Running title: Barriers and facilitators for telepractice

Identifying barriers and facilitators to telepractice in children ≤ 12 years for speech and language therapists and audiologists in Belgium: A Nominal Group Technique study

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ABSTRACT

Purpose: The use of telepractice in speech therapy or audiology has long been limited to situations in which a person could not access a specialised clinician. Following the COVID-19 pandemic, however, many speech therapists and audiologists were forced to use it even though they were not accustomed to doing so. A guideline for the use of telepractice in speech therapy and audiology for children up to

the age of 12 in Belgium has recently been established (Van Eerdenbrugh et al., 2023). To develop the guideline, it was essential to gain an understanding of the barriers and facilitators that therapists encounter in order to ensure that telepractice will be incorporated into their daily practice besides standard clinical practice. The aim of the present study is to identify barriers and facilitators to the use of telepractice in children up to 12 years from the perspective of speech and language therapists (SLTs) and audiologists in Belgium.

Methods: Two separate nominal group technique (NGT) sessions were held to explore the barriers and facilitators to the use of telepractice with children up to 12 years in Belgium. The barriers and facilitators generated by five SLTs (meeting 1) and six audiologists (meeting 2) were coded according to the updated Consolidated Framework for Implementation Research (CFIR).

Results and discussion: The results are in line with previous literature about barriers and facilitators to the use of telepractice in speech and language therapy and audiology in adults. They highlight the importance of establishing clear guidelines for the use of telepractice and developing tools and training to help therapists implement telepractice in their current practice.

Keywords: Telepractice, tele-speech and language therapy, teleaudiology, updated CFIR, Implementation science, barriers, facilitators

INTRODUCTION

Telepractice is a promising alternative format for delivering care in the medical and allied health care field, including speech and language therapy (SLT) and audiology. Telepractice is defined as the delivery of services where 'a healthcare provider and a patient are separated by distance' (WHO & ITU, 2022). Also known as telehealth or telemedicine, this term refers to the use of a variety of telecommunication technologies (including but not limited to videoconferencing, phone, e-mail) to provide care from a distance. Telepractice delivery can be more cost-effective relative to in-person intervention (Bridgman et al., 2016) and increases access to specialized healthcare professionals as distance does not need to

be considered. Studies have shown its efficacy and safety of use with children in a variety of areas related to SLT and audiology.

Efficacy of Teletreatment and Accuracy of Tele-Assessment

Some randomized control trials (RCTs) supported its efficacy in training parents to help children with hearing problems (e.g., Blaiser et al., 2013), stuttering (Bridgman et al., 2016), developmental disabilities (e.g., Lau et al., 2022) and autism spectrum disorders (Wainer et al., 2021). Other RCTs revealed its efficacy in the direct treatment of children with reading disorders (Cancer et al., 2021), language disorders (Cameron & Hutchinson, 2009), developmental speech sound disorders (Grogan-Johnson et al., 2013) and speech disorders associated with cleft palate (Sweeney et al., 2020).

Previous data also underlined the accuracy of the teleassessment of (breast)feeding and swallowing (e.g., Raatz et al., 2021), cochlear fitting (e.g., Goehring & Hughes, 2017), hearing screening (e.g., Monica et al., 2017), language (e.g., Raman et al., 2019), reading and spelling (e.g., Hodge et al., 2019).

Implementation of Telepractice in Routine Care

Despite the reported efficacy and accuracy, prior to the COVID-19 pandemic, the use of telepractice in speech-language therapy was often limited to situations in which face-to-face care was not possible due to geographical distance or the client's mobility. The confinement caused by the pandemic forced therapists to adopt telepractice to ensure continuity of care (Guglani et al., 2023; Hewitt & Loring, 2020; Law et al., 2021). Once the lockdown was lifted, some therapists, who were convinced by the benefits of telepractice, continued using it in their daily practice, while others returned to exclusively offering their usual in-person care. However, while the telepractice delivery model should not be considered to replace in-person care, in certain contexts telepractice can be preferable, for example (1) to continue delivery of care because in-person sessions are no longer/not all the time possible or (2) if families/situations indicate that telepractice is the preferred delivery model. In healthcare, it is not uncommon for the adoption of new practices to vary greatly from one therapist to another. While some clinicians may quickly adopt these new effective clinical innovations, others may not be in favour of doing so. Studies in healthcare estimate that it takes 17-20 years for effective clinical innovations to

be implemented in routine care, with less than 50% ever making it into general usage (Balas & Boren, 2000; Grant et al 2003; Morris et al., 2011). Indeed, the long-term adoption of new practices depends largely on the barriers, facilitators and benefits perceived by clinicians on a day-to-day basis (Peters et al., 2020). The emerging field of implementation science offers valuable insights into identifying and addressing these factors (Nilsen 2024, p 24). Implementation science is 'the scientific study of implementation strategies to promote the systematic uptake of research findings and other evidence-based practice into routine practice and, hence, to improve the quality and effectiveness of health services or care' (Eccles & Mittman, 2006; Nilsen 2024, p. 24). It provides different theoretical approaches to study change in clinical practice. These theoretical approaches can be grouped into five main categories (Nilsen, 2015): process models, determinant frameworks, classic theories, implementation theories, and evaluation frameworks. Specifically, determinant frameworks aim to identify and structure the barriers or facilitators that influence the implementation outcomes. Several frameworks in this category are commonly used in healthcare research, such as the Promoting Action on Research Implementation in Health Services (PARIHS) framework (Rycroft-Malone, 2004), the Theoretical Domains Framework (TDF; Cane et al., 2012; Michie et al., 2005), and the Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2009).

The Updated Consolidated Framework for Implementation Research

In this study, we chose the updated version of CFIR (Damschroder et al., 2022), because it offers a comprehensive and practical structure for classifying implementation-related factors. The updated CFIR defines an overarching taxonomy composed of '*constructs within general domains that are believed to influence (positively or negatively, as specified) implementation*' (Damschroder et al., 2022, p.3). This revised framework is based on over a decade of use in different settings, and includes precise definitions, conceptual clarity, and an explicit focus on equity and the role of the innovation recipient (Damschroder et al., 2022). This framework is especially relevant for analysing the implementation of telepractice in a multidisciplinary context such as paediatric SLT and audiology.

The updated CFIR comprises five main domains: innovation (the new practice that is implemented), outer setting (the setting in which the inner setting exists, e.g. hospital, state, community…), inner setting (the setting in which the innovation is implemented, e.g. unit, team, classroom…), individuals (the roles and characteristics of individuals) and implementation process (the activities and strategies used to implementation the innovation). Each domain consists of several constructs (e.g. policies and laws, innovation technology infrastructure, available resources, innovation deliverers, innovation recipients) which can themselves be divided into more precise concepts (e.g. space, funding, need, capability). This updated CFIR can thus be used to interpret the barriers and facilitators reported in the literature regarding incentives or disincentives to adopting new practices.

In the context of SLT and audiology, several barriers and facilitators to the implementation of telepractice in daily practice have been highlighted by therapists. In Tables 1 and 2, we present a literature review of these barriers, facilitators and benefits according to the concepts of the updated CFIR. This literature review was conducted whilst developing a guideline for the use of telepractice in speech therapy and audiology for children up to the age of 12 in Belgium (Van Eerdenbrugh et al., 2023, see below). Only RCTs and systematic reviews were included in the search. Eight databases were consulted, i.e. in Web of Science, PubMed and PsycInfo, on the platform Proquest in Linguistics and Language Behavior Abstracts (LLBA), ERIC and Embase, in the Cumulative Index to Nursing and Allied Health Litterature (CINAHL) and in the Joanna Briggs Institute (JBI) database. First, a set of search terms of interest were defined irrespective of the specific databases. These search terms were reviewed, adjusted, and finally approved by the guideline development group and stakeholders (methodological focus). Subsequently, the search terms and field for searching were specified per database. For each database that allows the use of MeSH terms, relevant MeSH terms were specified in the search string. In addition, free text terms were included that were limited to the title and abstract fields. After conducting the systematic literature search in the selected databases, duplicates were removed using the Zotero software package. Sources were screened for inclusion and exclusion criteria in a two-step procedure. First, the titles and abstracts were screened for relevance. Second, full texts were screened.

For this purpose, the software package Rayyan was used. The included records were appraised for their quality. The Joanna Briggs Institute tools (JBI, 2021) were considered adequate for the quality appraisal of all records.

Barriers to the Implementation of Telepractice

Among the barriers, literature reports obstacles related to the outer setting domain, such as reimbursement practices and legal issues but most of them are related to the inner setting and individuals' domains. Concerning the inner setting domain, technical issues, incompatibility with workflows, the lack of available resources (in terms of funding, space, materials and equipment), as well as insufficient access to knowledge and information were reported in previous studies (see Table 1). In terms of restrictions linked to telepractice users, limited capability (e.g. being unfamiliar with telepractice, capacity to manage the child during therapy), opportunity (e.g. increased administrative burden) and motivation (e.g. telepractice is seen as an additional workload for therapists and technical problems may hinder client's motivation) were mentioned for both therapists (innovation deliverers) and clients (innovation recipients). None of the barriers mentioned in the literature are related to the innovation domain or implementation process. <Insert Table 1 about here>

Facilitators to the Implementation of Telepractice

Facilitators to telepractice implementation have also been underlined. Some depend on the inner setting domain, such as reliable and constant internet access, clear dissemination of the aims of the telepractice and providing training to children, therapists and parents. Other facilitators depend on therapists and client's capability (such as giving instruction and carrying out preliminary tests), opportunity (e.g. telepractice encourages a higher level of focus on the family and/or the client) and motivation (e.g. families enjoying telepractice; therapists believe that families are more relaxed in their home environment and that telepractice facilitates respect for privacy, i.e. clients are not identified as seeking care) (see Table 2). Finally, some facilitators are related to the implementation process (involvement of staff throughout planning and implementation), and implementation leads (cultivation of telemedicine champions). Moreover, several perceived benefits and relative advantages

to the use of telepractice are also listed in the innovation domain. Of those, some are inherent to telepractice itself, such as reduced travel time, cost-effectiveness, improved access to specialised therapists for families, possibility to perform the session during illness and better insight into the child's environment. Other benefits of telepractice depend on the inner setting domain, such as its compatibility with the workflow (e.g. an improved communication between families and staff, the strengthening of relationships between therapists and other disciplines, a better access to multidisciplinary care). Finally, benefits also depend on the clients themselves (e.g. compatibility with professional and familial constraints, and the ease of transferring therapy to the natural environment) (see Table 2). <Insert Table 2 about here>

Some results are also encouraging, such as the confidence in the technology that grew with the increased use of telepractice (Blaiser et al., 2013; Tully et al., 2021). Caregivers felt that teletreatment services did not interfere with their relationships and interactions with the therapists (Blaiser et al., 2013). The quality of audio and visual components can also be rated as acceptable for most sessions according to the therapists, despite occasional technical problems (McGill et al., 2019). From the perspective of the therapists, the technology can be seen as easy to use (Tully et al., 2021).

