	School, type not specified
Grogan-Johnson (2018), United States	Explore telepractice and describe implementation of telepractice in a public school	Non-empirical	Limited staff and/or resources	SLP/SLT	Telehealth, mode not specified	Not reported	Public
Grogan-Johnson (2021), United States	Explore the concept of telepractice as a service delivery model	Non-empirical	COVID-19	SLP/SLT	Telehealth, mode not specified	Student	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Grogan-Johnson et al. (2010), United States	Not reported	Empirical, Quantitative Pilot trial	Serve rural and remote communities	SLP/SLT	Videoconferencing	Student	Public
Grogan-Johnson et al. (2011), United States	Determine if speech sound disorder intervention using video conferencing is comparable to side-by-side therapy	Empirical, Quantitative Prospective	Serve rural and remote communities	SLP/SLT	Videoconferencing	Student	Public
Hall et al. (2021), United States	Describe pediatric PTs' perceptions and confidence in providing telehealth services during the COVID-19 pandemic	Empirical, Quantitative Survey	COVID-19	PT	Videoconferencing	Student; Parent	School, type not specified
Hall (2022), United States	Determine if telepractice should be implemented using an ethical decision-making model	Non-empirical	COVID-19	SLP/SLT	Telehealth, mode not specified	Not reported	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Hämäläinen et al. (2023), Finland	Investigate well-being and ACT intervention on engagement in secondary education	Empirical, Quantitative Randomized controlled trial	Not reported	Psychology Students	Website; online modules; instant messages	Student	School, type not specified
Hines et al. (2015), Australia	Investigate SLPs experiences transitioning to school-based telepractice	Empirical, Qualitative Interviews	Limited staff and/or resources	SLP/SLT	Videoconferencing; Email	Student; Parent; Teacher	School, type not specified
Hyde et al. (2022)(Hyd e et al., 2022), Australia	Identify the challenges and changes to school psychology	Empirical, Mixed methods Survey	COVID-19	Psychologist	Videoconferencing; telephone; online workshops	Student; Parent; Teacher	Public; private
Kriechman et al. (2010), United States	Not reported	Non-empirical	Serve rural and remote communities	Psychiatrist	Videoconferencing; Telephone; Website	Student; Parent; Teacher; Behavioural health care providers; Primary care providers	School, type not specified
Lam et al. (2023), Hong Kong	School-based SLT adoption of telehealth	Empirical, Quantitative Survey	COVID-19	SLP/SLT	Videoconferencing	Student	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Lam et al. (2021)(Lam et al., 2021b), Hong Kong	Preferences of parents and students regarding telepractice	Empirical, Quantitative Study design, type not reported	COVID-19	SLP/SLT	Telehealth, mode not specified	Not reported	School, type not specified
Langbecker et al. (2019), Australia	What is the impact of SLP and OT delivered by telehealth on speech and language outcomes, participation in class, and educational outcomes?	Empirical, Quantitative Prospective evaluation	Serve rural and remote communities	Allied health students (SLT or OT) under the supervision of clinical educators	Videoconferencing	Student	School, type not specified
Lee et al. (2017), United States	Intervention effects on phonological awareness in children with hearing loss	Empirical, Quantitative Pre-post study	Limited staff and/or resources	SLP students supervised by certified SLPs	Telehealth, mode not specified	Student	School, type not specified
Lincoln et al. (2015), Australia	Investigate stakeholders' perspective on feasibility and acceptability of teletherapy in schools	Empirical, Qualitative Interviews	Serve rural and remote communities	SLP/SLT	Videoconferencing	Student	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Lowman and Kleinert (2017), United States	Collect information about the perspectives of directors of special education regarding telepractice	Empirical, Quantitative Study design, type not reported	Serve rural and remote communities	SLP/SLT	Telehealth, mode not specified	Not reported	Public
Lundblom et al. (2022), United States	Describe the School-Based Telepractice Assessment tool for lawful telepractice	Non-empirical	COVID-19	SLP/SLT	Telehealth, mode not specified	Not reported	School, type not specified
Machalicek et al. (2009), United States	Examine use of widely available videoconferencing equipment and efficacy of functional analyses conducted using videoconferencing	Empirical, Quantitative Study design, type not reported	Access specialist	Behaviour Analyst	Videoconferencing	Student	Special school for students with autism
Marrapese et al. (2021), United States	Describe the role of a school nurse in a virtual school	Non-empirical	Virtual school	Nurse	Videoconferencing; Email; Videos	Student; Parent; Teacher; Community providers; Administrators	Public; Virtual

