Guideline: Telepractice for speech-language pathology and audiology with children ≤ 12 years

(2023)

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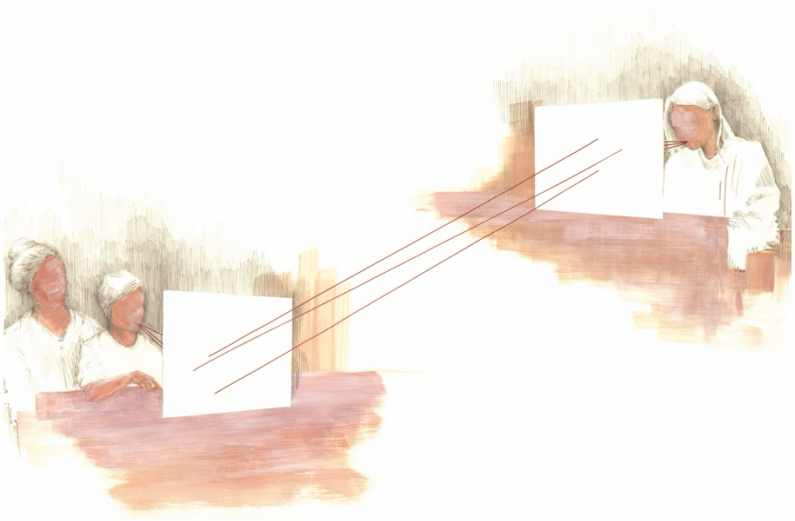
Version validated on 10/10/2023



Patient (client) input and consideration by the health provider (speech-language pathologist or audiologist)

Good medical practice guidelines provide directional support and guidance when making diagnostic or therapeutic decisions in family medicine. They summarise for the health provider what is scientifically the best policy for the average patient. There is also the context of the patient, who is an equal partner in making decisions. Therefore, the healt provider clarifies the patient's question through appropriate communication and provides information on all aspects of possible policy options. So, it may happen that health provider and patient together responsibly and reasoned make a different best choice. For practical reasons, this principle is not repeated every time in the guidelines but is explicitly mentioned here.

This guideline was developed within the Evikey network with the financial support of the Federal Department of Health. www.evikey.be.

When quoting this guideline, use the following reference:

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.

The development of the guideline has been realised by a guideline development group consisting of:

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To ensure quality during the process and a broad support to the clinical field, 14 **stakeholders** were involved in the process. For the composition of this group, a balance was sought between Dutch-speaking and French-speaking stakeholders. This group consisted of people with different perspectives to the topic of this guideline, including speech-language pathologists, audiologists, a paediatrician, a teacher, a CLB-employee, and parents and children who received telepractice.

A group of 5 **experts** was involved to review the decisions taken by the guideline development group and stakeholders, to review the methodological protocol, to evaluate the step from evidence to recommendation (including the degree of certainty). These experts have substantive research knowledge and expertise relevant to the topic or to the development of clinical guidelines.

- dr. Tom Van Daele, researcher at Thomas More (E-Health), psychologist
- dr. Kurt Eggers, researcher at Thomas More and UGent, SLP
- Prof. dr. Nicolas Verhaert, ENT-specialist, KU Leuven/UZ Leuven
- Nancy Durieux, methodological expert EBP, ULiège
- Sofie De Smet, general practitioner, Child & Family

For the duration of the project, this consortium was assisted by external experts as part of an advisory board. This board consisted of members from different organisations as listed below:

- FOD volksgezondheid – SPF Santé Publique
- RIZIV/INAMI
- Evikey Network
- Cebam –evaluation cell
- EBPracticenet – implementation cell
- KCE - Priorisation cell
- WOREL

- VVL
- UPLF

Acknowledgements

We would like to thank Séraphine Colmant and Lèna Pavone for their contribution in the literature selection process. A special thanks also to Trudy Bekkering, who gave us advice on processing the systematic reviews. Thanks also to Estelle Dauvister for the translation to French.

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PART III: Scientific foundation

Tele-assessment : general recommendation

1. Only propose tele-assessment as an option if you consider it safe and feasible. **(GPP)**

Evidence in the literature: Evaluation of the safety of tele-assessment

Summary of the literature

Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021a). Evaluating the use of telepractice to deliver pediatric feeding assessments. *American Journal of Speech-Language Pathology, 30*(4), 1686-1699. https://doi.org/10.10.1044/2021_ajslp-20-00323

Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021b). Evaluating the use of telepractice for bottle-feeding assessments. *Children, 8*(11), 989. https://doi.org/10.3390/children8110989

Schepers, K., Steinhoff, H. J., Ebenhoch, H., Böck, K., Bauer, K., Rupprecht, L., ... & Hagen, R. (2019). Remote programming of cochlear implants in users of all ages. *Acta Oto-Laryngologica, 139*(3), 251-257. https://doi.org/10.1080/00016489.2018.1554264

The first study of Raatz et al. (2021a) determined if acceptable levels of interrater reliability could be achieved conducting tele-assessment of pediatric feeding and swallowing compared with traditional assessment. The assessment form incorporated 65 assessment items across eight areas that were considered as typically included in a clinical feeding assessment. Individual sections included (a) assessment of positioning for feeding, (b) developmental screen, (c) oral sensorimotor assessment, (d) prefeeding respiratory status, (e) observation of eating and drinking, (f) assessment of parent–child interaction, (g) assessment of overall feeding skills, and (h) feeding recommendations. All sections (100%) were completed without safety concerns or technical difficulties impacting clinical care, and the SLP was not required to intervene during any appointments.

The second study of Raatz et al. (2021b) investigated whether acceptable levels of inter-rater reliability (percentage exact agreement ≥ 80%; Kappa value > .6) could be achieved conducting bottle-feeding tele-assessment compared with traditional assessment in infants. Bottle-feeding assessment items were (1) developmental screen, (2) assessment of state, colour and respiration, (3) oral motor assessment, (4), infant oral reflex exam, (5) tongue tie screen, (6) non-nutritive suck assessment, (7) assessment of bottle-feeding, (8) assessment of overall feeding skills and (9) recommendations. All telepractice sessions were completed without the need for the SLP to intervene.

The study of Schepers et al. (2019) investigated whether the telemetry values of cochlear inplant users of all ages differ in a traditional fitting or in a telefitting. Safety, fitting duration, video frame rate and overall bandwith were reported for the telefitting condition. All the telefitting sessions were concluded safely and successfully and, according to the results of the ad hoc questionnaires, no major/bothersome delays were experienced. No adverse events were reported. The telefitting sessions in children took a mean of 35.84 minutes and traditional fitting sessions took a mean of 35.28 minutes. This difference was not significant ($p > .05$).

Synthesis of the evidence

Three RCTs investigated the safety of the tele-assessment of cochlear implant fitting and (breast) feeding in babies and young children. In the assessment studies of the paediatric feeding, SLPs did not have to intervene at any point in time. In the assessment study of the cochlear implant fitting, no safety issues were reported and assessment did not take more time than traditional assessment.

From evidence to decision: Evaluation of the safety of tele-assessment

Information of this section is also presented in Table 8.

Experts' opinions:

The stakeholders did not report any experience with tele-assessments leading to unsafe situations for the client or themselves.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that most telepractice assessments can occur in a safe way. There was no difference between telepractice and traditional diagnostiek.

Challenges:

- Evidence in the literature shows that literacy tele-assessment took slightly longer than traditional assessment; language tele-assessment resulted in decreased behavioural responses.
- If a situation is unsafe, the therapist can only use oral instructions (as opposed to physical actions) to make the situation safe again.

Feasibility

Any potential safety concern should be taken seriously, and assessment or treatment should not be administered through telepractice. In most cases, telepractice is feasible.

Value & preferences:

Professional preferences:

- Therapists prefer to assess in the traditional setting if any safety concern is present.

Client preferences:

- Clients may prefer traditional assessment above tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors. Clients prefer the presence of a therapist, certainly if safety issues could arise.