Context of the Present Study

Given the arrival of telepractice in the practices of speech and language therapists (SLTs) and audiologists in many countries in response to the COVID-19 pandemic, it has become important to establish recommendations for its use. The lack of evidence about telepractice in SLT and audiology prompted the Belgian Federal Public Service to provide funding to develop a guideline for the use of telepractice in SLT and audiology for children up to the age of 12, given that they are most strongly represented in the caseload of Belgian therapists. This age limit corresponds to the end of primary school in Belgium and therefore makes sense in the Belgian SLT and audiology context. The authors of this paper developed the guideline. The guideline (Van Eerdenbrugh et al., 2023) summarises international research evidence about telepractice in paediatric populations systematically and offers recommendations about the accuracy of telepractice assessment, the efficacy of telepractice

intervention, and about establishing adherence and a good interaction between the child, caregiver and therapist. Its development process included consultations with SLTs and audiologists to consider the feasibility and future implementation of the recommendations. Indeed, the adoption of the recommendations by clinicians depends largely on barriers and facilitators that are specific to their own context (Damschroder et al., 2022). We knew that results from the literature were not simply transferable from one healthcare context to another. If we wanted to help therapists change their practices and integrate telepractice as one of the practice options they can offer their clients, it was necessary to first identify the barriers and facilitators experienced by SLTs and audiologists in the Belgian healthcare context.

Research Questions

The research question of the present study is 'What are the barriers and facilitators to the use of telepractice for the assessment and treatment of children ≤ 12 years for SLTs and audiologists in situations that indicate a preference for telepractice in the Belgian healthcare context?' To answer this question, a diagnostic analysis was performed by consulting the SLTs and audiologists (e.g. the deliverers of telepractice) through a nominal group technique approach during the guideline development process. The barriers and facilitators mentioned by therapists were classified according to the updated CFIR constructs to reflect on the levers necessary for the long-term implementation of telepractice by SLTs and audiologists when it is relevant and recommended.

METHODS

Study Design

The nominal group technique (NGT) was used to facilitate group discussion within a panel of SLTs and audiologists. The NGT is a small group consensus method that can be used to generate answers to questions which can be prioritized or agreed upon (Delbecq & Van de Ven, 1971; McMillan et al., 2016). This technique follows a systematic and democratic process that facilitates equal participation and limits dominant participants from influencing the discussion. In this study, NGT was applied to identify and prioritize key ideas rather than to obtain in-depth qualitative descriptions. Numerous studies have

applied the NGT in healthcare research settings to elicit input from a panel of stakeholders on clinical issues (e.g., Carretero et al., 2021; Harvey & Holmes, 2012; McMillan et al., 2016). Two separate meetings using the NGT methodology were organised to explore the barriers and facilitators to telepractice in children ≤ 12 years from the perspective of five SLTs (meeting 1), and six audiologists (meeting 2). Separate meetings were held so that we could fully gather opinions related to the two realities of these two professions. This study was approved by the ethics committee of the University of Liege, Belgium (reference number: 2223-010). The present study is reported according to the Consolidated Criteria for Reporting Qualitative Research Checklist (Tong et al., 2007).

Participant Selection and Setting

Potentially eligible therapists for the two separate NGT meetings with SLTs and audiologists were identified through peer consultations. Eligible participants were SLTs and/or audiologists working in Belgium, with children up to the age of 12. Experience with telepractice was not a prerequisite for participation because of the need to capture all opinions about the barriers and facilitators to telepractice. Therapists were recruited based on their field of work and their practice context as stated on the lists of professional associations, so as to cover as many areas of expertise and practice contexts as possible. The identified SLTs and audiologists were approached by the investigators (AL and WD) in person or via phone calls to discuss the study in detail and to set a date for the meeting. The objective was to recruit a convenience sample of up to eight participants for both NGT meetings. We sought participants until eight therapists agreed to participate in both NGT meetings. Eventually, three SLTs and two audiologists informed us the day before or the actual day that they could not take part due to illness or a compelling need. We took care to select SLTs who covered the various fields of SLT (acquired neurological disorders, intellectual and neurodevelopmental disorders, hearing disorders, developmental language disorders, speech disorders, written language disorders, dyscalculia, developmental coordination disorders, swallowing disorders, myofunctional disorders and voice disorders) and the different contexts in which they practise in Belgium (hospital, multidisciplinary rehabilitation centre, special school and private practice). We have also taken care to select

audiologists so as to cover as many different clinical practice situations as possible (in private practice, in a rehabilitation centre, in hospital, in a hearing centre, in an implant company, or a combination of some of them), with a width range of area of expertise (auditory training, hearing aid fitting and cochlear implant fitting). We deliberately chose to vary the number of years of experience and the degree of familiarity with telepractice in order to be as representative as possible of clinicians in the field. This was done in order to gather as many barriers and facilitators perceived by these different categories of clinicians as possible. Please refer to Table 3 for detailed characteristics of each participant. The first NGT meeting with SLTs was held in November 2022 on the campus of the University of Liège, and the second NGT meeting with audiologists was held in December 2022 on the campus of Thomas More University of Applied Sciences in Antwerp (Belgium).

Data Collection

Prior to the NGT meetings, participants were asked to complete a pre-NGT questionnaire that gathered information about their work setting, field of expertise, years of experience and their (previous) use of telepractice with children. Participants were informed that they would discuss barriers and facilitators to the use of telepractice by children under the age of 12 years. All participants provided their informed consent before participating in the NGT meeting. Each face-to-face NGT meeting consisted of two rounds and lasted approximately two and a half hours. During the first round, the participants were presented with the question about the barriers: 'What are or would be, in your opinion, the barriers to the use of telepractice for the assessment and treatment of children ≤ 12 years for SLTs (first NGT meeting) or audiologists (second NGT meeting)?' The second round addressed the question about the facilitators: 'What are or would be, in your opinion, the facilitators to the use of telepractice for the assessment and treatment of children ≤ 12 years for SLTs (first meeting) or audiologists (second meeting)?' Each question remained visible to the participants for the duration of the rounds. Three researchers with specific roles (moderator, scribe, and observer) were present at each NGT session (meeting 1: moderator: AL, scribe and observer : two SLT students; meeting 2: moderator: WD, scribe: SVE, observer: SLT student) to coordinate the meetings according to the following structure: (1) silent

generation of ideas, (2) round robin, (3) clarification and discussion, and (4) voting (see Figure 1).

<Insert Figure 1 about here>

After an initial introduction to the project objectives by the moderator, the first round commenced with participants silently generating ideas by writing down their viewpoints about the use of telepractice for assessment with children on the one hand and for treatment on the other hand, for ten minutes. During the second step (round robin), the moderator invited one participant at a time to share a single idea about the use of telepractice during treatment. Once all participants had given their ideas on the use of telepractice during treatment, the moderator then proceeded to invite one participant at a time to state a single idea about the use of telepractice during assessment, until all participants had given all their ideas about this. This step took 20 minutes to complete. The third step focused on clarifying and grouping similar ideas with consensus from all participants. The discussion focused first on ideas about the use of telepractice during treatment, followed by a discussion about its use during assessment. All ideas were thoroughly discussed to ensure participants' understanding and informed decisions. This step took 55 minutes. Finally, participants were asked to select and rank their five most important barriers from the list of generated statements. They were asked to allocate a number to each selected item using a 5-point scale, with 5 signifying the most important barrier and 1 least important barrier. Participants silently ranked the items and then, one at a time, shared their ranking about the use of telepractice during treatment and then during assessment. This final step took 10 minutes.

After a break, the second round of the NGT meeting about the facilitators was held. The same NGT structure was applied, but the duration of the clarification and discussion step was limited to 25 minutes, as many concepts and ideas related to telepractice with children had already been addressed during the first round. The duration of the other steps remained unchanged from the first round.

Data Analysis

The data analysis combines both quantitative scoring and qualitative coding. First, the points given to each statement during the NGT meetings were used to calculate the priority and popularity indices.

The priority index is the total number of points given to each statement and the popularity index is the number of times statements were chosen. Both indices were used to provide order lists of statements with barriers and facilitators to adopt telepractice mentioned during the meetings by the SLTs and audiologists. Second, all statements generated by both NGT meetings were coded following the updated CFIR domains and constructs. We decided to classify these statements according to the updated CFIR in order to facilitate the subsequent development of an implementation plan. Two investigators (AL and WD) conducted deductive coding using a codebook based on the updated CFIR constructs (Damschröder et al., 2022) to map each statement independently. The coding of each statement was discussed, and when there was any doubt, a third researcher (SVE) was called in to reach consensus on the classification.

The barriers and facilitators listed by the SLTs and audiologists were associated with one of the five main domains of the updated CFIR (Damschroder et al., 2022). In the present study, the five domains relate to the following specific concepts: First, the domain of innovation refers to the use of telepractice in SLT and audiology. Second, the domain of the outer setting includes legislation around telepractice in SLT and audiology, reimbursement rules as well as privacy agreements. Third, the domain of the inner setting refers to the work context of the SLT or audiologist in which the telepractice is applied (e.g. independent practice, rehabilitation center, hospital, hearing center, and also the home context of the client because, during a teletreatment session, the home environment temporarily becomes part of the work context of the therapist). Fourth, the individuals' domain refers to both innovation deliverers (SLTs and audiologists) and innovation recipients (in the present context, the recipients include the client and his immediate environment, i.e., parents or caregivers) in relation to their need, capability, opportunity and motivation. Fifth, the implementation process domain includes all activities and strategies undertaken to include telepractice as an option with some clients.

RESULTS

Barriers to Teletreatment and Tele-Assessment

The NGT with SLTs generated a total of 18 barriers to the implementation of telepractice during treatment and 17 barriers to the implementation of telepractice during assessment. The NGT with audiologists revealed a total of nine barriers to the implementation of telepractice during treatment and ten barriers to the implementation of telepractice during assessment. All barriers were categorized following the five main domains defined in the updated CFIR. In some instances, this resulted in the division of barriers into two parts. For example, when therapists mentioned 'the lack of mastery of the digital tools by the therapist, the caregivers and the child' in a single statement, this was treated as two distinct barriers. In this case, we decided to report 'the lack of mastery of the digital tools by the therapist' among the barriers related to telepractice deliverers, and 'the lack of mastery of the digital tool by the caregivers and the child' among the barriers related to telepractice recipients, by giving both barriers the priority and popularity indices initially assigned. Table 4 gives an overview of the barriers to teletreatment and Table 5 of the barriers to tele-assessment. It was observed that none of the barriers mentioned were related to the domains of innovation or the implementation process, either for tele-assessment or teletreatment. For teletreatment, the therapists mentioned three barriers related to the outer setting domain, eight barriers related to the inner setting domain and 12 barriers related to the individuals' domain (eight to the therapists and four to the clients). The barriers mentioned were fairly similar in the two groups, but the indices of priority and popularity differed from one group to another (note that in some cases the figures do not add up, because the barriers mentioned by both SLTs and audiologists were only accounted for once).