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Martinez et al. (2022), United States	Explore telehealth adaptation of Fuertes program	Empirical, Qualitative	COVID-19	Psychologist; Student	Videoconferencing	Student	School, type not specified
McLellan et al. (2017), Australia	Explore feasibility and efficacy of telecare for anxiety in schools	Empirical, Quantitative Pilot Trial	Serve rural and remote communities	Psychologist	Videoconferencing; telephone; email; online self-report and parent-report measures	Student; Parent	School, type not specified
Miller et al. (2002)(Miller et al., 2002b), United States	Not reported	Empirical, Quantitative Case Report	Serve rural and remote communities	Psychiatrist	Videoconferencing	Parents; School officials; Child psychologists; Child psychiatrist	School, type not specified
Moirangthem & Ojha (2022), India	Identify innovative OT methods for students with disabilities.	Empirical, Scoping Review	COVID-19	OT	Videoconferencing; telephone; email; videos	Students	School, type not specified
Murphy et al. (2021), United States	How are children receiving services during COVID-19 and are parents satisfied with service delivery?	Empirical, Quantitative Survey	COVID-19	OT; PT; SLP/SLT; Behaviour Analyst; Psychologist; Other: social work, feeding	Videoconferencing; Telephone	Not reported	Public; Private; Charter; Home

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
				therapy, developmental therapy			
Nelson et al. (2023), United States	Describe telebehavioural health services	Non-empirical	Serve rural and remote communities	OT; SLP/SLT; Psychiatrist; Psychologist; Dietician; Consulting physician	Videoconferencing; electronic questionnaire	Student; Parent	School, type not specified
Norman et al. (2021), Australia	Explore educator perceptions of training and mentoring pertaining to a culturally responsive oral language and early literacy program, SWAY (Sounds, Words, Aboriginal Language and Yarning)	Empirical, Mixed Methods	Serve rural and remote communities	SLP/SLT	Videoconferencing	Not Reported	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Pahwa et al. (2021), India	Determine need, content, and structure of tele PT module for children with cerebral palsy	Empirical, Qualitative Focus Groups	Limited staff and/or resources	PT	Videoconferencing; Website	Not Reported	School, type not specified
Reupert et al. (2022), Australia	Investigate psychologists experiences and adaptations during COVID?	Empirical, Qualitative Exploratory	COVID-19	Psychologist	Videoconferencing; Telephone; Email	Student; Parent	Independent , Catholic, and public schools
Reupert et al. (2021), United States, Canada, Germany, and Australia	How are psychologists supporting mental health during the COVID-19 school closures?	Empirical, Quantitative Survey	COVID-19	Psychologist	Videoconferencing; Telephone; Website	Not Reported	School, type not specified
Rortvedt and Jacobs (2019), United States	What are the uses, barriers, and supports to the implementation of telehealth in school-based OT?	Empirical, Mixed Methods Survey	Limited staff and/or resources	OT	Telehealth, mode not specified	Not Reported	Public

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Rose et al. (2000)(Rose et al., 2000), United Kingdom	Commercial and clinical viability of videoconferencing	Non-empirical	Access specialist	SLP/SLT	Videoconferencing	Educational Support Assistant	School, type not specified
Schultz et al. (2018)(Schultz et al., 2018), United States	Determine the greatest barriers to decision to use teleconsultation between commute time, problem severity, and consultee familiarity with the technology	Empirical, Quantitative Choice-based conjoint study	Limited staff and/or resources	Psychologist	Videoconferencing	Not Reported	School, type not specified
Shahidullah et al. (2022), United States	Present an innovative approach to increase timely access to autism evaluations	Non-empirical	Limited staff and/or resources	Psychiatrist; Psychologist; Social worker	Videoconferencing; website; recorded videos	Student; Parent; Teacher	Public
Shahidullah et al. (2023), United States	Development of care coordination partnership program	Empirical, Quantitative Clinical program evaluation	Limited staff	Psychiatrist; Psychologist, Counsellor; Social Worker	Not reported	Student; School Staff	School, type not specified

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Stephan et al. (2016), United States	Describe potential and limits of school telemental health	Non-Empirical	Limited staff and/or resources	Psychiatrist; Students	Videoconferencing; Telephone	Student; Parent; Teacher; Administrators; Outside providers	Public
Stormshak et al. (2019), United States	Efficacy of web-based Family Check-Up intervention with and without coaching	Empirical, Quantitative Randomized controlled trial	Limited staff and/or resources	Psychology students	Telephone; Website	Parent	Public
Svendsen et al. (2023), Norway	Understand child, parent and teachers acceptability of Child in Context Intervention	Empirical, Qualitative Interviews of feasibility study	Reduce travel, time, and costs	Nurse; Neuropsychologists	Videoconferencing	Student; Parent; Teacher	Regular; Private; Special education
Tambyraja et al. (2021), United States	Examine how SLPs maintained clinical services via teletherapy during COVID-19	Empirical, Quantitative Survey	COVID-19	SLP/SLT	Data combined with preschool setting	Data combined with preschool setting	Public; Private
Tucker (2012), United States	Enhance understanding of SLP perceptions about telepractice in schools	Empirical, Quantitative Survey	Not Reported	SLP/SLT	Telehealth, mode not specified	Student; Parent; Teacher	Public; Private; Home; Virtual; Special education centre