Economic considerations:

- Therapist and client need stable internet, a device (computer or laptop, sometimes a mobile phone can be sufficient) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- If safety issues emerge during a telepractice assessment, the therapist will need to organise an additional traditional assessment which increases the cost for client and professional.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Evaluation of the feasibility of tele-assessment

Summary of the literature

Goehring, J. L., & Hughes, M. L. (2017). Measuring sound-processor threshold levels for pediatric cochlear implant recipients using conditioned play audiometry through telepractice. Journal of Speech, Language, and Hearing Research, 60(3), 732-740. https://doi.org/10.1044/2016_jslhr-h-16-0184

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

Raman, N., Nagarajan, R., Venkatesh, L., Monica, D. S., Ramkumar, V., & Krumm, M. (2019). School-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

Schepers, K., Steinhoff, H. J., Ebenhoch, H., Böck, K., Bauer, K., Rupprecht, L., ... & Hagen, R. (2019). Remote programming of cochlear implants in users of all ages. *Acta Oto-Laryngologica,* 139(3), 251-257. https://doi.org/10.1080/00016489.2018.1554264

Sutherland, R., Trembath, D., Hodge, A., Drevensek, S., Lee, S., Silove, N., & Roberts, J. (2017). Telehealth language assessments using consumer grade equipment in rural and urban settings: Feasible, reliable and well tolerated. *Journal of Telemedicine and Telecare, 23*(1), 106-115. https://doi.org/10.1177/1357633x15623921

Sutherland, R., Trembath, D., Hodge, M. A., Rose, V., & Roberts, J. (2019). Telehealth and autism: Are telehealth language assessments reliable and feasible for children with autism?. *International Journal of Language & Communication Disorders, 54*(2), 281-291. https://doi.org/10.1111/1460-6984.12440

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010a). 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)

The study of Goehring and Hughes (2017) evaluated the use of tele-assessment for measuring cochlear implant behavioural threshold levels in children using conditioned play audiometry. The two-way RM ANOVA with factors visit (one vs. two) and condition (tele-assessment versus traditional assessment) indicated no significant effect of visit, $F(1) = 2{,}39$, $p > .05$, or condition, $F(1) = 0{,}63$, $p > .05$ on the duration of the assessment. Across assessment conditions, the mean duration for visit one and two was 16.9 and 14.9 min, respectively. Across visits, the mean duration for the traditional assessment and tele-assessment was 16.4 and 15.4 min, respectively.

The study of Hodge et al. (2019) investigated whether tele-assessments for literacy skills can be administered reliably compared with traditional assessment. On some occasions, there were technical difficulties (likely due to insufficient bandwidth availability) leading to temporary screen freezing, the need to refresh the plaform connection, or restart the browser. Although these difficulties caused slight delays in tele-assessment, they did not prevent valid completion of the evaluation.

The study of Raman et al. (2019) explored the feasibility of conducting school-based language telescreening to expand its scope for providing speech-language pathology services in India. Technical factors influenced telelanguage screening: (1) slight lag in audio output, but this had no major effects on the assessment procedure and (2) disruption of the internet connection in 7 of the 15 sessions leading to a delay of 5-10 minutes. This decreased the motivation of one child.

The study of Schepers et al. (2019) investigated whether the telemetry values of cochlear inplant users of all ages differ in a traditional fitting or in a telefitting. Safety, fitting duration, video frame rate and overall bandwith were reported for the telefitting condition. All the telefitting sessions were concluded safely and successfully and, according to the results of the ad hoc questionnaires, no major/bothersome delays were experienced. No adverse events were reported. The telefitting sessions in children took a mean of 35.84 minutes and traditional fitting sessions took a mean of 35.28 minutes. This difference was not significant ($p > .05$).

The study of Sutherland et al. (2017) determined whether, within an existing service, a web-based telehealth application using consumer grade, commercially available computer equipment could be used to provide a formal language assessment that is 1) feasible, 2) reliable and 3) well-tolerated by participants and their families. All tele-assessments were completed: no assessments were discontinued after technological or other difficulties. The audio quality during the tele-assessments was good (74%), acceptable in 22% and poor in one assessment. The average audio rating for Hub 1 (location 1) was 1.88 (mode = 2, range 1–2), for Hub 2 (location 2) it was 1.43 (mode=2, range 0–2) and for Hub 3 (location 3) 1.75 (mode=2, range 1–2). The visual quality during tele-assessments was good in 83% of assessments. No assessments were rated as 'poor'. The average visual quality rating for Hub 1 (location 1) was 1.88 (mode=2, range 1–2), for Hub 2 (location 2) was 1.71 (mode=2, range 1–2) and for Hub 3 (location 3), 1.88 (mode=2, range 1–2).

The second study of Sutherland et al. (2019) investigated the reliability of tele-assessment using core language subtests of the CELF-4 for children with autism. To measure the feasibility, a behavioural rating scale based on the behaviour checklists of the CELF-Preschool 2 was administered in both assessment conditions. A Wilcoxon Signed Ranks Test was used to examine possible differences in behaviour between the two assessment conditions. Overall, the difference between the pairs of scores was not significant ($p > .05$), despite the wide variation at the individual level. Four children showed higher behaviour scores (more observations of inattention, distraction and/or anxiety) in the traditional assessment and seven had higher scores in the tele-assessment condition. Two children's scores were the same in both assessment conditions. A moderately strong correlation was noted between behaviour in the traditional assessment condition and the Social Communication Questionnaire scores ($r = .660$, $p = .019$) and moderate correlation between the behaviour during the tele-assessment and the Social Communication Questionnaire scores which approached significance ($r = .540$, $p = .07$).

The study of Waite et al. (2010a) examined the validity and reliability of an internet-based telehealth system for assessing childhood language disorders on the four core components of a standardized language assessment (CELF-4 Australian version). Technical issues during tele-assessment referred to the equipment size (headphones too big) , the internet connection (distortion), and the touch screen could at times not be recorded. Furthermore, practical issues were reported during tele-assessment: lightning issues (overexposure in video recordings) and positioning issues of participant (difficult to see responses in the pictures of the subtest Following Directions). The reported child-related issues concerned intelligibility (low speech volume and intelligibility), the interaction between child and SLP (no requests for repetition after short breakup, no requests for self-correction), attention and concentration (tired and restless after school) and the child's motor skills (difficulty operating touch screen).

Synthesis of the evidence

Seven RCTs investigated the feasibility of tele-assessment. These studies varied in the domain of the communication disorders and the outcome for which the feasibility was defined or measured. Two studies assessed the feasibility of tele-assessment for cochlear implant fitting, one study for literacy skills and four studies for language skills. Outcomes for feasibility varied between duration of the assessment, technical factors, tolerability by the clients and their family, behaviour (in clients with Autism Spectrum Disorder), practical and relational issues.

The duration of the assessment did not differ between tele-assessment and traditional assessment but was only measured for cochlear implant fitting. Technical factors were evaluated in five studies. One of them reported that there were no technical issues. Four studies, one of them conducted in India and two in rural Australia, reported insufficient internet quality leading to temporary screen freezing, causing slight delays but not prevention of the assessment. In one study this affected the motivation of the child. Other technological issues were a decreased audio quality for one child, headphones that were too big for the child and the touch screen that could not always record. One study reported that tele-assessment of language skills was well tolerated by families. The behaviour of children with Autism Spectrum Disorders varied with more observations of inattention, distraction and anxiety during tele-assessment for some children, while for others this was the case during traditional assessment. Some children showed no difference between the two assessment settings. One study reported overexposure in video recordings, difficulties observing the responses of the child in one subtest of the CELF-4 (Following directions), low speech volume and reduced intelligibility, restless and tired behaviour when assessed after school and difficulty operating the touch screen.

From evidence to decision: Evaluation of the feasibility of tele-assessment

Information of this section is also presented in Table 8.

Experts' opinions:

The stakeholders agreed that for some assessments and for some children and families, telepractice is feasible, while for others, it is not. The stakeholders gave the feedback more specifically when the recommendations for each domain were discussed.

It is important to know that a child is sometimes not clearly intelligible, as the evidence suggests.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that most tele-assessments are feasible (high correlations between measurements in both settings).
- A tele-assessment is easier to schedule for the family and reduces travel time.
- Parents and child usually feel more comfortable in their own environment.
- Tele-assessment usually does not take more time than a traditional assessment.

Challenges:

- A tele-assessment may be insufficient to assess all components. Evidence in the literature, however, shows that the items that were difficult to assess in tele-assessment were also difficult to asses in the traditional setting.
- Children may become restless or attention may reduce if the tele-assessment is organised after school.
- Technical issues may cause delays during the tele-assessment.

Feasibility

Tele-assessment seems feasible in most situations. Tele-assessment may not always be feasible to assess reading and spelling skills, and speech or oromotor skills. Also, for some children, depending on the age and temperament, tele-assessment may not be feasible.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional assessment over tele-assessment as the ability to observe all necessary behaviours may be jeopardised during a tele-assessment.

Client preferences:

- Clients may prefer traditional assessment over tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors.
- A lack of confidence in technological skills may prevent a client to receive tele-assessment.

Economic considerations:

- Therapist and client need stable internet, a device (computer or laptop, sometimes a mobile phone can be sufficient) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- If a tele-assessment was administered but not feasible, an additional (traditional) assessment will be organised, which leads to an increased cost for professional and client.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Tele- assessment: Can telepractice be proposed as an accurate alternative for assessment?