Barriers to Teletreatment according to Audiologists

For teletreatment, the most important barrier mentioned by audiologists (in terms of both priority and popularity indexes) is related to the individuals domain, and more specifically to the capability of the therapist (i.e. the lack of ability to emotionally and physically regulate the behaviour of the child and parents). The second largest barriers identified by audiologists are related to the domain of inner setting (i.e., success of therapy depends on environmental factors; lack of resources). The third

barrier is again related to individuals' domain (telepractice increases therapist's fatigability; being unprepared for this way of delivering therapy; being unprepared for this way of delivering therapy; lack of technological knowledge among parents).

Barriers to Teletreatment according to SLTs

The most important barrier mentioned by the SLTs (in terms of both priority and popularity indexes) was related to the inner setting domain, and more specifically on information technology infrastructure (i.e., instability of the internet connection, lack of image and sound quality; unavailability of an adapted videoconference platform and computer in the client's home). The second largest barrier was related to the therapist's needs (i.e., fear of lack of flexibility and spontaneity during the session; fear of a relational distance; impossibility of physical contact with the client ; limitation of the kinds of feedback that can be given to clients and/or caregiver), on the therapist and client's capability (lack of mastery of the digital tool by the therapist, the caregivers and the child;). The third barrier was related to material and equipment, as part of the inner setting domain (i.e., the time-consuming aspect of adapting and/or designing the therapy sessions and the resources to telepractice). Some barriers related to the outer setting domain were also raised, such as the concern about cybersecurity and confidentiality, as well as the lack of an appropriate legal framework and reimbursement rules. It should be noted that at the time of the study, the rules for reimbursement of telepractice in SLT in Belgium had just been adopted, and not all SLTs seemed to be clear about this new legal framework. Moreover, barriers related to the access to knowledge and information (lack of practice and training in telepractice for the therapist) and to the available resources (non-optimal environmental conditions for the child) were also raised. Finally, other barriers were also mentioned in both therapist groups, without receiving priority points in the vote (see Table 4). <Insert Table 4 about here>

Barriers to Tele-Assessment according to Audiologists

For tele-assessment, the therapists mentioned three barriers related to the outer setting domain, 10 barriers related to the inner setting domain and 14 barriers related to the individuals' domain (nine to the therapists and five to the clients).

The largest barriers mentioned by audiologists in terms of priority and popularity indexes related to the inner setting domain, and more specifically to materials and equipment (i.e., unavailability of standardized and normed assessment tools for use in telepractice) and the resources available in terms of space (on the client's site, i.e., reliable diagnosis depends on environmental factors in children younger than seven years e.g., environmental noise). The highest priority and most popular barriers were then linked to the needs and abilities of the therapist (i.e., more difficult to provide personal guidance from the therapist) and the client (i.e., lack of technological knowledge of caregivers; expectation that an adult must be present). Other concerns were also raised related to the inner setting domain, about the available resources (the expectation to have specific software and hardware as client and therapist) and the instability of the internet connection. Audiologists also mentioned therapist's and client's motivation (part of the individuals' domain) and the lack of reimbursement (part of the outer setting domain).

Barriers to Tele-Assessment according to SLTs

The largest barriers mentioned by SLTs in terms of both priority and popularity indexes were associated to the inner setting domain, and more specifically to materials and equipment (i.e., unavailability of assessment tools that are adapted to videoconference administration) followed by barriers related information technology infrastructure (instability of the internet connection, unavailability of an adapted videoconference platform and computer in the client's home). The barriers that were then prioritised related to the therapist's needs (i.e., concern about the therapeutic alliance; need for physical contact for certain types of assessments; no possibility of using specific equipment required for certain types of evaluation; loss of information about the child's overall functioning and interaction). They mentioned the same barriers as those mentioned for teletreatment concerning the outer setting domain (concern about cybersecurity and

388 confidentiality, the lack of an appropriate framework), and the therapist's and the client's capability
389 (lack of mastery of the digit tools by the therapist, the caregivers and the child; telepractice requires
390 more management of the child's attention, telepractice requires an adapted involvement of the
391 caregiver). Concerns were furthermore raised about available resources (in terms of space, i.e., non-
392 optimal environmental conditions for the child) and compatibility (concern about encountering
393 difficulties in conducting a joint multidisciplinary assessment).
394 Finally, other barriers were also mentioned by both groups of therapists without receiving priority
395 points in the voting (see Table 5). <Insert Table 5 about here>

396 **Facilitators to Teletreatment and Tele-Assessment**

397 The NGT with SLTs generated a total of 17 facilitators (and/or benefits) for the implementation of
398 telepractice during treatment and 13 facilitators for the implementation of telepractice during
399 assessment (Table 6). The NGT with audiologists revealed a total of 7 facilitators (and/or benefits) to
400 both treatment and assessment (in some cases, the figures do not seem to add up, because we did
401 not count twice the facilitators mentioned for both treatment and assessment, or the facilitators
402 mentioned by both SLTs and audiologists). It was observed that none of the facilitators mentioned
403 were directly related to the implementation process domain, either for tele-assessment or
404 teletreatment. All facilitators were categorized following the updated CFIR domains and constructs
405 and Table 6 gives an overview of the facilitators to teletreatment (T) and tele-assessment (A).
406 Therapists listed a range of potential facilitators for their use of telepractice in assessment and
407 treatment. As with the barriers, the facilitators mentioned were fairly similar in both groups, but the
408 indices of priority and popularity differed from one group to another. The therapists mentioned 9
409 facilitators related to the innovation domain, 4 facilitators related to the outer setting domain,
410 sixteen facilitators related to the inner setting domain and 3 facilitators related to the individuals
411 domain.

412 ***Facilitators to Teletreatment and Tele-Assessment according to Audiologists***

All the facilitators mentioned by the audiologists were related to the inner setting domain. The most important facilitators in terms of priority and popularity indexes were associated with the access to knowledge and information (i.e., short knowledge clips, brochures and infographics for client and therapist; telepractice courses for students in training and for audiologists in the field) and available resources: materials and equipment (e.g., availability of resources) as well as funding (reimbursement for client and therapist). Audiologists also mentioned facilitators related to information technology infrastructure (I.e. availability of secure platforms; a platform for audiovisual material).

Facilitators to Teletreatment according to SLTs

Concerning the SLTs, the most important facilitator mentioned for treatment in terms of priority and popularity related to the inner setting domain and more specifically to the information technology infrastructure (i.e., availability of free, simple and secure video conferencing platforms) followed by facilitators linked to the telepractice relative advantage (innovation domain) (i.e. telepractice enables treatment to be conducted when face-to-face is not possible; it reduces the costs and time associated with client and therapist travel; it allows to increase the frequency of sessions and the attendance of the client in sessions; it facilitates the meeting of different stakeholders). The facilitators who were given the most importance afterwards were associated with policies and laws in the outer setting domain (i.e., guidelines for the use of telepractice; a clear legal framework for the use of telepractice in treatment). SLTs also listed important facilitators linked to the inner setting domain: the available resources in terms of materials and equipment (i.e., availability of treatment materials suitable for telepractice use), the access to knowledge and information (being trained to use telepractice, availability of evidence of effectiveness for treatments delivered via telepractice) and the relational connections (creating professional telepractice networks). Finally, some facilitators to telepractice treatment related to the innovation deliverers (in terms of capability; knowing how to use telepractice) and recipients (in terms of motivation: knowing how to use telepractice).

Facilitators to Tele-Assessment according to SLTs

Many of these facilitators were also mentioned by SLTs for assessment, but they were not always given the same priority and popularity indices. Concerning telepractice assessment, the most important facilitator depended on material and equipment (inner setting domain: availability of assessment tools that are validated and adapted for use in telepractice), then on the telepractice relative advantage (innovation domain: telepractice facilitated the observation of the child and his interactions in his own environment; telepractice facilitates the meeting of different stakeholders; telepractice allows remote supervision) and on policies and laws (outer setting domain: having a clear legal framework for the use of telepractice in assessment, guidelines for the use of telepractice. SLTs also listed facilitators related to the inner setting domain, and more precisely to information technology infrastructure (availability of free simple and secure video conferencing platforms) as well as to access to knowledge and information (proof of reliability, validity and good psychometric qualities of the assessment tools used for telepractice evaluation; being trained to use telepractice). Finally, they raised facilitators related to the therapist's capability (knowing how to use telepractice).

<Insert Table 6 about here>

DISCUSSION

Telepractice is a promising alternative format for delivering care in the medical and allied healthcare field, including SLT and audiology. It is, however, not adopted as an alternative delivery model by SLTs and audiologists in their standard. This study therefore investigated the barriers and facilitators encountered by Belgian SLTs and audiologists to the use of telepractice in situations that indicate a preference for telepractice in children up to twelve years. This study was conducted as part of the guideline development process (Van Eerdenbrugh et al., 2023), with the objective to initiate a future implementation plan for the guideline. Two sessions of NGT, one with SLTs and one with audiologists, revealed the barriers and facilitators experienced during tele-assessment and teletreatment which will be addressed (barriers) or deployed (facilitators) in the actual context of clinical practice to support adoption of telepractice in situations that indicate a preference for it. While the two groups of therapists did not necessarily assign the same level of priority or popularity to the barriers and

facilitators they identified, it is notable that many of their responses were similar. All barriers and facilitators were categorised using the updated CFIR, which enabled a comprehensive analysis across the five domains and the identification of constructs requiring tailored implementation strategies.

Barriers

Many of the barriers mentioned by the Belgian therapists align with what was listed by other SLTs or audiologists in the literature. Most of them relate to the inner setting domain and the individuals' domain.