Citation, Author Country	Research Question or Purpose	Article Type and Study Design	Rationale for Using Telehealth	Population Regulated Health Professional	Concept Telehealth delivery mode	Context Telehealth Participants	Type of School
Walker et al. (2021), United States and Fiji	Highlight a partnership between an academic program and an international school telepractice program	Non-empirical	Limited staff and/or resources	SLP/SLT; students	Videoconferencing	Student	Private international school
Zhang et al. (2023), United States	Examine barriers and successes of telebehavioural health in schools	Empirical, Qualitative Semi-structured interviews	Serve rural and remote communities	Psychiatrist; Psychologist	Videoconferencing	Student; Parent; Teacher	School, type not specified

Note. Occupational Therapist (OT), Physical Therapist (PT), Speech-Language Pathologist/Speech-Language Therapist (SLP/SLT)

Included articles dated back to 1998 with a noted increase in articles published from 2017 onwards (n=51, 73%) (Figure 2). Of note, 37 articles (53%) were published prior to the COVID-19 pandemic, six (9%) collected data prior to the COVID-19 pandemic but were published after the beginning of the pandemic, two studies (3%) were unclear as to when data were collected, and 25 articles (36%) included data collected during the COVID-19 pandemic. Forty-seven articles (67%) originated from the United States, 12 (17%) from Australia, two from each of Hong Kong, United Kingdom, and India, one from each of Finland and Norway, and three studies spanning more than one country. Articles included 16 (23%) non-empirical articles and 54 (77%) empirical articles, with the latter comprising 13 qualitative studies, 33 quantitative studies, 1 systematic review of the literature, 1 scoping review, and 6 mixed methods studies.

Figure 2. Article Year of Publication

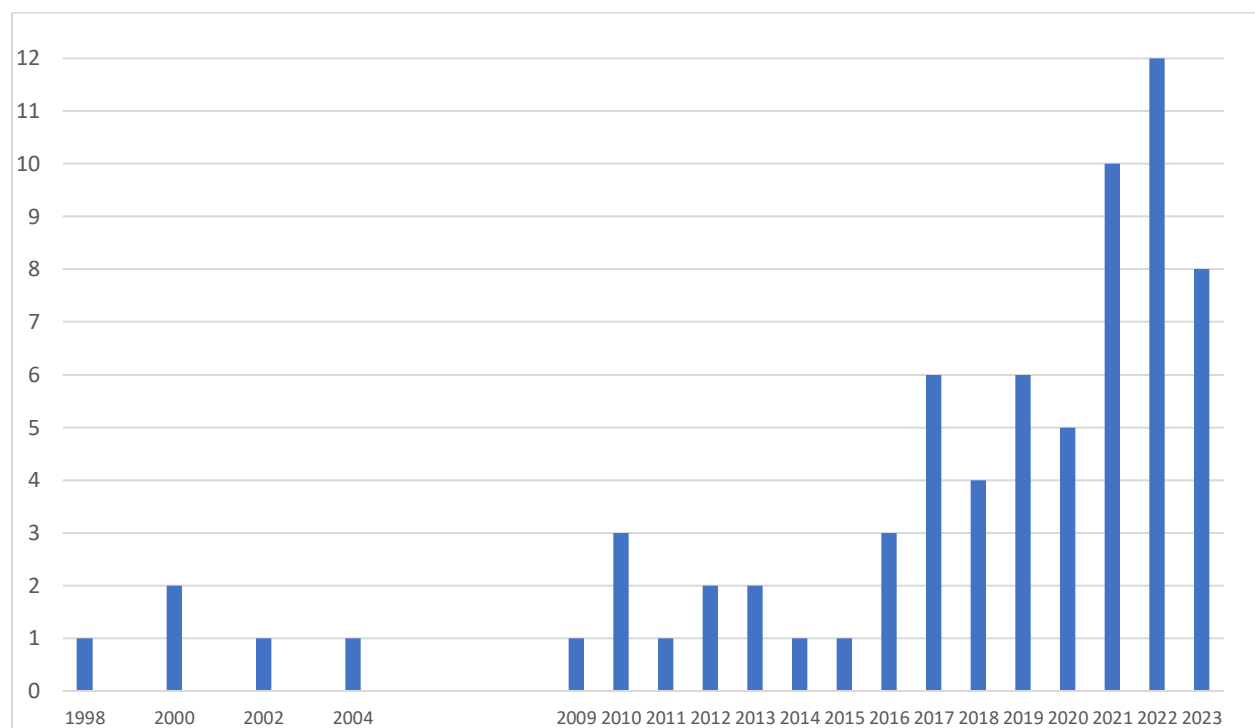


Figure 2 Alt Text: Bar graph showing number of articles published per year, ranging from 0 to 12, with number of articles generally increasing in more recent years.