2. If it enables you to increase compliance, interaction and adherence, propose tele-assessment as an accurate alternative for traditional
    - (breast) feeding and swallowing assessment in children (1 month-7 years). **(1B)**
    - cochlear implant fitting in children (2-12 years). **(1C)**
    - hearing screening with auditory brainstem response or otoacoustic emissions in infants (0-45 days). **(2B)**
    - hearing screening with pure tone audiometry or otoacoustic emissions in children (5-9 years). **(2B)**
    - language assessment in children (5-12 years) also those with Autism Spectrum Disorder. **(2B)**
    - reading and spelling assessment in children (6-12 years) also those with Attention Deficit Hyperactive Disorder. **(2B)**
    - assessment of speech sounds in children (4-9 years) but only if the child is intelligible and the mouth can be observed accurately. **(GPP)**

It is likely that adjacent areas, such as dyscalculia, that are not covered by this guideline, can also be addressed with a similar approach.

Comparative studies between tele-assessment and traditional assessment indicate in most cases similar results.

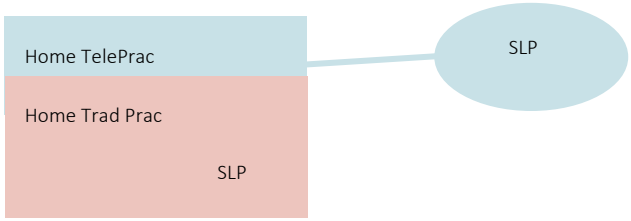
Evidence in the literature: (Breast) feeding and swallowing assessment

Summary of the literature

Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021a). Evaluating the use of telepractice to deliver pediatric feeding assessments. *American Journal of Speech-Language Pathology*, *30*(4), 1686-1699. https://doi.org/10.10.1044/2021_ajslp-20-00323

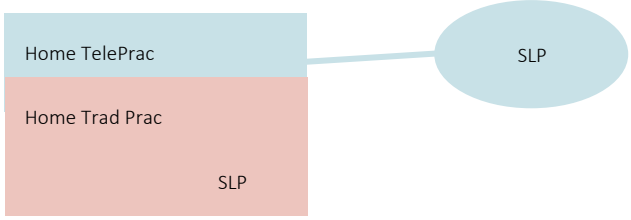
Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021b). Evaluating the use of telepractice for bottle-feeding assessments. *Children*, *8*(11), 989. https://doi.org/10.3390/children8110989

The first study of Raatz et al. (2021a) determined whether acceptable levels of interrater reliability could be achieved in tele-assessment of pediatric feeding and swallowing assessment compared with traditional assessment. Feeding assessment forms were compared for exact agreement between raters, with results reported in percentages. High levels of agreement (> 85%) were achieved with almost all assessment components (52/55) meeting the preidentified interrater reliability criteria (percent exact agreement ≥ 80%; $\kappa > .6$). The kappa value for saliva control (.53) was below the set criteria. The percent exact agreement, however, was 97% and hence was still considered to meet study criteria. Overall assessment ratings (i.e., within normal limits versus impaired) and scores on the Functional Oral Intake Scale—Suckle Feeds and Transitional Feed were identical. Ratings on the Eating and Drinking Classification Scale were above set agreement criteria, and any rating discrepancies were within 1 point of difference. Two components within the oral sensorimotor assessment (palate and palatine tonsils) failed to meet agreement criteria and were found to be difficult to complete in both the traditional assessment and tele-assessment.



- Raatz et al. (2021a)
- Two settings at the same time, assessment led by SLP through videoconferencing, rated by both SLPs
- Child and parent at home
- Positioning for feeding, oral sensorimotor assessment, prefeeding respiratory tasks, observation of eating and rinking, parent-child interaction, overall feeding skills
- Range = 4 months-7 years
- N = 40

The second study of Raatz et al. (2021b) investigated whether acceptable levels of inter-rater reliability (percentage exact agreement ≥ 80%; Kappa value > 0.6) could be achieved conducting bottle-feeding tele-assessment compared with traditional assessment in infants. High levels of agreement (percentage exact agreement ≥ 80% and Kappa > 0.6) were achieved for most assessment components (41/53). There were four other assessment components (rhythmicity, oral phase, nasal congestion and implementation of feeding skills) where the Kappa value was below the set criteria. Percentage exact agreement, however, was >80% so these were considered to meet agreement criteria, leading to 85% of items considered to meet reliability criteria (45/53). Hence, eight assessment components did not meet agreement criteria. Those are divided over three components-infant oral reflex exam (palate, gag, oral phase and nasal congestion/regurgitation) (n = 1), tongue-tie screen (tongue posture during crying, tongue lateralisation, lingual frenulum, frenulum thickness, frenulum attachment to tongue and extension of tongue) (n = 6) and non-nutritive suck assessment (rhythmicity) (n = 1). Regarding the assessment of palate integrity, it is important to note that this assessment component was considered difficult to assess in both traditional assessment and tele-assessment and was unable to be completed by either SLP in 14 of the appointments (47%). However, for the children where this assessment component was assessed, the provision of asynchronous images pre-appointment was beneficial and improved agreement for this assessment component (71% percentage exact agreement for palate integrity ratings when images were provided vs. 11% percentage exact agreement without images, p = .01).



- Raatz et al. (2021b)
- Two settings at the same time, rated by both SLPs
- Child and parent at home
- Developmental screen, assessment of state, respiration, oral motor assessment, infant oral reflex examination, tongue tie screen, non-nutritive suck assessment, assessment of bottle feeding, overall feeding skills
- Range = 1 month-2 years
- N = 30

Synthesis of the evidence

Two RCTs investigated the assessment of (breast or bottle) feeding in babies and young children up to 7 years of age. In both studies, nearly all components could be assessed accurately through tele-assessment and traditional assessment. The items that could not be assessed accurately through tele-assessment, were also difficult to assess in traditional assessment. They could often not be assessed in any of the two settings. The scores on two scale questionnaires about feeding were identical or nearly identical (one point difference) in both assessments. Providing pictures helped the assessment of difficult components in both settings.

From evidence to decision: (Breast) feeding and swallowing assessment

Information of this section is also presented in Table 8.

Expert opinions:

Assessment through telepractice is easier to schedule, in terms of timetable for the family. Tele-assessment of (breast)feeding and swallowing is ideal if a quick first advice is wanted or necessary. This could prevent a parent to give up breastfeeding, or this could help a parent who suffers from painful breastfeeding or when bottle feeding takes a very long time. Successful assessment requires a (real-time) video recording of the swallowing.

Clinical examination of for example tongue or lip seal, however, is not possible in a tele-assessment.The implementation of tele-assessment is feasible for an evaluation of the tongue tightness, growth curve with position compared to peers and evolution compared to previous measurement, and to apply the *baby taking breast* technique.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that a tele-assessment for (breast)feeding and swallowing in babies is as accurate as traditional assessment.
- A tele-assessment is easier to schedule for the parent and reduces travel time.
- It allows providing quick advice at times when the parent experiences acute difficulties. This may prevent a parent giving up on the breastfeeding.
- Parents and child usually feel more comfortable in their own environment, and especially for breast feeding, this is an important factor.

Challenges:

- A parent may need to provide additional information, such as pictures or a video. Without them, the tele-assessment may be insufficient to assess all necessary components.
- A tele-assessment may be insufficient to assess all components of the feeding and swallowing.

Feasibility

Direct intervention on behaviour is only possible through oral instruction, not through physical actions. This makes certain components more difficult to assess. Depending on the problem, a tele-assessment may be feasible or not.

Value & preferences:

Professional preferences:

- SLPs often prefer to intervene directly because they can perform manoeuvres themselves.
- SLPs prefer to have a first encounter with a client in real-life to build up a relationship.
- SLPs may lack the confidence to administer a tele-assessment.

Client preferences:

- Clients may prefer traditional assessment over tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors. Clients who receive tele-assessment are usually satisfied but may not have a preference before they received it.
- Most clients have learnt to use videoconferencing during the COVID-19 period. This familiarity with videoconferencing helps them to make a more realistic decision when they are offered tele-assessment.
- A lack of confidence in technological skills may prevent a client to receive tele-assessment.