Inner Setting Domain

Concerning the inner setting domain, problems with technology infrastructure (internet connection, the videoconferencing platform, the quality of image and sound) were listed as important barriers and were also mostly frequently cited in the literature (Armoiry et al., 2018; Boisvert & Hall, 2014; Furlong et al., 2021; Govender & Mars, 2017; Grogan-Johnson et al., 2013; Hodge et al., 2019; Law et al., 2021; McCarthy et al., 2019; Molini-Avejonas et al., 2015; Monica et al., 2017; Raman et al., 2019; Tully et al., 2021; Waite et al., 2010a, 2010b). As previously noted in the literature, a limitation of available resources was also raised, more specifically the lack of an adequate space for telepractice (Raman et al., 2019), and the lack of adapted therapeutic or assessment materials (linked to the time-consuming aspect of adapting existing materials). This last barrier was previously mentioned in the literature as impeding therapists' motivation (Grant et al., 2022; Law et al., 2021; McCarthy et al., 2019). Motivation should not be ignored, as it has also been listed by the audiologists in this study as a barrier to the use of telepractice (see below, in the Individuals' Domain: Therapist section). Insufficient access to knowledge and information (insufficient practice or training to implement telepractice) was also mentioned by both groups of therapists. Finally, concerns about compatibility with the workflow have also been mentioned by some Belgian therapists in some specific situations (multidisciplinary assessment), as was the case in the literature in other specific situations (telepractice in school; Grant et al., 2022).

Individuals Domain: Therapist

The barriers related to the inner setting domain likely interact with barriers linked to the individuals' domain: the insufficient telepractice training will probably impede therapist's self-confidence (Grant et al., 2022), as shown by the number of barriers linked to the therapist's needs (concern about therapeutic alliance, fear of a lack of flexibility and spontaneity), capability and motivation. Previous studies have indeed shown that therapists need to be familiar with the technologies and must accept this new healthcare delivery format before they can engage in telepractice (Law et al., 2021; McCarthy et al., 2019; Molini-Avejonas et al., 2015). It's likely that many of the barriers mentioned by the Belgian therapists in this study could be extinguished by implementation strategies that focus on training and educating (Waltz et al., 2015). Eventually, certain barriers related to the Belgian therapists' needs, which are difficult to circumvent in certain specific situations, are unlikely to find a straightforward solution. This is particularly true for the lack of physical contact with the client during telepractice and the impossibility of using specific equipment required for certain types of evaluation (as is the case for oro-myo-functional or swallowing therapies and assessments, for example). Faced with this type of problem, previous studies have introduced the presence of a professional in the room with the patient so that a certain number of technical procedures can be carried out and the results transmitted to the specialist present by telepractice (Burns et al., 2016). Such a solution is only possible if it is compatible with the workflow of the inner setting, and therefore probably not possible or preferable in all cases.

Individuals Domain: Child and Caregivers

Other barriers also relate to the child and /or his caregiver's capability, opportunity and motivation. Previous literature has also identified a lack of clients' capability as impeding the use of telepractice, such as their lack of technological knowledge (Grogan-Johnson et al., 2013; Law et al., 2021), and the need for an increased involvement of the caregiver and their ability to manage the child's attention and behaviour (Grogan-Johnson et al., 2013; Tully et al., 2021; Waite et al., 2010b). However, these barriers were not rated as the most important during the votes, which probably indicates that therapists consider them to be manageable.

517 ***Outer Setting Domain***

518 Finally, some barriers are linked to the outer setting domain, such as policies and laws. The need for
519 an appropriate legal framework and reimbursement rules was mentioned by the Belgian therapists.
520 Previous data indeed showed that concerns about legal issues are significant barriers to the use of
521 telepractice (Tully et al., 2021). At the time the NGT were conducted, a guideline had been
522 established for telepractice with children up to the age of 12 (Van Eerdenbrugh et al., 2023) and
523 telepractice in SLT and audiology had just received full reimbursement agreement. Nevertheless, a
524 previous study showed that an additional barrier could be the fact that reimbursement practices do
525 not necessarily compensate for the workload associated with the use of telepractice (McCarthy et al.,
526 2019). It is likely that as long as the telepractice is seen as an additional workload and/or cost,
527 reimbursement for telepractice sessions equivalent to face-to-face sessions may not sufficiently
528 compensate for the time and investment in the technology (Grant et al., 2022; McCarthy et al., 2019;
529 Tully et al., 2021).

530 **Facilitators**

531 Faced with these various barriers, the Belgian therapists have also identified multiple facilitators that
532 would enable them to implement telepractice.

533 ***Innovation Domain***

534 A number of these facilitators depend on the innovation domain in itself: the relative advantages of
535 using telepractice as compared to traditional practice. These advantages, including the reduced time
536 and costs for therapists and clients, the possibility to conduct a treatment session when the client is
537 sick, and the better insight into the child's environment have previously been listed in the literature
538 as being important facilitators (Barr et al., 2019; Blaiser et al., 2013; Ellison et al., 2021; Law et al.,
539 2021; McCarthy et al., 2019; Molini-Avejonas et al., 2015; Sheikhtaheri & Kermani, 2018; Sutherland
540 et al., 2018; Tully et al., 2021). We can therefore assume that if the therapists and clients become
541 sufficiently trained and informed, these benefits will offset the disadvantages of implementing
542 telepractice and encourage therapists and clients to do so.

Inner Setting Domain

Important facilitators for Belgian therapists are linked to the inner setting domain and refer to the increased access to knowledge and information: the introduction of knowledge clips, brochures and courses, the training to use telepractice, and the availability of evidence of effectiveness for teletreatment and reliability for tele-assessment. The importance of providing training and information on equipment and procedures to children, therapists or parents was also mentioned several times in previous literature (Campbell et al., 2020; Grant et al., 2022; Tully et al., 2021). This will be of prime importance in our implementation strategies to coach therapists and make them aware that telepractice remains relevant, even outside periods of confinement. This will also directly increase their capabilities and therefore have an impact on the facilitators of the individuals' domain (see below). Other facilitators in the inner setting domain depend on available and funded resources (materials and tools that are validated and adapted for use in telepractice), as well as on information technology infrastructure. The availability of reliable and constant internet access was indeed underlined by the literature as an important facilitator to access information and services for families living in rural areas (Barr et al., 2019).

Individuals Domain

The Belgian therapists underlined facilitators related to the therapists' capability (knowing how to use telepractice), that may be related to their future commitment to telepractice (e.g., McCarthy et al., 2019). They also mentioned facilitators associated to the client's motivation, such as the attractiveness of the digital tool. As shown in other studies, the clients' (and their families') positive experience of telepractice is a facilitator to its use (Molini-Avejonas et al., 2015).

Outer Setting Domain

At the time the NGT was conducted, the Belgian therapists mentioned the need for a clear legal framework and guidelines for the use of telepractice. As already stated, since then, all telepractice procedures have been reimbursed and guidelines for the use of telepractice in SLT and audiology in children up to 12 years are freely available to clinicians (Van Eerdenbrugh et al., 2023).

Many Different Realities

For certain topics, therapists seemed ambivalent about their status as a barrier or a facilitator. For example, when it comes to the possibility of bringing together different stakeholders, some therapists see telepractice as difficult to integrate into the workflow of their work environment, while others see telepractice as a facilitator for bringing together the different stakeholders in a multidisciplinary treatment (as stated in Tully et al., 2021). This underlines the importance of taking into account the realities of different therapists when establishing strategies for implementing this new way of delivering care. In particular, it will be important to remember that telepractice does not have to be an all-or-nothing approach, but that its hybrid application, alternating face-to-face and remote sessions, can also be a good solution for adapting to the realities of each individual.

A specific benefit that was not mentioned by therapists, even though it is well documented in the literature (Barr et al., 2019; Grant et al., 2022; Jacups & Kinchin, 2021; Law et al., 2021; McCarthy et al., 2019; Molini-Avejonas et al., 2015), is the fact that telepractice provides easier access to specialists. Even if it may seem surprising at first sight, Belgium is a small country and access to specialist therapists is perhaps less of a problem than it might be in other countries. This is likely the reason why this facilitator was not mentioned by Belgian therapists.

Future Work

Now that the guideline exists (Van Eerdenbrugh et al., 2023), we will need to develop strategies to help as many therapists as possible implement this new practice when it may be beneficial and relevant for their clients. This process requires the involvement of stakeholders to define specific implementation strategies and decide how to evaluate the success of implementation.

Strengths and Limitations of the Study

This study has several methodological strengths that support the integrity and relevance of the findings. First, although not all therapists had experience with telepractice, this variation reflects the current reality of Belgian clinical practice, thereby enhancing representativeness. Second, the study deliberately included both French- and Dutch-speaking professionals, which ensured that the

perspectives of Belgium's two main language communities were represented and that participants could contribute in their preferred language. Third, the convergence of responses across these groups, despite the language separation, further strengthens confidence in the robustness of the findings. Fourth, the barriers and facilitators identified were largely consistent with those described in the international literature, reinforcing the external validity of the results. Fifth, the consistency of responses across clinical phases (e.g., assessment and treatment) points to the internal coherence of the data. Finally, the analytic approach combined the participant-driven quantification produced through the NGT process with the structured interpretation provided by the updated CFIR. This innovative integration ensured that the analysis remained grounded in participant priorities while benefiting from an established implementation science framework.

Despite these strengths, several limitations must be acknowledged. First, the number of participants per group was limited, and late withdrawals further reduced the sample size. Also, the paediatric caseloads and the work contexts of the participating therapists varied across SLT and audiology domains. This choice was important in order to describe the Belgian healthcare context as a whole, but more setting specific conclusions cannot be drawn. Second, not all interviewed therapists had prior experience with telepractice, which may limit the barriers identified compared to those reported by more experienced practitioners. This choice, however, was intended to ensure that the views collected reflect the current population of Belgian therapists in the field. Third, the bilingual design, while ensuring inclusiveness, also meant that SLTs and audiologists were consulted in separate groups, which may have limited cross-professional interactions. Since legislation, care practices, and reimbursement are identical for French- and Dutch-speaking therapists in Belgium, major differences in responses were not expected; the similarity of reported barriers and facilitators supports the validity of the ideas collected.