Telehealth Characteristics

Who engaged in telehealth?

Depending on how articles reported information, students who received services through telehealth ranged in age from 4 to 19 years and were in kindergarten through grade 12. Among the articles that included the diagnosis of the children with whom telehealth services were provided ($n = 31$, 44%), a wide range of diagnoses were reported, and many articles included multiple diagnostic groups (64 diagnoses reported in 31 articles). Some of the most frequently reported diagnoses included autism spectrum disorder ($n = 15$), language or communication impairment ($n = 7$), emotional/behavioural disorder ($n = 7$), cognitive or intellectual impairment ($n = 6$), and specific learning disability ($n = 6$). Several additional diagnoses were reported less frequently, including attention deficit/hyperactivity disorder ($n = 6$), hearing impairment ($n = 4$), mental health ($n = 4$), anxiety disorder ($n = 4$), developmental delay ($n = 3$), visual impairment ($n = 3$), brain injury ($n = 3$), medical conditions ($n = 3$), motor/physical disability ($n = 2$), sensory processing disorder ($n = 2$), and cerebral palsy ($n = 1$). Of the 54 included empirical articles, many different people were included as participants, including students ($n = 23$, 33%), health professionals ($n = 20$, 29%), educators ($n = 13$, 19%), parents ($n = 9$, 13%), and education administrators ($n = 6$, 9%) (some articles targeted more than one sample group; therefore, the sum of the numbers is greater than 54). The recipients and providers of telehealth services are presented in table 2. Services were primarily provided by SLPs ($n=28$, 40%) or psychologists ($n=28$, 40%) with the student ($n=48$, 69%) as the most frequent recipient of the telehealth service followed by parents ($n=26$, 37%) and educators ($n=24$, 34%). Finally, although many of the included articles did not report an onsite support person ($n=40$, 57%), of those that did, an

educational or therapy assistant was the most common onsite adult support described (n=11, 16%) or parent (n=10, 14%).

Table 4. Providers and recipients of telehealth services.

Health Professional Provider^a		Recipient of telehealth^{a,b}		Additional adult present to support telehealth delivery^{a,c}	
Profession	Number of Articles	Recipient	Number of Articles	Adult support	Number of Articles
Speech language pathologist	28 (40%)	Student	48 (69%)	Aide/assistant (therapy or educational)	11 (16%)
Psychologist	28 (40%)	Parent	26 (37%)	Parent	10 (14%)
Occupational therapist	9 (13%)	Educator	24 (34%)	Title not specified	6 (9%)
Social Worker	8 (11%)	Other professional	5 (7%)	Teacher	5 (7%)
Psychiatrist	7 (10%)	Education administrator	3 (4%)	School mental health provider	3 (4%)
Physical therapist	5 (7%)	Paraprofessional	2 (3%)	Post-secondary student	2 (3%)
Behaviour analyst	4 (6%)			No one	2 (3%)
Nurse	4 (6%)				
Physician	4 (6%)				
Dietician	1 (1%)				

Note. ^aSome articles reported on more than one professional, recipient, and/or support adult. ^bNot reported (n=11), not applicable (n=1), or data not reported by setting (n=1). ^cNot reported (n=25) or not applicable (n=15).

What did telehealth look like?

The service delivery model of telehealth varied throughout the included articles. Exclusively telehealth service was provided in 24 (34%) of the included articles, hybrid (telehealth and in-person services) was provided in 14 (20%) of the included sources, and sequential services (telehealth followed by in-person services or vice versa) for the purposes of research comparisons were provided in 4 (6%) of the included articles. The type of service

provided through the use of telehealth was reported in 55 (79%) of the included articles: many articles reported on multiple services provided through telehealth and these included individual intervention (n=37, 53%), consultation (n= 29, 41%), assessment (n= 28, 40%), group intervention (n=14, 20%), meetings (n=9,13%), and family communication (n=5, 7%).

How was telehealth provided?