Economic considerations:

- SLP and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone, headphones or a second screen. This may lead to an increased cost.
- Time saving results in a decreased cost for the client.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

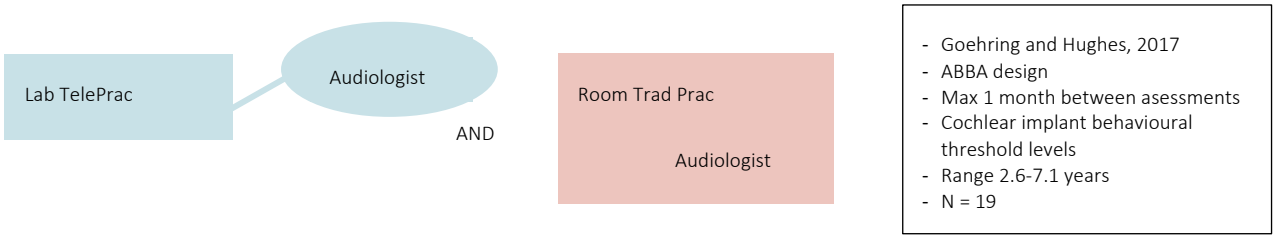
Evidence in the literature: Cochlear fitting

Summary of the literature

Goehring, J. L., & Hughes, M. L. (2017). Measuring sound-processor threshold levels for pediatric cochlear implant recipients using conditioned play audiometry through telepractice. *Journal of Speech, Language, and Hearing Research*, *60*(3), 732-740. https://doi.org/10.1044/2016_jslhr-h-16-0184

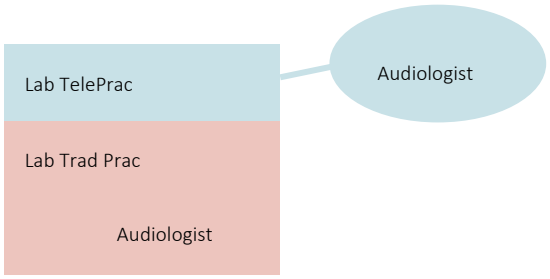
Schepers, K., Steinhoff, H. J., Ebenhoch, H., Böck, K., Bauer, K., Rupprecht, L., … & Hagen, R. (2019). Remote programming of cochlear implants in users of all ages. *Acta Oto-Laryngologica*, *139*(3), 251-257. https://doi.org/10.1080/00016489.2018.1554264

The study of Goehring and Hughes (2017) evaluated the use of tele-assessment for measuring cochlear implant behavioural threshold levels in children using conditioned play audiometry. In summary, threshold levels were not significantly different between traditional assessment and tele-assessment. An ABBA paradigm was used (A = traditional assessment, B = tele-assessment). The two assessments were no more than 1 month apart. The hit rate was calculated for each individual subject (number of electrodes measured divided by the number attempted). The overall hit rate was 98% for the traditional assessment and 97% for the tele-assessment, i.e. no significant difference in hit rate between conditions ($p > .05$). Results of the three-way RM ANOVA indicated no significant effect of visit ($p > .05$); condition ($p > .05$); or electrode ($p > .05$). On average, the tele-assessment yielded threshold levels that were 0.13 nC lower than those obtained in the traditional assessment (2.95 vs. 3.08 nC, respectively).



The study of Schepers et al. (2019) investigated the telemetry values of cochlear implant users of all ages in a traditional fitting or in a tele-fitting. It focused on the safety, especially with paediatric users. No significant difference between traditional fitting and tele-fitting was found for the total mean impedance field telemetry scores or within groups (children compared with children; adults compared with adults) ($p > .05$). Additionally, the mean impedance field telemetry value per electrode contact at traditional fitting and tele-fitting revealed no electrode contact-specific bias. No significant difference was found between traditional fitting and tele-fitting for the maximum comfortable levels for children ($p > .05$). No significant difference was found between traditional fitting and tele-fitting for threshold levels for children ($p > .05$). No significant difference was found between

traditional fitting and tele-fitting for audiometry for children (p > .05). No significant difference between mean scores after traditional fitting and tele-fitting was found for any speech test (p > .05).



- Schepers et al., 2019
- Two settings at same time
- Impedance field telemetry, maximum comfortable levels, threshold levels, audiometry, speech understanding
- Range 3.2-14.7 years
- N = 46

Synthesis of the evidence

Two RCTs were conducted to compare telefitting and traditional cochlear fitting in young children between 2 and 14 years old. No differences were found between the studies for threshold levels, the total mean impedance field telemetry scores, maximum comfortable levels, audiometry or speech test.

From evidence to decision: Cochlear fitting

Information of this section is also presented in Table 8.

Experts' opinions:

Performing a telefitting for cochlear implants can be an accurate alternative to traditional fitting in the Belgian health care context. Telefitting would cost the same as traditional fitting. The surgery procedure of placing the cochlear implants remains, as well as the cost of the audiologist and the use of the equipment. The same equipment can be used in the traditional setting in case a telefitting is not possible or additional tests are needed.

It does not seem feasible to perform a first telefitting in very young children (< 2 years) because the behaviour is more difficult to observe during remote play audiometry. Experience shows that a telefitting is accurate from children aged 2 years and older. It is possible that older preschool aged children (4 years and older) are more compliant in the telesetting than younger children. For this reason, a telefitting in older preschool aged children is usually more accurate.

A first cochlear implant fitting is preferably performed in a traditional setting also for another reason. At the beginning of a collaboration, the audiologist wants to build up a relationship with the child and this seems easier for most therapists in a traditional setting. Also, the audiologist needs to give more instructions because the procedure is new to the child (and parent). This is for most therapists easier in a traditional setting. For routine fittings, for example yearly follow-up fittings, a telefitting is a recommended alternative.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that a tele-assessment for cochlear fitting is as accurate as traditional assessment.
- A tele-assessment is easier to schedule for the parent and reduces travel time.
- Parents and child usually feel more comfortable in their own environment.

Challenges:

- A first cochlear fitting may be difficult through telepractice as the child and parents don't know how the fitting proceeds.
- Compliance to the telesettings increases with age and is acceptable in children around the age of 4 and older.

Feasibility

A telefitting as a routine procedure is feasible in children aged 4 and older.

Value & preferences:

Professional preferences:

- Audiologists often prefer to intervene directly because they can perform manoeuvres themselves.
- Audiologists prefer to have a first encounter with a client in real-life to build up a relationship.
- Audiologists may lack the confidence to administer a telefitting.

Client preferences:

- Clients may prefer traditional assessment over tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors. Clients who receive tele-assessment are usually satisfied but may not have a preference before they have received it.
- Most clients have learnt to use videoconferencing during the COVID-19 period. This familiarity with videoconferencing helps them to make a more realistic decision when they are offered tele-assessment.
- A lack of confidence in technological skills may prevent a client to receive tele-assessment.

Economic considerations:

- Audiologist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone, headphones or a second screen. This may lead to an increased cost.
- Time saving results in a decreased cost for the client.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Hearing screenings

Summary of the literature

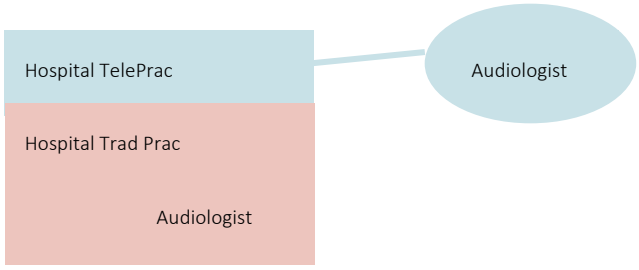
Krumm, M., Huffman, T., Dick, K., & Klich, R. (2008). Telemedicine for audiology screening of infants. *Journal of Telemedicine and Telecare*, *14*(2), 102-104. https://doi.org/10.1258/jtt.2007.070612

Lancaster, P., Krumm, M., Ribera, J., & Klich, R. (2008). Remote hearing screenings through telehealth in a rural elementary school, *American Journal of Audiology, 17*, 114-122. https://doi.org/10.1044/1059-0889(2008/07-0008)

Monica, S. D., Ramkumar, V., Krumm, M., Raman, N., Nagarajan, R., & Venkatesh, L. (2017). School entry level tele-hearing screening in a town in South India–Lessons learnt. *International Journal of Pediatric Otorhinolaryngology*, *92*, 130-135. https://doi.org/10.1016/j.ijporl.2016.11.021

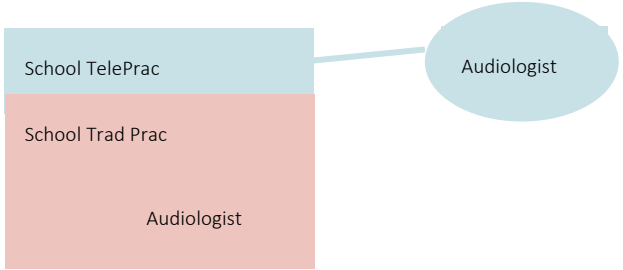
Ramkumar, V., Hall, J. W., Nagarajan, R., Shankarnarayan, V. C., & Kumaravelu, S. (2013). Tele-ABR using a satellite connection in a mobile van for newborn hearing testing. *Journal of Telemedicine and Telecare*, *19*(5), 233-237. https://doi.org/10.1177/1357633x13494691

The study of Krumm et al. (2008) determined the feasibility of providing new-born and infant hearing screening through a telescreening. To do so, authors compared distortion-product otoacoustic emissions and automated auditory brainstem responses obtained through telescreening and traditional screening in the same infants. Identical hearing screening results were obtained for telescreening and traditional screening with all infants. 29/30 infants passed distortion-product otoacoustic emissions screening and 27/30 infants passed automated auditory brainstem responses screening. There was a significant main effect for distortion-product otoacoustic emissions test frequencies ($F = 6.5$, $p < .05$). These findings were expected because distortion-product otoacoustic emissions data typically differ between frequencies. There was no significant difference for the test method ($F = 0.8$, $p = .05$) and no significant interaction between screening method and the distortion-product otoacoustic emissions frequencies ($F = 1.0$, $p = .05$). These latter findings indicated that the mean sound pressure levels for distortion-product otoacoustic emissions screening at a given frequency were essentially the same regardless of screening method.