Fourth, the NGT method itself can lead to facilitators being closely tied to reported barriers, as participants often identify missing elements when reflecting on obstacles. The fact that most of the barriers and facilitators mentioned are similar to those mentioned in the literature is however

reassuring in terms of the representativeness of the participants and the procedure used. Fifth, due to time constraints, audiologists discussed facilitators for both assessment and treatment together; however, their responses likely would not have differed if addressed separately, as SLTs reported similar facilitators for both contexts. Sixth, categorizing some statements within the updated CIFR domains was not always straightforward. Indeed, a facilitator/benefit such as the fact that 'telepractice allows observation and practice in the child's environment' can be considered as both an opportunity for the telepractice deliverer (individuals domain) and an innovation relative advantage (innovation domain). We made choices that corresponded best to the discussions arising from the NGT sessions so as not to mention the same statement twice in a table. These statements are generally both facilitators and benefits to the use of telepractice. Seventh, while the updated CFIR often applies a –2 to +2 scoring system to indicate the valence and strength of determinants (Damschroder & Lowery, 2013; Damschroder et al., 2022), we opted for the popularity and priority indices traditionally used in NGT studies (McMillan et al., 2014). These indices allowed us to reflect both the frequency with which statements were selected by participants and the relative importance they attributed to each barrier or facilitator. The decision to use the updated CFIR was taken after data collection, in order to thematically organise and interpret the statements within a well-established implementation framework. This approach ensured that our analysis remained grounded in participants' priorities while still enabling structured interpretation using the updated CFIR. Eighth, because we used classic NGT, the data emphasize the identification and prioritization of key ideas rather than the collection of detailed, context-rich descriptions. This limitation has been described in the literature, where NGT is recognized as efficient for generating and ranking ideas but less suitable for producing in-depth qualitative insights (Delbecq & Van de Ven, 1971; McMillan et al., 2016). Generating more comprehensive insights would require additional methods, such as focus groups or interviews. Finally, regarding transferability, the findings are embedded within the Belgian healthcare context, including legislation, professional roles, and reimbursement systems. As such,

while the results are highly relevant within Belgium, caution is needed when applying them to other countries or healthcare systems with different organizational structures or regulatory frameworks.

Ethical Considerations

During the conduct of this study, no major ethical dilemmas arose, but some challenges are worth noting. For instance, bringing together SLTs and audiologists from different language communities required careful facilitation to ensure that all participants could contribute in their preferred language without disadvantage. This decision, although pragmatic, also raised the question of whether separating groups limited interprofessional dialogue. Future research could address this by exploring bilingual or mixed-language formats supported by professional translation, while still safeguarding the comfort and autonomy of participants. In addition, the structured nature of the NGT, while promoting fairness and equal participation, limited opportunities for more in-depth exploration of sensitive topics. Researchers planning similar studies may therefore consider combining NGT with follow-up interviews or focus groups to balance democratic consensus with deeper individual reflection.

Conclusion

Belgian therapists mentioned a number of barriers to the use of telepractice, most of which relate to the inner setting domain (in particular, the quality of the technological infrastructure, availability of adapted resources, access to knowledge and information), the individuals' domain (mainly linked to the training and education of therapists and clients) and the outer setting domain (e.g. legal framework, reimbursement scheme and guideline) of the updated CFIR. In the face of these barriers, the therapists also raised many facilitators linked to the same inner setting and individuals' domains, but also, very encouragingly, to the advantages of telepractice itself. Moreover, the evolution of the legal framework in Belgium and the presence of the recently developed guideline are important steps towards the adoption of telepractice. These facilitators and barriers should guide the tailoring of the implementation strategies in a next phase, such as developing more adapted material, developing professional networks for collaborative support, and improving information and training

for therapists, while including them in the process of reflection, planning and implementation to promote the uptake of telepractice by SLTs and audiologists.

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DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are available within the article (Tables 4 to 6).

REFERENCES

Armoiry, X., Sturt, J., Phelps, E. E., Walker, C. L., Court, R., Taggart, F., ... & Atherton, H. (2018). Digital clinical communication for families and caregivers of children or young people with short-or long-term conditions: rapid review. *Journal of medical Internet research*, *20*(1), e5. https://doi.org/10.2196/jmir.7999

Balas, E. A., & Boren, S. A. (2000). Managing clinical knowledge for health care improvement. *Yearbook of medical informatics*, *9*(01), 65-70. PMID: 27699347

Barr, M., Dally, K., & Duncan, J. (2019). Service accessibility for children with hearing loss in rural areas of the United States and Canada. *International Journal of Pediatric Otorhinolaryngology, 123*, 15-21. https://doi.org/10.1016/j.ijporl.2019.04.028

Blaiser, K. M., Behl, D., Callow-Heusser, C., & White, K. R. (2013). Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. *International Journal of Telerehabilitation*, *5*(2), 3. https://doi.org/10.5195/ijt.2013.6129

Boisvert, M., & Hall, N. (2014). The use of telehealth in early autism training for parents: A scoping review. *Smart Homecare Technology and Telehealth*, *2*, 19-27. https://doi.org/10.2147/SHTT.S45353

Bridgman, K., Onslow, M., O'Brian, S., Jones, M., & Block, S. (2016). Lidcombe Program webcam treatment for early stuttering: A randomized controlled trial. *Journal of Speech, Language, and Hearing Research, 59*(5), 932-939. https://doi.org/10.1044/2016_jslhr-s-15-0011

Burns, C. L., Ward, E. C., Hill, A. J., Phillips, N., & Porter, L. (2016). Conducting real-time videofluoroscopic swallow study via telepractice: a preliminary feasibility and reliability study. *Dysphagia*, *31*, 473-483. https://doi.org/10.1007/s00455-016-9701-2

Cameron, C. A., & Hutchison, J. (2009). Telephone-mediated communication effects on young children's oral and written narratives. *First Language, 29*(4), 347-371. https://doi.org/10.1177/014272309105313

Campbell, J., Theodoros, D., Hartley, N., Russell, T., & Gillespie, N. (2020). Implementation factors are neglected in research investigating telehealth delivery of allied health services to rural children: A scoping review. *Journal of Telemedicine and Telecare, 26*(10), 590-606. https://doi.org.10.1177/1357633x19856472

Cancer, A., Sarti, D., De Salvatore, M., Granocchio, E., Chieffo, D. P. R., & Antonietti, A. (2021). Dyslexia telerehabilitation during the COVID-19 pandemic: Results of a rhythm-based intervention for reading. *Children, 8*(11), 1011. https://doi.org/10.3390/children8111011

Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, *7*(1), 37. https://doi.org/10.1186/1748-5908-7-37

Carretero, C., Carbonnel, F., Ferrante, M., Knudsen, T., Van Lent, N., Lobo, A. J., ... & Oliva, S. (2021). Monitoring established Crohn's disease with pan-intestinal video capsule endoscopy in Europe: Clinician consultation using the nominal group technique. *Current Medical Research and Opinion*, *37*(9), 1547-1554. https://doi.org/10.1080/03007995.2021.1940910

Damschroder, L. J., & Lowery, J. C. (2013). Evaluation of a large-scale weight management program using the consolidated framework for implementation research (CFIR). *Implementation Science*, *8*(1), 51. https://doi.org/10.1186/1748-5908-8-51

724 Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009).
725 Fostering implementation of health services research findings into practice: a consolidated
726 framework for advancing implementation science. Implementation science, 4(1), 50.
727 Damschroder, L. J., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. (2022). The updated
728 Consolidated Framework for Implementation Research based on user feedback. *Implementation*
729 *science*, *17*(1), 75. https://doi.org/10.1186/s13012-022-01245-0
730 Delbecq, A. L., & Van de Ven, A. H. (1971). A group process model for problem identification and
731 program planning. *The journal of applied behavioral science*, *7*(4), 466-492.
732 https://doi.org/10.1177/002188637100700404
733 Eccles, M. P., & Mittman, B. S. (2006). Welcome to Implementation Science. *Implementation Science*,
734 *1*(1), 1. https://doi.org/10.1186/1748-5908-1-1
735 Ellison, K. S., Guidry, J., Picou, P., Adenuga, P., & Davis III, T. E. (2021). Telehealth and autism prior to
736 and in the age of COVID-19: A systematic and critical review of the last decade. *Clinical Child and*
737 *Family Psychology Review, 24*(3), 599-630. https://doi.org/10.1007/s10567-021-00358-0
738 Furlong, L., Serry, T., Bridgman, K., & Erickson, S. (2021). An evidence-based synthesis of instructional
739 reading and spelling procedures using telepractice: A rapid review in the context of COVID-19.
740 *International Journal of Language & Communication Disorders, 56*(3), 456-472.
741 https://doi.org/10.1111/1460-6984.12619
742 Goehring, J. L., & Hughes, M. L. (2017). Measuring sound-processor threshold levels for pediatric
743 cochlear implant recipients using conditioned play audiometry through telepractice. *Journal of*
744 *Speech, Language, and Hearing Research, 60*(3), 732-740. https://doi.org/10.1044/2016_jslhr-h-
745 16-0184
746 Govender, S. M., & Mars, M. (2017). The use of telehealth services to facilitate audiological
747 management for children: A scoping review and content analysis. *Journal of Telemedicine and*
748 *Telecare, 23*(3), 392-401. https://doi.org/10.1177/1357633x16645728

Grant, J., Green, L., & Mason, B. (2003). Basic research and health: A reassessment of the scientific basis for the support of biomedical science. *Research Evaluation*, *12*(3), 217–224. https://doi.org/10.3152/147154403781776618

Grant, C., Jones, A., & Land, H. (2022). What are the perspectives of speech pathologists, occupational therapists and physiotherapists on using telehealth videoconferencing for service delivery to children with developmental delays? A systematic review of the literature. *Australian Journal of Rural Health, 30*(3), 321-336. https://doi.org/10.1111/ajr.12843

Grogan-Johnson, S., Schmidt, A. M., Schenker, J., Alvares, R., Rowan, L. E., & Taylor, J. (2013). A comparison of speech sound intervention delivered by telepractice and side-by-side service delivery models. *Communication Disorders Quarterly, 34*(4), 210-220. https://doi.org/10.1177/1525740113484965

Guglani, I., Sanskriti, S., Joshi, S. H., & Anjankar, A. (2023). Speech-language therapy through telepractice during COVID-19 and its way forward: A scoping review. *Cureus*, *15*(9). https://doi.org/10.7759/cureus.44808

Harvey, N., & Holmes, C. A. (2012). Nominal group technique: an effective method for obtaining group consensus. *International journal of nursing practice*, *18*(2), 188-194. https://doi.org/10.1111/j.1440-172x.2012.02017.x

Hewitt, K.C., & Loring, D.W. (2020). Emory university telehealth neuropsychology development and implementation in response to the COVID-19 pandemic*. The Clinical Neuropsychologist*, *34*, 1352-66. https://doi.org/10.1080/13854046.2020.1791960

Hodge, M. A., Sutherland, R., Jeng, K., Bale, G., Batta, P., Cambridge, A., ... & Silove, N. (2019). Literacy assessment through telepractice is comparable to face-to-face assessment in children with reading difficulties living in rural Australia. *Telemedicine and e-Health, 25*(4), 279-287. https://doi.org/10.1089/tmj.2018.0049

Jacups, S. P., & Kinchin, I. (2021). A rapid review of evidence to inform an ear, nose and throat service delivery model in remote Australia. *Rural and Remote Health, 21*(1). https://doi.org/10.22605/rrh5611

Joanna Briggs Institute (2021). Critical appraisal tool. https://jbi.global/critical-appraisal-tools (accessed on 8 December, 2022)