Exclusively synchronous (real-time) telehealth services were provided in 46% (n=32) of articles, 31% (n=22) of articles used a combination of synchronous and asynchronous telehealth services, 3% (n=2) used exclusively asynchronous telehealth, and the remaining articles (20%, n=14) did not identify the synchronicity of services. Seventy-four per cent (n=52) of articles used videoconferencing as part of their telehealth services, 17% (n=12) of articles used telephone, and 16% (n=11) used each of website and email for telehealth service. Laptop (n= 11, 16%), desktop (n=10, 14%), and tablet (n=14, 20%) were the most used computer hardware with 17% (n=12) of articles making specific mention of a webcam and 12% (n=13) specifically including use of headphones for telehealth delivery. Other hardware used was reported in three or fewer studies and included items such as document cameras, video cameras, telepresence robots, and speakers. Eight different videoconferencing software programs were specifically mentioned by article authors and an additional three software programs that included a videoconferencing component with additional tools (assessments, games, and activities) for the professional to use. Additional software reported to support telehealth delivery included camera applications, file storage and transfer, presentation, and instant messaging software.

When was telehealth provided?

Telehealth service length and frequency varied across included articles. Most often, telehealth services were provided on a weekly basis (41%, with 11 of 27 studies reporting on

frequency). The number of sessions ranged from 1-48 sessions with 5-12 sessions being most common (55%, 17 of 31 studies). Of the 23 articles reporting session length, 70% (16 of 23) reported a length between 20 and 45 minutes. The range of session length varied from 11 minutes to 3 hours. Most articles that reported session length provided either intervention or assessment telehealth services. The duration from first session to final session ranged from 1 week to 48 weeks with 36% (n=8 of 22) of articles that reported on duration having a duration of 10-12 weeks.

Where was telehealth provided?

Telehealth services were predominantly provided within the public-school setting (n=35, 50%). Other settings included private school (n=7, 10%), special education school (n=4, 6%), virtual school (n=2, 3%), home school (n=2, 3%), and charter school (n=1, 1%). Many of the services were between a provider at a university lab and a recipient at a school (n=15, 22%). Other arrangements included a provider at a clinic to students at the school (n=9, 13%), and from a provider at a school or their home to the student at home (n=9, 13%). Of articles that reported on the timing of the services (n=19, 27%), 15 (79%) provided services during the school day, 2 (11%) provided services both during the school day and after school, and 2 (11%) provided an asynchronous service that was available on demand. Only one article reported how telehealth services were documented, which was in an electronic health record. Finally, 37 (53%) of articles reported the health professional's employment status: 17 (46%) were health professional students, 6 (16%) were school employees, 6 (16%) were researchers, 5 (14%) were clinic employees, 4 (11%) university employees, and 3 (8%) were employed by an academic medical centre.

Why was telehealth provided?

Telehealth was used for a variety of purposes, including to address limited staff and resources (n= 21, 30%), to increase access to services in rural areas (n=21, 30%), and to respond to closures during the COVID-19 pandemic (n=20, 29%). The services provided addressed many categories of student goals, including challenging behaviours (n=15, 21%), speech and language (n=13, 19%), mental health and well-being (n=10, 14%), social emotional (n=6, 9%), assessment (n=5, 7%), and motor (n=2, 3%). Twenty-seven per cent (n=19) of articles did not include what student goals were targeted using telehealth technology.

Discussion

This review aimed to describe the range of literature pertaining to telehealth use in schools. Additionally, we aimed to identify areas for future research related to telehealth use in the schools since this is an emerging and fast-growing service delivery model. The literature predominantly originates from the United States (67%) and is empirical (77%). It also showed that students in all grades participated in telehealth, mostly with speech-language pathologists (40%) and psychologists (40%). A variety of health services such as assessment, intervention, and consultation were provided frequently by using videoconferencing (74%). Telehealth was provided due to staffing limitations, rural location of students, and COVID-19 restrictions.

Who engaged in telehealth?

With respect to the health professionals delivering telehealth services in schools, we found that the existing literature largely originates within psychology and SLP professions. Although we do not know why these two professions are represented more often in the literature, one possibility is that psychologists and SLPs tend to provide verbal interventions more than they do physical interventions. In their systematic review of telerehabilitation in pediatrics, Camden and colleagues (2020) found that interventions targeting behaviour were more effective

than interventions targeting physical function. Although all health providers can provide verbal intervention or consultation, some professionals also need to target physical skills that may be more suited to in-person intervention (e.g., physiotherapists who might target muscle tone and spasticity to help a student sit at a desk or actively participate in physical education). Thus, it may be that there is a greater focus on telehealth services within schools among professions like psychology and SLP that can adapt their services to a telehealth context more readily and effectively.