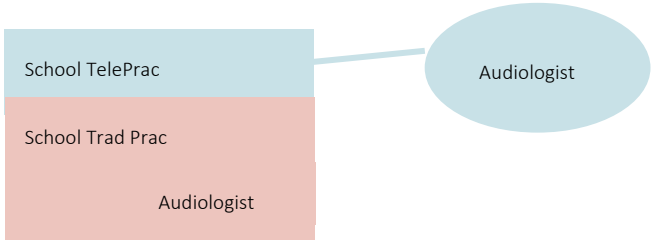
- Krumm et al. (2008)
- Two settings at same time
- Distortion product otoacoustic emissions, auditory brainstem responses
- Range 11-45 days
- N = 18

The study of Lancaster et al. (2008) assessed the feasibility and reliability of delivering hearing screening services by telepractice. It compared otoscopy, immittance and pure-tone audiometry results obtained by telescreening versus traditional screening in the same children. The examiners did not agree on overall screening results of five students because of different pure-tone screening results obtained with telescreening and traditional screening. Overall screening outcomes varied between the telescreening and traditional screening, but the binomial test indicated that these differences were not statistically significant ($p > .05$).



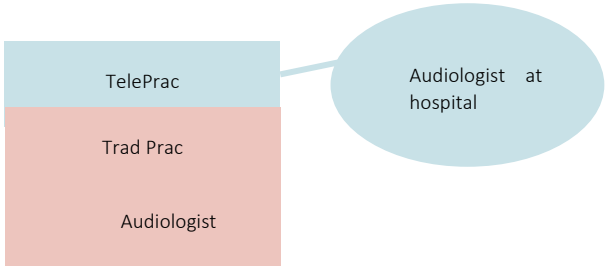
- Lancaster et al. (2008)
- Two settings at same time
- Otoscopy, pure tone audiometry
- Range 8-9 years
- N = 32

The study of Monica et al. (2017) assessed the feasibility of telescreening in a small town in India. To do so, authors compared traditional hearing screening at school to those obtained by telescreening. Each screening was conducted in both traditional assessment and telescreening on the same day. The p-value indicated no significant difference observed between distortion product otoacoustic emissions obtained in 1000 Hz ($p = .88$), 1500 Hz ($p > .05$), 2000 Hz ($p > .05$), 3000 Hz ($p > .05$), 4500 Hz ($p > .05$) and 5500 Hz ($p > .05$) indicating no systematic bias in teletesting of distortion product otoacoustic emissions. The estimated p-values indicate that there was no significant difference in thresholds of both ears between the two screening methods in 1000 Hz ($p > .05$), 2000 Hz ($p > .05$) and 4000 Hz ($p > .05$) suggesting there is no systematic bias in telescreening of pure tone audiometry.



- Monica et al. (2017)
- Two settings at same time
- Video otoscopy, pure tone audiometry, distortion product otoacoustic emissions
- Range 5-8 years
- N = 31

The study of Ramkumar et al. (2013) assessed the feasibility of conducting real-time auditory brainstem response in a mobile van using satellite connectivity, with the help of trained health workers. Testing was conducted when the babies were asleep. Auditory brainstem response latency was compared between the two acquisition modes. There was no significant difference between latency in tele-assessment and in traditional assessment. The mean difference between the two modes at 30 dBnHL was 0.021 s, at 50 dBnHL it was 0.057 and at 70 dBnHL was 0.007. Normality of distribution was determined using the Shapiro Wilk test, which suggested that the data followed a normal distribution in both assessment modes at all intensities. The Pearson product moment correlation was calculated for auditory brainstem response latencies obtained in the two assessment modes. There was a strong correlation between the two assessment methods ($r = .94$ at 70 dBnHL, .98 at 50 dBnHL, .98 at 30 dBnHL), significant at $p < .0001$. The agreement between the two assessment methods was examined by the Bland Altman technique. The difference plot showed points scattered above and below the zero line for all three intensities. Almost all points were within the limits of agreement, suggesting no bias in the two assessment modes.



- Ramkumar et al. (2013)
- Two settings at same time
- Auditory brainstem responses
- Range 0-20 days
- N = 24

Synthesis of the evidence

Two RCTs compared hearing screenings through tele-assessment and traditional assessment in babies up to 45 days, and two RCTs compared them in children between 5 to 8 years old. In the studies with the baby screening, no differences were found between the two ways of assessment for distortion-product otoacoustic emissions and automated auditory brainstem responses. The studies with the children also did not show statistical differences between the telescreening and the traditional screening for otoscopy, immittance and pure-tone

audiometry results and distortion product otoacoustic emissions. One of these studies with the children was conducted in India and one in the US. Both studies obtained similar results.

From evidence to decision: Hearing screenings

Information of this section is also presented in Table 8.

Experts' opinions:

The need for hearing screening through teleaudiology in the Belgian health care context does not immediately impose itself. Hearing screening in infants is routinely performed by nurses from the Early Child Organisation (Kind & Gezin, Office de la Naissance et de l'Enfance) during home visits or at their centre. Hearing screening in school-aged children is systematically performed by staff from the Centre of Student Guidance (Centrum voor LeerlingenBegeleiding, Centres Psycho-Médico-Sociaux).

It would, however, be feasible to perform telescreenings in school-aged children. To do this, a sound-proof cabin is required to obtain accurate results and an assistant is needed. If schools want to implement telescreenings, they will need to invest.

Telescreenings for babies and school-aged children is accurate and a feasible alternative to hearing screenings in a traditional setting. It does, however, not add much value in the current Belgian health care context.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that a tele-assessment for hearing in babies and in primary school children is as accurate as traditional assessment.
- There are no additional benefits for the telescreening in babies if screening is organised through home visits. The parent and baby don't have to travel and they feel comfortable in their home environment.
- If screenings in babies are not organised through a home visit, telescreening has the advantage that parent and baby usually feel more comfortable in their own environment.
- The benefits of telescreening of primary school children at home is that a parent can be present during the screening, whereas s/he is not if the screening is organised at school or during school hours. If the telescreening is organised at school, it is not a benefit.

Challenges:

- Telescreening in babies: Using the test materials (for example, placing the electrodes) is difficult if the audiologist is not present with the baby. The audiologist can only work with the parent through oral instruction, and cannot manipulate the test material as s/he usually does.
- Telescreening in primary school children: To perform an accurate telescreening, a soundproof cabin is necessary.
- Evidence in the literature shows that connectivity issues and school-related issues may occur.

Feasibility

Technically, both screenings in babies and in primary school children could be feasible but in the Belgian health context, they do not add value to the current situation.

Value & preferences:

Professional preferences:

- Audiologists think it is feasible, but don't see an added value in telescreening in babies and primary school infants.

Client preferences:

- Clients receive hearing screening systematically through the Early Child Organisation (Kind & Gezin, Office de la Naissance et de l'Enfance) during home visits or at their centre. Hearing screening in school-aged children is systematically performed by staff from the Centre of Student Guidance (Centrum voor LeerlingenBegeleiding, Centres Psycho-Médico-Sociaux). The systematic service through these organisations runs smoothly and does not require much effort from clients.