Lau, J. S., Lai, S. M., Ip, F. T., Wong, P. W., Team, W. H., Servili, C., ... & Brown, F. L. (2022). Acceptability and feasibility of the World Health Organization's Caregiver Skills Training Programme (WHO CST) delivered through eLearning, videoconferencing, and in-person hybrid modalities in Hong Kong. *Frontiers in Psychiatry, 1855.* https://doi.org/10.3389/fpsyt.2022.915263

Law, J., Dornstauder, M., Charlton, J., & Gréaux, M. (2021). Tele-practice for children and young people with communication disabilities: Employing the COM-B model to review the intervention literature and inform guidance for practitioners. *International Journal of Language & Communication Disorders*, *56*(2), 415-434. https://doi.org/10.1111/1460-6984.12592

McCarthy, M., Leigh, G., & Arthur-Kelly, M. (2019). Telepractice delivery of family-centred early intervention for children who are deaf or hard of hearing: A scoping review. *Journal of Telemedicine and Telecare, 25*(4), 249-260. https://doi.org/10.1177/1357633x18755883

McGill, M., Noureal, N., & Siegel, J. (2019). Telepractice treatment of stuttering: A systematic review. *Telemedicine and e-Health, 25*(5), 359-368. https://doi.org/10.1089/tmj.2017.0319

McMillan, S., Kelly, F., Sav, A., Kendall, E., King, M., Whitty, J., & Wheeler, A. (2014). Using the Nominal Group Technique: How to analyse across multiple groups. *Health Services and Outcomes Research Methodology*, *14*, 92–108. https://doi.org/10.1007/s10742-014-0121-1

McMillan, S. S., King, M., & Tully, M. P. (2016). How to use the nominal group and Delphi techniques. *International journal of clinical pharmacy*, *38*, 655-662. https://doi.org/10.1007/s11096-016-0257-x

798 Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., Walker, A., & "Psychological Theory"
799 Group. (2005). Making psychological theory useful for implementing evidence based practice: A
800 consensus approach. *Quality & Safety in Health Care*, *14*(1), 26–
801 33. https://doi.org/10.1136/qshc.2004.011155
802 Molini-Avejonas, R. D., Rondon-Melo, S., de La Higuera Amato, C. A., & Samelli, A. G. (2015). A
803 systematic review of the use of telehealth in speech, language and hearing sciences. *Journal of*
804 *Telemedicine and Telecare, 21*(7), 367-376. https://doi.org/10.1177/1357633x15583215
805 Monica, S. D., Ramkumar, V., Krumm, M., Raman, N., Nagarajan, R., & Venkatesh, L. (2017). School
806 entry level tele-hearing screening in a town in South India–Lessons learnt. *International Journal of*
807 *Pediatric Otorhinolaryngology, 92,* 130-135. https://doi.org/10.1016/j.ijporl.2016.11.021
808 Morris, Z. S., Wooding, S., & Grant, J. (2011). The answer is 17 years, what is the question:
809 Understanding time lags in translational research. *Journal of the Royal Society of Medicine*,
810 *104*(12), 510–520. https://doi.org/10.1258/jrsm.2011.110180
811 Nilsen, P. (Ed.). (2024). Implementation Science: Theory and Application (1st ed.). Routledge.
812 https://doi.org/10.4324/9781003318125
813 Nilsen, P. (2015). Making sense of implementation theories, models and frameworks.
814 *Implementation Science: IS*, *10*, 53. https://doi.org/10.1186/s13012-015-0242-0
815 Peters, S., Bussières, A., Depreitere, B., Vanholle, S., Cristens, J., Vermandere, M., & Thomas, A.
816 (2020). Facilitating Guideline Implementation in Primary Health Care Practices. *Journal of Primary*
817 *Care &Amp; Community Health*, *11*, 215013272091626.
818 https://doi.org/10.1177/2150132720916263
819 Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021). Evaluating the use of telepractice to deliver
820 pediatric feeding assessments. *American Journal of Speech-Language Pathology, 30*(4), 1686-
821 1699. DOI: 10.1097/00001786-200410000-00002 10.10.1044/2021_ajslp-20-00323
822 Raman, N., Nagarajan, R., Venkatesh, L., Monica, D. S., Ramkumar, V., & Krumm, M. (2019). School-
823 based language screening among primary school children using telepractice: A feasibility study

from India. *International Journal of Speech-Language Pathology, 21*(4), 425-434. https://doi.org/10.1080/17540507.2018.1493142

Rycroft-Malone, J. (2004). The PARIHS framework—a framework for guiding the implementation of evidence-based practice. *Journal of nursing care quality*, *19*(4), 297-304. DOI: 10.1097/00001786-200410000-00002

Sheikhtaheri, A., & Kermani, F. (2018). Telemedicine in Diagnosis, Treatment and Management of Diseases in Children. *eHealth*, 148-155. https://doi.org/10.29086/jisfteh.6.es1

Sutherland, R., Trembath, D., & Roberts, J. (2018). Telehealth and autism: A systematic search and review of the literature. *International Journal of Speech-Language Pathology, 20*(3), 324-336. https://doi.org/10.1080/17549507.2018.1465123

Sweeney, T., Hegarty, F., Powell, K., Deasy, L., Regan, M. O., & Sell, D. (2020). Randomized controlled trial comparing Parent Led Therapist Supervised Articulation Therapy (PLAT) with routine intervention for children with speech disorders associated with cleft palate. *International Journal of Language & Communication Disorders, 55*(5), 639-660. https://doi.org/10.1111/1460-6984.12542

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, *19*(6), 349–357. https://doi.org/10.1093/intqhc/mzm042

Tully, L., Case, L., Arthurs, N., Sorensen, J., Marcin, J. P., & O'Malley, G. (2021). Barriers and facilitators for implementing paediatric telemedicine: rapid review of user perspectives. *Frontiers in Pediatrics*, 180. https://doi.org/10.3389/fped.2021.630365

Van Eerdenbrugh, S., D'haenens, W., Leysen, H., Leclercq, A.-L., Vanden Bempt, F., Bouckaert, L., & Vanderauwera, J. (2023). *Guideline: Telepractice for speech-language pathology and audiology with children ≤12 years.* Collaboration between the Federal Government and the Evikey network, UCLouvain, ULiège, Artevelde College of Applied Sciences and Thomas More University of Applied

Sciences. https://thomasmore.be/en/guideline-telepractice-speech-language-pathology-and-audiology

Wainer, A. L., Arnold, Z. E., Leonczyk, C., & Valluripalli Soorya, L. (2021). Examining a stepped-care telehealth program for parents of young children with autism: a proof-of-concept trial. *Molecular Autism, 12*(1), 32. https://doi.org/10.1186/s13229-021-0443-9

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010a). Assessment of children's literacy through an Internet-based telehealth system. *Telemedicine and e-Health, 16*(5), 564-575. https://doi.org/10.1089/tmj.2009.0161

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010b). Internet-based telehealth assessment of language using the CELF–4. *Language, Speech, and Hearing Services in Schools, 41*(4), 445-458. https://doi.org/10/1044/0161-1461(2009/08-0131)

Waltz, T., Powell, B., Matthieu, M., Damschroder, L., Chinman, M., Smith, J., Proctor, E., & Kirchner, J. (2015). Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: Results from the Expert Recommendations for Implementing Change (ERIC) study. Implementation Science, 10, 1–8. https://doi.org/10.1186/s13012-015-0295-0

World Health Organization & International Telecommunication Union (2022). WHO-ITU global standard for accessibility of telehealth services. Geneva. Licence: CC BY-NC-SA 3.0 IGO.

TABLE 1. Overview of the barriers to the use of telepractice in SLT and audiology listed in the literature according to the updated CFIR model.

Domain	Construct	Barriers	References
OUTER SETTING	**POLICIES & LAWS = The degree to which legislation on telepractice in SLT and audiology, reimbursement rules, privacy policy agreements, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the telepractice.**		
		Reimbursement practices do not compensate for the use of telepractice	McCarthy et al. (2019)
		Professionals have concerns around legal issues	Tully et al. (2021)
INNER SETTING	**STRUCTURAL CHARACTERISTICS > INFORMATION TECHNOLOGY INFRASTRUCTURE = The degree to which technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting.**		
		Problems with the videoconferencing programme, the audio, the headphones, the webcam or the Internet connection affect telepractice sessions	Armoiry et al. (2018); Barr et al. (2019); Boisvert & Hall (2014); Furlong et al. (2021); Govender & Mars (2017); Grogan-Johnson (2013); Hodge et al. (2019); Law et al. (2021); McCarthy et al. (2019); Molini-Avejonas et al. (2015); Monica et al. (2017); Raman et al. (2019); Tully et al. (2021); Waite et al. (2010a, 2010b)
	COMPATIBILITY = The telepractice fits with workflows, systems, and processes.		
		Implementing telepractice in schools requires an adult to be present with the child, which is not always possible	Grant et al. (2022)
	AVAILABLE RESOURCES > FUNDING = Funding is available to implement and deliver the telepractice.		
		Technological equipment is a cost for therapists	Grant et al. (2022) ; McCarthy et al. (2019)
	AVAILABLE RESOURCES > SPACE = Physical space is available to implement and deliver the telepractice.		
		Telepractice requires a quiet place	Raman et al. (2019)

	ACCESS TO KNOWLEDGE AND INFORMATION = The degree to which guidance and/or training is accessible to implement and deliver the telepractice.	
	Therapists may lack confidence due to lack of telepractice training	Grant et al. (2022)
INDIVIDUALS	**INNOVATION DELIVERERS > CAPABILITY = The therapists have interpersonal competence, knowledge and skills to deliver telepractice**	
	Professionals need to be familiar with the technologies available before they can engage in telepractice	Law et al. (2021); McCarthy et al. (2019)
	Therapists must accept this new health care delivery format	Molini-Avejonas et al. (2015)
	Telepractice sessions are less personalised than traditional treatment sessions	McGill et al. (2019)
	INNOVATION DELIVERERS > OPPORTUNITY = The therapists have availability, scope, and power to deliver telepractice.	
	Telepractice increases administrative burden	Tully et al. (2021)
	INNOVATION DELIVERERS > MOTIVATION = The therapists are committed to delivering telepractice.	
	Adapting equipment and technology is seen as an additional workload for therapists	Grant et al. (2022); Law et al. (2021); McCarthy et al. (2019)
	INNOVATION RECIPIENTS > NEED = The clients and/or caregivers have deficits related to well-being, or personal fulfilment, which will be addressed by implementation and/or delivery of telepractice.	
	A parent wants hybrid therapy because direct contact with the therapist is still important to them	McGill et al. (2019)
	INNOVATION RECIPIENTS > CAPABILITY = The clients and/or caregivers have interpersonal competence, knowledge, and skills to receive telepractice.	
	It may be difficult to keep the child at the optimum angle for the camera	Grogan-Johnson et al. (2013); Waite et al. (2010b)
	It may be difficult for the child to manipulate the computer mouse	Grogan-Johnson et al. (2013)

Children need help to use technical equipment	Law et al. (2021)
Parents may have concerns about the responsibility of describing their child's condition in the absence of a face-to-face examination	Tully et al. (2021)
INNOVATION RECIPIENTS > MOTIVATION = The clients and/or caregivers are committed to receiving telepractice.	
Technical problems have reduced a child's motivation	Raman et al. (2019)

TABLE 2. Overview of the facilitators and benefits to the use of telepractice in SLT and audiology listed in the literature according to the updated CFIR model.