With respect to the individuals receiving the telehealth services, we found students were most often the recipients with parents and educators as the second and third most common target population of service delivery. Interestingly, a systematic review of pediatric telerehabilitation found that using a coaching approach with parents provided greater effectiveness of telerehabilitation than targeting the child directly (Camden et al., 2020). Therefore, school-based providers should take into consideration who is their target service delivery recipient and determine if this should be adjusted when providing telehealth versus in-person services to provide the most effective services. Additionally, the students involved in telehealth services were a heterogeneous group with a wide range of ages, grades, diagnoses, and health needs. Many of the studies included grade ranges spanning five grades or more (often entire schools or provider caseloads), and more than one disability diagnosis. Such variability in student characteristics suggests that the students are not being chosen for telehealth service delivery based on their specific age, grade, goals, or diagnoses; rather, the service delivery model is being selected and applied to all students needing access to health services in a school. This interpretation of our findings is consistent with our observation that telehealth was reportedly utilized in most articles as a response to staff shortages, rural location, or due to COVID

restrictions. Of note, one study in our review reported differences across grades in students' responses to telehealth services with respect to their speech and language, class participation, and educational outcomes (Langbecker et al., 2019). However, this study also indicated that more research is needed regarding optimal age for telehealth as this was not their study's primary research focus. We suggest that the need for additional research also applies to other student characteristics as well, including diagnoses and service goals.

What did telehealth look like?

The most common services delivered via telehealth in schools were the same as those most frequently delivered in person – individual intervention, consultation with educators, and assessment. However, our findings suggest that the proportion of time that health professionals spend delivering these services may vary when services are provided via telehealth. For example, according to the ASHA survey on SLP workload management, school-based therapists in general were found to spend most of their time, approximately 60%, on direct intervention, and minimal time on assessment and consultation services (10% and 5% respectively) (American Speech-Language-Hearing Association, 2020, 2022). Yet when using telehealth, our findings suggest that the literature is more evenly split between individual intervention, assessment, and consultation. We think this could mean that SLPs using telehealth may need more research regarding assessment and consultation services because these tasks may be more challenging to adapt to telehealth delivery.

As a second example, a typical school psychologist's workload consists of a large portion of time, 25.73 hours weekly, on assessment services, 11.82 hours weekly on intervention, and 11.42 hours weekly on meetings (Filter et al., 2013). From our scoping review data, we found only 11% of sources reported using telehealth for meetings with only two articles reporting both

telehealth for meetings and psychologists as the health care provider, even though meetings are typically a significant portion of the school psychologists' workload (Filter et al., 2013). This leaves it unclear if meetings were simply underreported in the included articles or if they were accurately reported but did not occur frequently or occurred in person during times of telehealth service delivery. If meetings occurred less frequently during telehealth, this may point to a missed opportunity for health professionals to use telehealth to connect with families and school staff, especially given that health professionals often serve multiple schools and may find it challenging to attend meetings in person.

How was telehealth provided?

Telehealth was provided using technology commonly available within schools. We found that 74% of articles used videoconference either alone or in addition to another telehealth method. Of the articles that did not report on the telehealth method used (20%), it is likely that videoconferencing was used but was not specifically mentioned. Telehealth is at times defined using a more narrow definition that is synonymous with videoconferencing to replace face-to-face interactions between clients and providers (Fischer, Dart, et al., 2017). According to our scoping review, the technology used by providers included email, phone, websites, and videoconferencing. These technology types all fall within the low to mid-tech classification of complexity (Camden & Silva, 2021). Additionally, this technology is frequently readily available through typical technology stores, without needing to purchase specialty therapeutic/medical technology. Stephan and colleagues (2016) stated that consumer grade technology is sufficient for school telehealth use. The types of technology used in the articles included in the scoping review are best suited for consultation, discussion, screening, observations, and coaching (Camden & Silva, 2021). Assessments, beyond clinical observation, and specialized

interventions are better suited for more complex high-tech telehealth (Camden & Silva, 2021). Therefore, much of the telehealth technology explored in the articles included in this scoping review would be readily available to health professionals, which would facilitate the trialing and use of telehealth for those who are interested.

When was telehealth provided?

The telehealth service frequency, duration, and length often were not thoroughly reported (44%, 33%, and 33%, of articles respectively) and varied greatly from one article to the next. Empirical studies included data on at least one of frequency, duration, and length of sessions in 29 of 54 studies (54%), while non-empirical studies included this information in 5 of 16 studies (31%). Traditionally, services provided based on an individualized educational plan (IEP) in the United States are determined at an IEP meeting and session frequency, duration, and length are specified on the IEP (Center for Parent Information & Resources, 2019). Thus, it is notable that such details often were omitted in the literature. Further, without knowing the frequency, duration, and length of services, it is difficult to evaluate the effectiveness of the services or to replicate the intervention conditions in research or practice (Hoffmann et al., 2014). Additionally, cost of care analysis is not possible without this information (Burnett, 2009). Finally, guidelines and recommendations for clinical practice cannot be made without service frequency information (Hoffmann et al., 2014).