Economic considerations:

- Organising telescreenings means that investments need to be done. Audiologist and client need stable internet, a device (computer or laptop, sometimes a mobile phone can be sufficient) and need accessories such as a microphone and headphones. If schools would offer telescreenings, they need to invest in soundproof cabins. This would lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Language assessment

Summary of the literature

Raman, N., Nagarajan, R., Venkatesh, L., Monica, D. S., Ramkumar, V., & Krumm, M. (2019). School-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

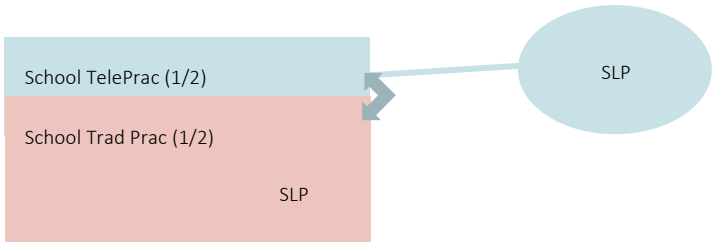
Sutherland, R., Trembath, D., Hodge, A., Drevensek, S., Lee, S., Silove, N., & Roberts, J. (2017). Telehealth language assessments using consumer grade equipment in rural and urban settings: Feasible, reliable and well tolerated. *Journal of Telemedicine and Telecare*, *23*(1), 106-115. https://doi.org/10.1177/1357633x15623921

Sutherland, R., Trembath, D., Hodge, M. A., Rose, V., & Roberts, J. (2019). Telehealth and autism: Are telehealth language assessments reliable and feasible for children with autism? *International Journal of Language & Communication Disorders*, *54*(2), 281-291. https://doi.org/10.1111/1460-6984.12440

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010a). 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)

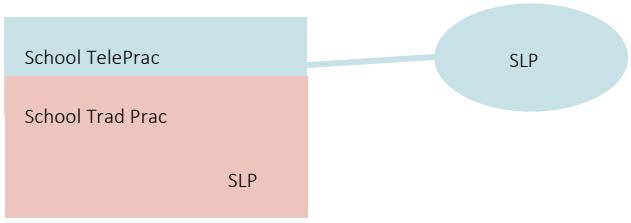
The study of Raman et al. (2019) explored the feasibility of conducting school-based language screening using telepractice to expand its scope for providing speech-language pathology services in India. Wilcoxon's test revealed no significant difference [$Z = 1.31$, $p = .19$] between scores for receptive language obtained in traditional assessment ($Mdn = 47.00$, $M = 46.56$, $SD = 3.87$) and tele-assessment ($Mdn = 47.00$, $M = 46.34$, $SD = 3.89$). Similarly, there was no significant difference [$Z = -1.09$, $p > .05$] in scores for expressive language between traditional assessment ($Mdn = 49.00$, $M = 47.31$, $SD = 3.97$) and tele-assessment ($Mdn = 49.00$, $M = 46.34$, $SD = 3.89$). Comparisons of scores obtained through traditional assessment and through tele-assessment for receptive and expressive language skills were also made using Bland–Altman's plots. The limits of agreement (±2 SD) between the two methods for receptive language domain was –2.87 and 2.75. Similarly, the limits of agreement between the two methods for expressive language domain was –2.51 and 2.0. Visualisation of both plots revealed that the scores between language screenings conducted through traditional assessment and

through tele-assessment were within two standard deviations from the mean, except for two values in the receptive domain and one value in the expressive domain. Both traditional assessment and tele-assessment identified the same two children (one child in the age range of 5 to 5;11 years and another child in the age range of 7 to 7;11 years) who obtained scores below the 80% criteria for both receptive and expressive domains. These children were noted to be at-risk of having mixed receptive and expressive language disorder. Two other children demonstrated scores below 90% of total scores for expressive language alone suggesting risk for the presence of delay in expressive language skills.



- Raman et al. (2019)
- Two settings, ½ started through videoconferencing, ½ through traditional assessment
- Assessment of Language Development
- Mean age = 6.3 years
- N = 32

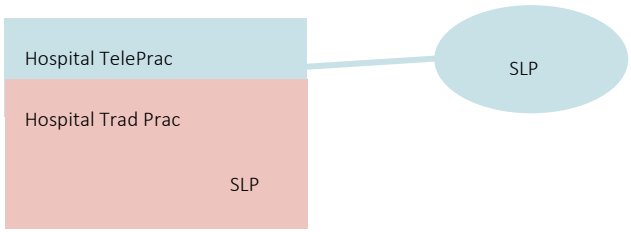
The study of Sutherland et al. (2017) determined whether, within an existing service, a web-based telehealth application using consumer grade, commercially available computer equipment could be used to provide a formal language assessment that is 1) feasible, 2) reliable and 3) well-tolerated by participants and their families. Plots (with 95% levels of agreement) showed no clear trend in difference between the different assessors, and the variance did not appear to differ with the mean. Correlations between tele-assessment scores and traditional assessment scores were strong for all measures (.96-1.00): Concepts and Following Directions $r = .99$, $p < .001$; Formulated sentences, $r = .97$, $p < .001$; Word Classes (Receptive) $r = 1.0$, $p < .001$; Word Classes (Expressive) $r = .96$, $p < .001$; Recalling sentences $r = .96$, $p < .001$; Core Language Score $r = .99$, $p < .001$.



- Sutherland et al. (2017)
- Two settings at the same time, some subtests led by SLP through videoconferencing, some by SLP through traditional assessment
- Core Language subtests of CELF-4
- Range = 8-12 years
- N = 23

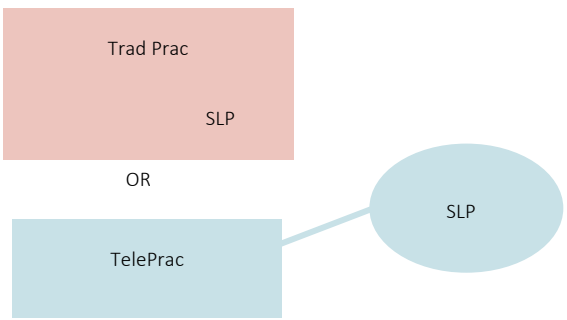
The second study of Sutherland et al. (2019) investigated the reliability of tele-assessment using core language subtests of the CELF-4 for children with Autism Spectrum Disorder. They also investigated the feasibility of tele-assessment with children with autism, by exploring their behavioural responses to tele-assessment and traditional assessment. There were strong correlations between the two modes, with correlations between the standard and scaled scores for the subtests ranging from .943 to .993: Core language score $r = .993$ $p < .01$; Concepts and Following directions $r = .967$ $p < .01$; Recalling sentences $r = .989$ $p < .01$; Formulated sentences $r = .943$ $p < .01$, Word classes $r = .965$ $p < .01$. The Bland–Altman plots showed no trend in differences between the assessors and the level of agreement between assessors did not differ across ability levels. There was greater agreement in subtests that required less clinical judgement and interpretation due to more prescriptive scoring

procedures. In addition, there was complete agreement on the severity levels of language disorder between the therapists for 10 of the 13 children. For three children, the Core Language Scores were on the cusp of two clinical severity levels and small difference in the scores meant that a different severity level was ascribed for these children in the two assessment modes.



- Sutherland et al. (2019)
- Two settings at the same time, some subtests led by SLP through videoconferencing, some by SLP through traditional assessment
- Core Language subtests of CELF-4
- Range = 9.5-12.3 years
- N = 13

The study of Waite et al. (2010a) examined the validity and reliability of an internet-based telehealth system for assessing childhood language disorders on the four core components of a standardized language assessment (CELF-4 Australian version – subtests). There was no significant difference between the total raw scores and scaled scores ($p > .006$ – Bonferroni correction) for all subtests obtained through tele-assessment and traditional assessment. Very good agreement was determined between the two raters for the total raw scores and scaled scores ($k > .90$) for all subtests. The difference between the scaled scores of tele-assessment and traditional assessment was no greater than 1 point for the Concepts and Following Directions and Recalling Sentences subtests, and no greater than 2 points for the Word Structure and Formulated Sentences subtests, for any participant. The kappa and weighted kappa analyses revealed very good agreement between the ratings of tele-assessment and traditional assessment for the individual item scores on all subtests ($k = .88–.98$). Very good levels of agreement were also found for the core language score ($k = .99$) and the severity level ($k = .99$). The difference between the core language score of tele-assessment and traditional assessment was no greater than 5 points for any participant. The intrarater reliability was very good (>.80) for the tele-assessment ratings on all measures. IntraClass Correlations for the individual item scores ranged from .91 to .99. IntraClass Correlations of at least .97 were achieved for all subtest total raw scores and scaled scores. An IntraClass Correlation of .99 was achieved for the intrarater reliability on the core language score, and complete agreement (IntraClass Correlation = 1.00) was obtained for the severity level. Very good interrater reliability was found for the tele-assessment individual item scores for each subtest (IntraClass Correlation range = .84–.98). Interrater reliability was similarly very good for the total raw scores (IntraClass Correlation = .96–>.99), scaled scores (IntraClass Correlation = .92–1.00), core language score (IntraClass Correlation = .98), and severity level (IntraClass Correlation- = 1.00).