CFIR Domain	Construct	Facilitators	References
INNOVATION	**INNOVATION RELATIVE ADVANTAGE = Telepractice is better than current practice.**		
		Telepractice reduces the travel time and/or costs for clients and professionals compared to traditional practice	Barr et al. (2019); Blaiser et al. (2013); McCarthy et al. (2019); Molini-Avejonas et al. (2015); Tully et al. (2021)
		Telepractice is more cost-effective than in-home practice	Ellison et al. (2021); Molini-Avejonas et al. (2015); Sutherland et al. (2018); Sheikhtaheri & Kermani (2018); Tully et al. (2021)
		Telepractice improves access to specialised services for children	Barr et al. (2019); Grant et al. (2022); Jacups & Kinchin (2021); Law et al. (2021); McCarthy et al. (2019); Molini-Avejonas et al. (2015)
		Telepractice prevents exposure of a sick child	Blaiser et al. (2013); McCarthy et al. (2019); Tully et al. (2021)
		Therapists gain a better insight into the child's environment and additional health conditions through telepractice	Law et al. (2021)
INNER SETTING	**STRUCTURAL CHARACTERISTICS > INFORMATION TECHNOLOGY INFRASTRUCTURE = Technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting.**		
		Reliable and constant Internet access could improve access to information and services for families living in rural areas.	Barr et al. (2019)
	COMPATIBILITY = **Telepractice fits with workflows, systems, and processes.**		
		Telepractice offers opportunities for greater involvement of the child's cultural and community support networks (e.g. availability of an interpreter)	Law et al. (2021)
		Telepractice is seen by families as having the potential to streamline access to multidisciplinary care	Tully et al. (2021)
		Telepractice enables an improved communication between families and clinical staff	Tully et al. (2021)
		Telepractice enables the strengthening of relationships between therapists and other disciplines	Tully et al. (2021)

	ACCESS TO KNOWLEDGE & INFORMATION = Guidance and/or training is accessible to implement and deliver the telepractice.	
	Provide training or information on equipment and procedures to children, therapists or parents	Campbell et al. (2020); Grant et al. (2022); Law et al. (2021); Tully et al. (2021)
	Clearly disseminating the objectives of ICT services can help to implement telepractice	Tully et al. (2021)
INDIVIDUALS	**IMPLEMENTATION LEADS = Individuals who lead efforts to implement the innovation**	
	Developing telehealth champions can help integrate telepractice into existing organisations	Tully et al. (2021)
	INNOVATION DELIVERERS > CAPABILITY = The therapists have interpersonal competence, knowledge, and skills to deliver telepractice.	
	Giving instructions and conducting preliminary tests can help users implement telepractice	Campbell et al. (2020)
	INNOVATION DELIVERERS > OPPORTUNITY = The therapists have availability, scope, and power to deliver telepractice.	
	Telepractice encourages a higher level of focus on the family and/or the client	McCarthy et al. (2019); Molini-Avejonas et al. (2015)
	INNOVATION DELIVERERS > MOTIVATION = The therapists are committed to delivering telepractice.	
	Therapists believe that telepractice reduces travel time, allows better access to specialist care, improves family-centred care, facilitates respect for privacy and is easier for family organisation	Grant et al. (2022)
	Therapists believe that families are more relaxed in their home environment and feel more supported in implementing therapeutic techniques at home	Grant et al. (2022)
	INNOVATION RECIPIENTS > OPPORTUNITY = The clients and/or caregivers have availability, scope and power to receive telepractice.	
	Caregivers perceive telepractice as more compatible with professional constraints and family commitments	Grant et al. (2022); Law et al. (2021); McCarthy et al. (2019); Tully et al. (2021)
	Telepractice makes it easier to transfer therapy to the natural environment	Grant et al. (2022); McGill et al. (2019)
	INNOVATION RECIPIENTS > Motivation = The clients and/or caregivers are committed to receiving telepractice.	
	Families enjoy telepractice	Molini-Avejonas et al. (2015)
	TEAMING = Join together, intentionally coordinating and collaborating on interdependent tasks, to implement the telepractice.	

IMPLEMENTATION PROCESS	Involving staff in the planning and implementation can help to integrate telepractice into existing organisations	Tully et al. (2021)

Table 3. Professional experience of the SLTs and audiologists (AUD) involved in both separate NGT

Expert	Work setting	Field of expertise	Years of experience	Experience with telepractice
SLT1	Hospital setting	Acquired and developmental neurological disorders	6 to 10 years	No
SLT2	Special education school and private practice	Neurodevelopmental disorders (e.g., autism spectrum disorder, intellectual disability, developmental coordination disorders), developmental language disorders, speech disorders	6 to 10 years	Yes
SLT3	Rehabilitation centre	Hearing disorders	6 to 10 years	No
SLT4	Multidisciplinary rehabilitation centre	Developmental language disorders, speech disorders, written language disorders, dyscalculia	1 to 5 years	Yes
SLT5	Hospital setting	Swallowing disorders, myofunctional disorders and voice disorders.	11 to 15 years	Yes
AUD1	Private practice	Auditory training	6 to 10 years	Yes
AUD2	Private practice and hearing centre	Fitting of hearing aids	11 to 15 years	Yes
AUD3	Rehabilitation centre	Auditory training	26 to 30 years	Yes
AUD4	Hospital setting	Fitting of cochlear implants, Clinical Audiologist	21 to 25 years	Yes
AUD5	Private practice, hearing centre and Implant firm	Fitting of hearing aids, fitting of cochlear implants	21 to 25 years	No
AUD6	Private practice Lecturer at University college	Auditory training	16 to 20 years	Yes

SLT = Speech and Language Therapist, AUD = Audiologist

Table 4. Overview of the statements regarding the barriers to teletreatment generated during the NGT with SLTs and NGT with audiologists *(AUD, in italic)* according to the updated CFIR model, with their respective priority and popularity indexes.

Domain	Construct	Statements	SLT or AUD	Priority index	Popularity index
OUTER SETTING	**POLICIES & LAWS = The degree to which legislation on telepractice in SLT and audiology, reimbursement rules, privacy policy agreements, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the telepractice.**				
		Lack of an appropriate legal framework and lack of reimbursement	SLT	6	2
		Concern about cybersecurity and confidentiality	SLT	5	1
		Concern about cybersecurity and confidentiality	*AUD*	*1*	*1*
INNER SETTING	**STRUCTURAL CHARACTERISTICS > INFORMATION TECHNOLOGY INFRASTRUCTURE = The degree to which technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting.**				
		Instability of the internet connection, lack of image and sound quality	SLT	14	3
		Unavailability of an adapted videoconference platform and computer in the clients' home	SLT	12	3
		Instability of internet connection	*AUD*	*0*	*0*
	COMPATIBILITY = Telepractice fits with workflows, systems, and processes				
		Concern about difficulties in coordinating the various stakeholders in a multidisciplinary therapy program	SLT	0	0
	AVAILABLE RESOURCES > SPACE = Physical space is available to implement and deliver telepractice				
		Non-optimal environmental conditions for the child	SLT	2	2
		Success of therapy depends on environmental factors	*AUD*	*18*	*5*
	AVAILABLE RESOURCES > MATERIALS & EQUIPMENT = Supplies are available to implement and deliver telepractice.				

	Time-consuming aspect of adapting and/or designing the therapy session and the resources to telepractice	SLT	5	2
	Limitation of the rehabilitation resources that can be used	SLT	0	0
	Lack of resources	*AUD*	*15*	*5*
	ACCESS TO KNOWLEDGE & INFORMATION = The degree to which guidance and/or training is accessible to implement and deliver the telepractice.			
	Lack of practice and training in telepractice for the therapist	SLT	3	2
	Being unprepared for this way of delivering therapy	*AUD*	*9*	*4*
INDIVIDUALS	**INNOVATION DELIVERERS > NEED =The therapists have deficits related to professional practice, well-being, or professional fulfilment, which will be addressed by implementation and/or delivery of the telepractice.**			
	Fear of a lack of flexibility and spontaneity during the session	SLT	8	3
	Fear of a relational distance (a reduced human contact)	SLT	8	2
	Impossibility of physical contact with the client	SLT	4	1
	Limitation of the quality and kinds of feedback and instructions that can be given to clients and/or caregivers	SLT	2	1
	INNOVATION DELIVERERS > CAPABILITY =The therapists have interpersonal competence, knowledge, and skills to deliver telepractice.			
	Lack of mastery of the digital tools by the therapist	SLT	6	3
	Telepractice requires more management of the child's attention	SLT	0	0
	Telepractice increases therapist fatigability	SLT	0	0
	Lack of ability to emotionally and physically adjust the behaviour of the child and parents	*AUD*	*28*	*6*
	Telepractice increases therapist fatigability	*AUD*	*11*	*6*
	INNOVATION DELIVERERS > MOTIVATION = The therapists are committed to delivering telepractice.			
	Negative attitude towards the use of digital tools among therapists	SLT	0	0

INNOVATION RECIPIENTS > CAPABILITY = The clients and/or caregivers have interpersonal competence, knowledge, and skills to receive telepractice.				
	Lack of mastery of the digital tools by the caregivers and the child	SLT	6	3
	Telepractice requires a greater involvement of the caregiver	SLT	0	0
	Lack of technological knowledge among parents	*AUD*	*8*	*3*
INNOVATION RECIPIENTS > MOTIVATION = The clients and/or caregivers are committed to receive telepractice.				
	Negative attitude towards telepractice among caregivers	*AUD*	*0*	*0*
	Negative attitude towards telepractice among caregivers and/or children	SLT	0	0

Table 5. Overview of the statements regarding the barriers to tele-assessment generated during the NGT with SLTs and the NGT with audiologists (*AUD, in italic)* according to the updated CFIR model, with their respective priority and popularity indexes.