Where was telehealth provided?

The inclusion criteria for this scoping review were that services needed to be integrated within the school setting. We were limited in our ability to describe this setting because many articles did not report on type of school or the employment status of the health professional. The employment status of the health professionals would have been helpful to know because in our

experience as health professionals, we have observed some differences between being an employee of the school district or being an ‘outsider’ either from a contracted position or researcher. Some of these differences include how providers are paid (fee for service or salary), which can influence the type of services they can provide as well as whether providers have access to school resources including technology, email, and physical space (Haeder et al., 2022). Our scoping review identified only six studies where the health professional was a school district employee: three studies from SLP (Boisvert & Hall, 2019; Erickson et al., 2021; Hall, 2022), one from nursing (Marrapese et al., 2021), one from psychology (Hyde et al., 2022), and one from social work (Daftary, 2021). The role of the school nurse was well described in Marrapese et al. (2021), including providing a job description and reporting on where nurses documented their telehealth services. Another study involving child and adolescent psychiatrists indicated that the health records were kept separate from educational records (Stephan et al., 2016). In our experience as clinicians and researchers, we have observed that health and education notes and reports are often documented separately with health privacy legislation limiting with whom and how those reports can be shared amongst health and education team members (Information and Privacy Commissioner of Ontario, 2006; U.S. Department of Health and Human Services & U.S. Department of Education, 2019). Thus, more detailed descriptions of the context of telehealth service provision would be helpful to understand if the context is similar or different from one’s own practice or research context. Additionally, a clear understanding of the context would allow practitioners and researchers to address barriers and facilitators to implementing telehealth.

Why was telehealth provided?

Consistent with existing reports of health professional shortages and restricted service access in rural and remote communities (National Association of School Psychologists, 2022;

People for Education, 2022), the primary reasons reported in the literature for telehealth use included serving children living in rural and remote areas (e.g. Fairweather et al., 2017; Grogan-Johnson et al., 2010; Lincoln et al., 2014); helping to manage provider workload, time, and travel (e.g. Boisvert & Hall, 2019; Fischer, Collier-Meek, et al., 2017; Grogan-Johnson, 2018); and complying with COVID-19 restrictions (e.g. Bolden & Grogan-Johnson, 2022; Hall, 2022; Lundblom et al., 2022). Unfortunately, disparities in service access persist even when enhancing access to students in rural and remote communities is the intention. Specifically, People for Education reported in 2022 that across Ontario, telehealth psychology was available in 80% of urban schools but only 57% of rural schools; similarly, while telehealth social work was available in 92% of urban schools, only 75% of rural schools have access to these services (People for Education, 2022). Thus, there appears to be a disconnect between the stated goal in the literature of increasing access to health services in rural areas and the actual access to telehealth services in rural areas in practice. Additionally, the continuously evolving and ongoing nature of the COVID-19 pandemic has not yet been fully captured by the literature, nor have its long-term effects on service delivery changes. Therefore, it is still unclear whether school-based services will continue to be provided via telehealth at an increased implementation level or if telehealth service delivery will return to the minimal pre-pandemic level of use.

Finally, apart from one study that discussed the school nurse role in a virtual school (Marrapese et al., 2021), the choice between telehealth or in-person services was not made by families. In the virtual school, families actively chose to enrol their child in the exclusively virtual, public school as opposed to a traditional public school. Thus, in making this school choice, families also selected to receive school health services virtually as well. To provide family centred care, health providers must also consider the family's preferences related to

technology and telehealth (Camden & Silva, 2021; Rosenbaum et al., 2021). We recommend health providers consider family and student preferences for telehealth when deciding to provide telehealth services.

Implications for professional practice

A large proportion of included articles (28 SLP, 27 psychology, 7 social work) involved health providers who engage in verbally-based assessments and interventions for language and behavioural goals. Professions requiring hands-on assessment and interventions may be better suited to a hybrid or in-person service delivery model as few articles (8 OT, 5 PT, and 4 nursing) included physical movement intervention and most focused on speech, language, and/or behavioural interventions. Additionally, meetings were rarely reportedly conducted via telehealth; however, this may be a promising use of telehealth to connect providers, educators, and families who are in different locations.