- Waite et al. (2010a)
- One setting (telepractice or traditional), rated by remote SLP and by SLP at school
- Core Language subtests of CELF-4
- Range = 3-8 years
- N = 25

Synthesis of the evidence

Four RCTs compared language assessment through telepractice and traditional assessment in children between 3 and 12 years of age. Three studies used the CELF-4 version, one study in India used their own language test. The results were similar across the studies: There is no difference between the scores obtained through telepractice or traditional assessment. In one study, the severity of the language disorder in children with Autism Spectrum Disorders varied between the tele-assessment and the traditional assessment for 3 of 13 children.

From evidence to decision: Language assessment

Information of this section is also presented in Table 8.

Experts' opinions:

Certain subtests of the CELF-4 language assessment are not ideal to administer through telepractice, such as Concepts and Following Directions. It is easy to miss what a child indicates or more difficult to catch the non-verbal information (looking, pointing, …). Also, the view on the child is limited to the child's face. It is not possible to obtain an overall picture (e.g., observe the motor restlessness, nervousness ...). A parent should be present at all times to give that extra information.

Up to now there are no norm adjustments in the standardised measuring instruments for telepractice use. The CELF-5 (language test, Wiig et al., 2013) has an iPad version, but norms are not available for telepractice use. EXALANG (language test, Croteau et al., 2010; Helloin et al., 2012) is a computer-based test.

The administration of the MAIN (Gagarina et al., 2019) in multilingual children through telepractice seems difficult. It is necessary to have both child and parent on screen when the home language is assessed. This is not necessary when obtaining a language sample in any language the SLP speaks. The risk exists that tele-assessment of the MAIN may lead to language samples of decreased quality.

Successful implementation of language assessment through telepractice is child-dependent. It is more feasible to administer a test through telepractice with a 11-year old child than with a 5-year old child. Older children can express themselves more easily. When a client has difficulty maintaining focus, it is more difficult for the SLP to do something about it. The child is not within reach. In all situations, a parent needs to be present and needs to be instructed beforehand (what can they observe, …). Parents are required to be involved more intensily than in traditional practice.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that a language assessment through telepractice in primary school children is as accurate as traditional assessment.
- A tele-assessment is easier to schedule for the family and reduces travel time.
- A child usually feels more comfortable in his/her own environment.

Challenges:

- Evidence in the literature shows that there were technical difficulties and child-related factors on some occasions that impacted on the tele-assessment.
- A parent needs to assist the child when instructional or technical obstacles occur.
- A tele-assessment may be insufficient to assess all non-verbal behaviour.

Feasibility

Language assessment through telepractice is feasible but not ideal if traditional assessment is an option. It is more feasible to administer with older primary school children than younger children.

Value & preferences:

Professional preferences:

- SLPs can only intervene through oral instructions.
- SLPs prefer to have a first encounter with a client in real-life to build up a relationship.
- SLPs may lack the confidence to administer a tele-assessment.

Client preferences:

- Clients may prefer traditional assessment over tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors. Clients who receive tele-assessment are usually satisfied but may not have a preference before they have received it.
- Many older primary school children have learnt to use videoconferencing during the COVID-19 period. This familiarity with videoconferencing helps them to make a more realistic decision when they are offered tele-assessment.
- A lack of confidence in technological skills may prevent a client and his/her parent to receive tele-assessment.

Economic considerations:

- SLP and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone, headphones or a second screen. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Reading and spelling assessment

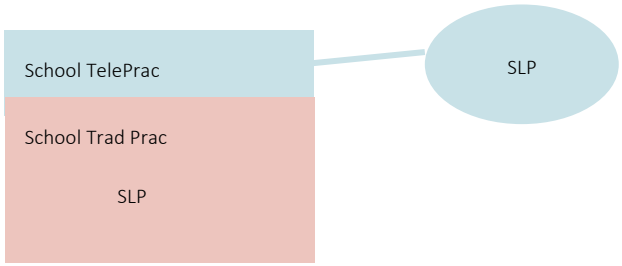
Summary of the literature

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

Nelson, N. W., & Plante, E. (2022). Evaluating the equivalence of telepractice and traditional administration of the Test of Integrated Language and Literacy Skills. *Language, speech, and hearing services in schools*, *53*(2), 376-390. https://doi.org/10.1044/2022_lshss-21-00056

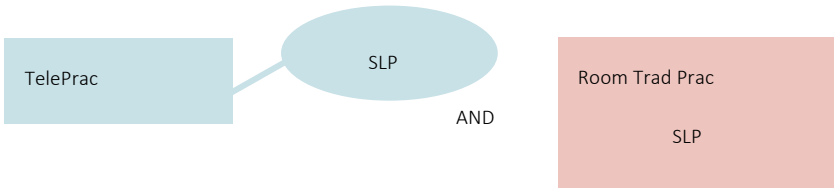
Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010b). Assessment of children's literacy through an Internet-based telehealth system. *Telemedicine and e-Health, 16*(5), 564-575. https://doi.org/10.1089/tmj.2009.0161

The study of Hodge et al. (2019) determined whether literacy assessments can be administered reliably through tele-assessment compared with traditional assessment. The analysis procedure allows the visualization of the mean differences and the extreme limits of agreement (±1.96 standard deviation of the difference) presented by the tele-assessment and traditional assessment. Bland–Altman plots indicated that, in general, the mean differences between traditional assessment and tele-assessment were small with the largest standard score discrepancy being 14 points in the Test of Word Reading Efficiency Phonemic Decoding subtest (Torgesen et al., 1999). There is no difference between the traditional reading assessment or tele-assessment of the children with or without ADHD (Spearmans r all > .8 with one r = .767 in the no ADHD group on tele-assessment).



- Hodge et al. (2019)
- Two settings at the same time, assessment through videoconferencing
- Subtests of Woodcock Reading Mastery Test (3rd Ed.), Test of Word Reading Efficiency (2nd Ed.), MultiLit, Dalwood Spelling Test
- Order of test administration was randomised
- Range 8-12 years
- N = 37

The study of Nelson and Plante (2022) evaluated the equivalence of the Test of Integrated Language and Literacy Skills when administrated through tele-assessment and traditional assessment. Evaluation of identification equivalence showed 96% agreement between methods (49 of 51 decisions), with 39 agreements of no disorder, 10 agreements of yes disorder, and two disagreements (yes disorder for tele-assessment and no disorder for traditional assessment). Partial correlations, controlled for test order, showed moderate to high agreement between all composite and subtest scores, except Nonword Repetition. Scoring by examiners and the first author showed high interrater agreement. No differences between Nonword Repetition scores were found for students who wore headsets (n = 12), whereas differences were found for those who did not (n = 34).

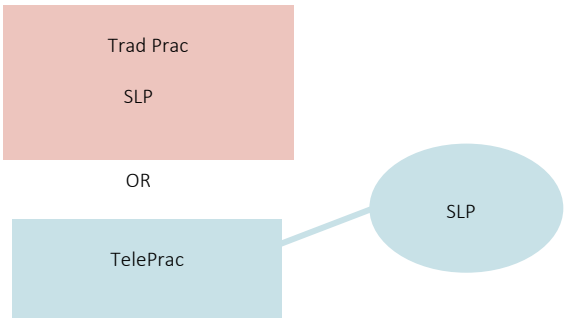


- Nelson and Plante (2022)

- Two settings, both performed for each child with 2 to 4 weeks in between children with (suspected) language or literacy disorder/ difficulties
- Range years 6-18;11 (oldest group not icluded for the guideline)
- 6-7 years: n = 9; 8-11 years: n = 21
- Test of Integrated Language and Literacy Skills
- Telepractice and traditional methods were randomly selected

The study of Waite et al. (2010b) investigated the validity and reliability of a tele-assessment of children's literacy on a battery of standardized assessments (Queensland University Inventory of Literacy, South Australian Spelling Test, and Neale Analysis of reading Ability, 3rd edition). The difference scores between ratings for the tele-assessment and traditional assessment were not significantly different (p>0.01) for any measure. Therefore, the scores obtained from tele-assessment and traditional assessment were pooled together for subsequent analyses: The Bland-Altman limits of agreement were within the clinical criteria for all raw scores except for nonword spelling (> +/- 1 point), nonword reading (> +/- 1 point), and the Neale-3 rate score (> +/- 8.9 points). The weighted kappa analysis revealed very good agreement for all scaled scores (k = 0.92–1.00). Percentage levels of agreement were above 90% for all raw scores and scaled scores, except for the nonword reading raw score (65%). The mean percentage agreement for individual items of the Queensland University Inventory of Literacy nonword spelling and nonword reading subtests was 96.9% and 94.5%, respectively. The overall agreement on the Neale Analysis

of reading Ability error classification was 75.9%, with the levels of agreement for the individual error types ranging from 0%-88.9%. Intrarater reliability for the tele-assessments was very good on all parameters (IntraClass Correlation > .9). The percentage level of intrarater agreement was above 80% for all parameters except the Neale Analysis of reading Ability rate percentile rank (62.5%) and the reversal error classification (66.7%). The mean percentage intrarater agreement was 95.3% for the Queensland University Inventory of Literacy nonword spelling task and 95.5% for nonword reading. Interrater reliability was very good for all online parameters (IntraClass Correlation: .89–1.00). The percentage levels of close agreement were at least 80% for all parameters except the nonword spelling raw score (75%), the Neale Analysis of reading Ability rate percentile rank (75%), and the mispronunciation error classification (63.2%). The mean percentage interrater agreement for individual items of the nonword spelling and nonword reading subtests was 95.3% and 97.2%, respectively.