Domain	Construct	Statements	SLT or AUD	Priority index	Popularity index
OUTER SETTING	**POLICIES & LAWS = The degree to which legislation on telepractice in SLT and audiology, reimbursement rules, privacy policy agreements, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the telepractice.**				
		Fear for cybersecurity and confidentiality	SLT	5	1
		Lack of an appropriate legal framework and lack of reimbursement	SLT	4	1
		Lack of reimbursement	*AUD*	*1*	*1*
INNER SETTING	**STRUCTURAL CHARACTERISTICS > INFORMATION TECHNOLOGY INFRASTRUCTURE = The degree to which technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting.**				
		Instability of the internet connection, lack of image and sound quality	SLT	13	3
		Unavailability of an adapted videoconference platform and computer in the clients' home	SLT	12	4
		Instability of the internet connection	*AUD*	*1*	*1*
		Lack of digital uniformity among hearing aid firms	*AUD*	*0*	*0*
	COMPATIBILITY = Telepractice fits with workflows, systems, and processes				
		Concern about encountering difficulties in conducting a joint multidisciplinary assessment when needed	SLT	1	1
	AVAILABLE RESOURCES > SPACE = Physical space is available to implement and deliver the telepractice				
		Non-optimal environmental conditions for the child	SLT	4	1
		Reliable diagnosis depends on environmental factors in children younger than 7 years (e.g., environmental noise)	*AUD*	*16*	*5*
	AVAILABLE RESOURCES > MATERIALS & EQUIPMENT = **Supplies are available to implement and deliver the telepractice.**				
		Unavailability of assessment tools that are adapted to videoconference administration	SLT	14	4
		Time consuming aspect of adapting and/or designing the assessment session and/or materials	SLT	0	0

	Unavailability of standardized and normed assessment tools for use in telepractice	*AUD*	*29*	*6*
	The expectation to have specific software and hardware as client and therapist (e.g., smartphones, camera…)-	*AUD*	*8*	*5*
	ACCESS TO KNOWLEDGE & INFORMATION = The degree to which guidance and/or training is accessible to implement and deliver the telepractice.			
	Lack of practice and training in telepractice for the therapist	SLT	0	0
INDIVIDUALS	**INNOVATION DELIVERERS > NEED = The therapists have deficits related to professional practice, well-being, or professional fulfilment, which will be addressed by implementation and/or delivery of telepractice.**			
	Concern about the therapeutic alliance	SLT	7	3
	Need for physical contact for certain types of assessments	SLT	5	1
	No possibility of using specific equipment required for certain types of evaluation (e.g. swallowing assessment)	SLT	3	1
	Loss of information about the child's overall functioning and interactions	SLT	2	1
	Fear of a lack of flexibility and spontaneity during the session	SLT	0	0
	INNOVATION DELIVERERS > CAPABILITY = The therapists have interpersonal competence, knowledge, and skills to deliver telepractice.			
	Lack of mastery of the digital tools by the therapist	SLT	3	2
	Telepractice requires more management of the child's attention	SLT	1	1
	More difficult to provide personal guidance from the therapist	*AUD*	*16*	*5*
	INNOVATION DELIVERERS > MOTIVATION = The therapists are committed to deliver telepractice			
	Motivation of audiologist	*AUD*	*4*	*3*
	INNOVATION RECIPIENT > CAPABILITY = The clients and/or caregivers have interpersonal competence, knowledge, and skills to receive telepractice			
	Lack of mastery of the digital tools by the caregivers and the child	SLT	3	2
	Telepractice requires an adapted involvement of the caregiver	SLT	1	1
	Lack of technological knowledge of caregivers	*AUD*	*15*	*4*
	INNOVATION RECIPIENT > OPPORTUNITY = The clients and/or caregivers have availability, scope, and power to receive telepractice.			
	Expectation that an adult must be present	*AUD*	*15*	*4*
	INNOVATION RECIPIENT > MOTIVATION = The clients and/or caregivers are committed to receiving telepractice.			

Motivation of client	*AUD*	*4*	*3*

Table 6. Overview of the statements regarding the facilitators to tele-assessment (A) and teletreatment (T) generated during the NGT with SLTs and the NGT with audiologists (AUD, in italic) according to the updated CFIR model, with their respective priority and popularity indexes.

Domain	Construct	Statements	SLT or AUD	Priority index	Popularity index
INNOVATION	**INNOVATION RELATIVE ADVANTAGE = Telepractice is better than current practice**				
		Providing treatment when face-to-face contact is not possible	SLT - T	12	3
		Reduced costs and time associated with client and therapist travel	SLT - T	12	3
		Increasing the frequency of sessions and the client's attendance at sessions	SLT- T	7	2
		Facilitation of the meeting of the different stakeholders	SLT - T	2	1
		Facilitate observation and practice in the child's environment	SLT - T	0	0
		Facilitate observation of the child and his interactions in his own environment	SLT - A	10	3
		Carrying out an assessment when meeting face to face is not possible	SLT - A	7	2
		Facilitation of the meeting of the different stakeholder	SLT - A	4	1
		Possibility of remote supervision for the therapist	SLT - A	1	1
		Recording of the session is made easier	SLT - A	0	0
OUTER SETTING	**POLICIES & LAWS = Legislation on telepractice in SLT and audiology, reimbursement rules, privacy policy agreements, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the telepractice**				
		Guidelines for the use of telepractice	SLT - T	9	3
		A clear legal framework for the use of telepractice in treatment	SLT - T	5	2
		Having a clear legal framework for the use of telepractice in assessment	SLT -A	9	4
		Guidelines for the use of telepractice	SLT - A	6	2
INNER SETTING	**STRUCTURAL CHARACTERISTICS > INFORMATION TECHNOLOGY INFRASTRUCTURE = Technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting**				
		Availability of free, simple and secure video conferencing platforms	SLT - T	13	4
		Availability of free, simple and secure video conferencing platforms	SLT - A	6	2
		Availability of secure platforms	*AUD T&A*	*7*	*4*

	A single platform for audiovisual material	*AUD T&A*	*6*	*4*
	RELATIONAL CONNECTIONS = There are high quality formal and informal relationships, networks, and teams within and across Inner Setting boundaries			
	Creating professional telepractice networks	SLT - T	3	1
	AVAILABLE RESOURCES > FUNDING = Funding is available to implement and deliver the telepractice			
	A compensation for the workload that telepractice represents	SLT - T	0	0
	Reimbursement for compatible cell phones for client and reimbursement of equipment for therapist	*AUD T&A*	*6*	*3*
	AVAILABLE RESOURCES > MATERIALS & EQUIPMENT = Supplies are available to implement and deliver the telepractice			
	Availability of treatment materials suitable for telepractice use	SLT -T	8	3
	Availability of assessment tools that are validated and adapted for use in telepractice	SLT - A	20	4
	Availability of resources	*AUD – T&A*	*19*	*6*
	ACCESS TO KNOWLEDGE & INFORMATION = Guidance and/or training is accessible to implement and deliver the telepractice			
	Being trained to use telepractice	SLT - T	4	1
	Availability of evidence of effectiveness for treatments delivered via telepractice	SLT - T	7	3
	Being supervised for the use of telepractice	SLT - T	0	0
	Proof of reliability, validity, and good psychometric qualities of the assessment tools used for the telepractice evaluation	SLT - A	6	3
	Being trained to use telepractice	SLT - A	3	1
	Short knowledge clips, brochure and infographic for client and therapist on e.g. pairing hearing aid with cell phone	*AUD – T&A*	*27*	*6*
	Telepractice courses for students in training and for audiologists in the field	*AUD – T&A*	*22*	*6*
	Platform with knowledge clips to condition behavior like on how to put on the headphones	*AUD – T&A*	*3*	*1*
INDIVIDUALS	**INNOVATION DELIVERERS > CAPABILITY = The therapists have interpersonal competence, knowledge, and skills to deliver telepractice**			
	Knowing how to use telepractice	SLT - T	4	1
	Knowing how to use telepractice	SLT - A	3	2
	INNOVATION RECIPIENTS > MOTIVATION = **The clients and/or caregivers are committed to receive telepractice**			
	The attractiveness of digital tools for some children	SLT - T	1	1
	The good collaboration and commitment on the part of the client and/or his/her caregiver	SLT - T	0	0

The attractiveness of digital tools for some children	SLT - A	0	0

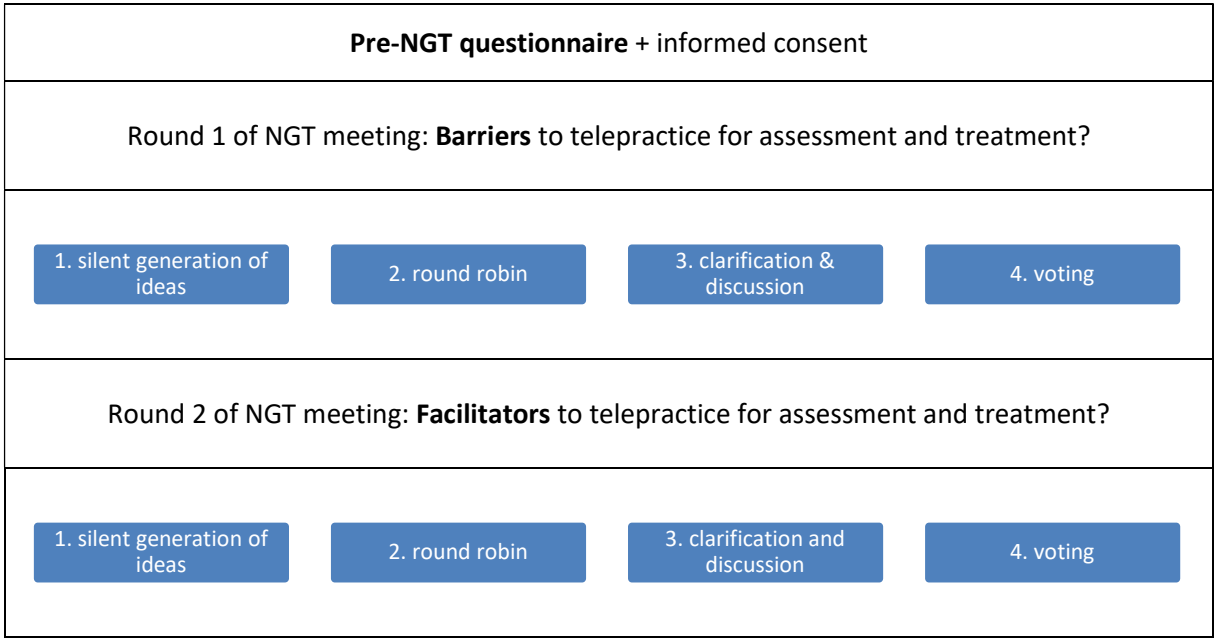

Figure 1: Overview of the data collection protocol