As recommended for all pediatric health care, services should be child and family centred. Some of the included studies (Crutchley & Campbell, 2010; Green et al., 2023; Lam et al., 2021b; Murphy et al., 2021a) sought out the perspectives of parents with regards to the use of telehealth and their satisfaction with services and perception of effectiveness. One study found that parent satisfaction with therapy services and with family-provider partnership during the pandemic was lower when services were provided through the school setting as compared with early intervention, outpatient, or multiple settings (Murphy et al., 2021a). Of note, the families in this survey who were receiving school-based services were also least likely to be receiving telehealth services (Murphy et al., 2021a). Parent satisfaction was mixed with regards to school-based SLP services, with families rating services as meeting expectation and needs, while also providing mixed ratings about the effectiveness of telehealth and a preference for on-site services

(Crutchley & Campbell, 2010; Lam et al., 2021b). Family perspectives should be considered when determining service delivery model. Camden and Silva (2021) propose a chart for determining the compatibility between telehealth and logistical, family and child factors, and service capabilities, to determine if telehealth or in-person sessions are most appropriate. Some of the considerations within this chart include family preferences, child's goals and needs, and technology access and comfort. Although their chart is intended for any pediatric PT and OT, many of the factors apply to the school setting and all health professionals.

Finally, telehealth was used with all ages of school children and with a large variety of diagnoses. Given the limited evidence to support the specifics of child characteristics, health professionals should consider the goals of treatment and the child's response to telehealth. There is a prevailing view that students learn better in person and that online learning is particularly difficult for marginalized students, including those with disabilities (Gallagher-MacKay et al., 2021; Hoffman & Miller, 2020). Given this, and with the results of the scoping review showing that many different students engaged in telehealth, it is important for health professionals to monitor the child's progress and to adjust services if necessary.

Future research

Many opportunities for future research have been identified through this scoping review. With the literature predominantly stemming from the United States, it is important to obtain greater representation from other countries because school systems, school health services, and school related legislation vary between countries. The student population described was heterogeneous and, therefore, further research is warranted to determine who benefits from telehealth considering age, grade, diagnosis, and treatment goals. Further research is needed to provide the optimal session length and frequency, and duration of therapy to provide sufficient

services for students to meet their goals. Following the Template for Intervention Description and Replication (TIDieR) checklist would improve researchers' reporting of interventions and thus improve replicability and transparency for incorporation into professional practice and future research (Hoffmann et al., 2014). Further family-centred care research is warranted to help understand families' preferences related to which services (i.e., intervention, assessment, meetings) are provided via telehealth and to achieve which student goals, with the potential for offering hybrid options.

The costs of services are also important to invested parties. Further information is needed to determine the costs of telehealth services and the impact on a provider's workload. Rose and colleagues (2000) found that providing telehealth saved 29 minutes per child per month as compared with in-person speech and language services. These authors did not specify how many students were on an SLP's caseload. They indicated that the savings came from decreased travel time. Boisvert and Hall (2019) conducted a survey and found that providers identified telehealth as reducing travel time, increasing flexibility in scheduling, and improving their ability to perform school-based responsibilities. Improved reporting on service intensity, duration, and frequency will also aid in the calculation of cost of services. Future studies are needed to determine the health economics and workload management impacts of providing school-based services through telehealth.

Limitations

The first limitation of our scoping review is related to the inclusion criteria we set. Only English language and peer-reviewed articles were included. Therefore, we may have excluded pertinent literature from the review. Additionally, we included only articles that discussed health services that were integrated within the school system. This inclusion criteria lead to the

exclusion of articles about health services housed within schools as a means of increasing access to children who otherwise would not receive services. Although this may have limited the breadth of included literature, we felt it was necessary to maintain this focus as it was essential to answering our specific research question.

A second limitation is that the research team included representation from OT, SLP, and medical sciences, as both researchers and clinicians with school-based experience. Additional health professionals represented by the included articles were not represented by the research team. This may have influenced how we developed and conducted the article selection, data extraction, and analysis because we have prior experience in these professions and may view certain tasks from these professional lenses.

A third limitation related to scoping review methodology was that quality appraisal of sources was not completed (Peters, Godfrey, et al., 2020). Scoping reviews intend to describe the literature and include many study designs; therefore, specific practice recommendations cannot be made because the quality of the evidence has not been considered. Nonetheless, the description of the literature provided by a scoping review can be used to inform practice and policy more generally (Peters, Godfrey, et al., 2020).

Conclusions and recommendations

Telehealth in schools has been researched with a heterogeneous student population and from the perspective of many health care providers. Additional research is needed to determine specifically who is best served by telehealth, with what frequency of intervention, and by which telehealth mode. Our scoping review highlighted that many providers were using telehealth for individual intervention, assessment, and consultation services. Future research should also

consider the service delivery method best suited for telehealth and should include geographic diversity beyond the United States.

The scoping review revealed that the primary method of telehealth was videoconferencing using common, readily available technology. Following professional practice guidelines, and while ensuring privacy legislation is followed, clinicians can use their clinical reasoning to consider using available technology for telehealth services within schools.

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