- Waite et al. (2010b)
- One setting (telepractice or traditional), rated by remote SLP and by SLP at school
- Queensland University Inventory of Literacy, South Australian Spelling Test, Neale Analysis of Reading Ability (3th Ed.)
- Range = 8-13 years
- N = 20

Synthesis of the evidence

Three RCTs were conducted to assess reading and spelling skills through telepractice and traditional assessment in primary school children aged 6 to 12 years. Tests included a non-word repetition task, a reading accuracy test and a spelling test. Among these children, some had ADHD but this did not have any impact on the results. Wearing headphones resulted in better outcomes, compared to not wearing them.

From evidence to decision : Reading and spelling assessment

Information of this section is also presented in Table 8.

Experts' opinions:

Time-based tests such as the Klepel-R test (Van den Bos et al., 1999) and other non-word tests are difficult to administer on a screen because the four columns with words do not fit on one screen. It should be provided in another way and with adjusted norms. A solution could be to send the paper version in an envelop and ask the parent to administer the test but then it is more difficult to have a standardised test sample.

The SLP looses information of the child, such as from the mouth (e.g., does the child read in a spelling way or not). To see this, it is necessary to have a close up view. But then other observations are not captured (e.g., body movements). Also it is not possible to see the pen grip in a writing or spelling test (e.g., is there any doubt when writing). Typing is not yet suited for school-aged children and it cannot solve this problem. A possibility is directing the camera to the paper. Reading on the screen is different than reading on paper. Reading tests have no adjusted norms for reading assessment through telepractice.

To diagnose a reading or spelling disorder, assessment through telepractice usually does not provide all information. To perform a follow-up assessment, e.g., with AVI (Jongen & Krom, 2009), telepractice seems feasible.

A parent needs to be present during the tele-assessment of the child. An intake or consult with the parent is also feasible to perform through telepractice.

Some children may be less nervous or stressed when they are in their home environment for the assessment.

Administering a reading or spelling tele-assessment is not ideal for the reasons mentioned previously (only limited view on the child, reading on a screen is different than reading on paper). However, it can be feasible if there are two screens, if the family has the digital possibilities and skills, if a parent is present, if a parent is prepared for the assessment (necessary materials or tools at hand), if there is a trust relationship with the SLP (e.g., already met at an earlier stage if first assessment).

Benefits and challenges:

Benefits:

- Evidence in the literature shows that a reading and spelling assessment through telepractice in primary school children is as accurate as traditional assessment if children are wearing headphones.
- A tele-assessment is easier to schedule for the family and reduces travel time.
- A child usually feels more comfortable in his/her own environment.

Challenges:

- Evidence in the literature shows that there were technical difficulties and child-related factors on some occasions that impacted on the tele-assessment.
- A parent needs to assist the child when instructional or technical obstacles occur.
- A tele-assessment may be insufficient to assess all non-verbal behaviour and motoric behaviour for example, pen grip during spelling.
- Tests are not accostumed to telepractice: the words on the paper do not fit on the screen and handwriting is assessed, not typing. SLPs may need to prepare the test materials in advance, wich requires time and effort.

Feasibility

Reading and spelling assessment through telepractice may be feasible but is not ideal. If traditional assessment is an option, it is better to have a traditional assessment. It is more feasible to administer with older primary school children than younger children.

Value & preferences:

Professional preferences:

- SLPs prefer to see the entire body of a child during reading and spelling assessment (pen grip, lip movement, finger placement during reading, …).
- SLPs prefer to have a first encounter with a client in real-life to build up a relationship.
- SLPs may lack the confidence to administer a tele-assessment.

Client preferences:

- Primary school children may prefer traditional assessment over tele-assessment, or the other way around, depending on the type of problem, their context, previous experience, or other factors.
- Many older primary school children have learnt to use videoconferencing during the COVID-19 period. This familiarity with videoconferencing helps them to make a more realistic decision when they are offered tele-assessment.

- A lack of confidence in technological skills may prevent a primary school child and his/her parent to receive tele-assessment.

Economic considerations:

- SLP and clients need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone, headphones or a second screen. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Assessment of speech sound disorders

Summary of the literature

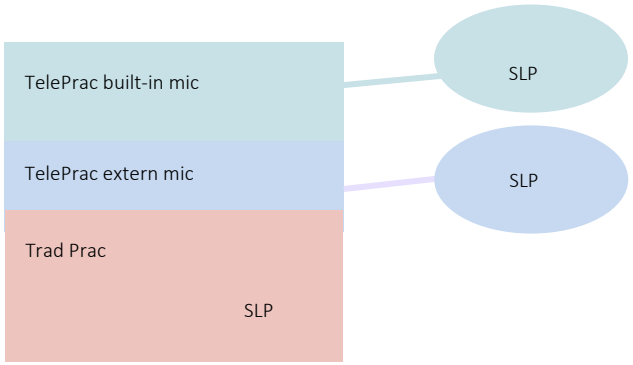
Campbell, D. R., & Goldstein, H. (2022). Reliability of Scoring Telehealth Speech Sound Assessments Administered in Real-World Scenarios. *American Journal of Speech-Language Pathology*, *31*(3), 1338-1353. https://doi.org/10.1044/2022_ajslp-21-00219

Waite, M. C., Cahill, L. M., Theodoras, D. G., Busuttin, S., & Russell, T. G. (2006). A pilot study of online assessment of childhood speech disorders. *Journal of Telemedicine and Telecare*, *12*(3_suppl), 92-94. https://doi.org/10.1258/13576330677938008

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2012). Assessing children's speech intelligibility and oral structures, and functions through an Internet-based telehealth system. *Journal of telemedicine and* telecare, 18(4), 198-203. https://doi.org/10.1258/jtt.2012.111116

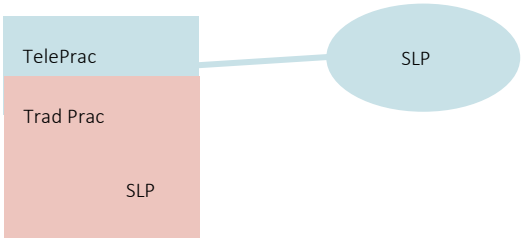
The study of Campbell and Goldstein (2022) investigated the reliability of scoring a speech sound assessment administered in real-world scenarios including two examples of tele-assessment. Percentage of agreement among the three scoring conditions was calculated. The mean item agreement for tele-assessment (built-in mic) versus traditional assessment was 86.3% (SD = 5.65), tele-assessment (built-in mic) versus tele-assessment (external mic) was 86.7% (SD = 5.56), and traditional assessment versus tele-assessment (external mic) was 85.2% (SD = 5.58). Twenty-one of the 141 total items had less than 80% agreement among all three scoring conditions. Those disagreements occurred for only eight sounds, many of which were assessed multiple times in the same position of a word, such as the final /l/ (5 times). The Bland–Altman analysis did not reveal a trend in the difference between the scoring conditions, with mean bias ranging from standard scores of only −1.79 to 1.0. Likewise, paired-samples t-tests showed no significant difference between standard scores for tele-assessment (built-in mic) and traditional assessment $t(38) = -0.56$, $p > .05$; tele-assessment (built-in mic) and tele-assessment (external mic), $t(38) = 0.72$, $p > .05$; and tele-assessment (external mic) and traditional assessment, $t(38) = -1.18$, $p > .05$. Skewness of standard score mean differences ranged from −.57 to .08, indicating a normal distribution. The standard score distributions for each scoring condition were normally distributed. The Goldman-Fristoe Test of Articulation-3 mean standard scores by scoring condition were 62.64 (SD = 19.21) for tele-assessment (built-in mic), 61.64 (SD = 18.53) for traditional assessment and 63.44 (SD = 18.68) for tele-assessment (external mic). A repeated-measures ANOVA was performed to evaluate mean differences between the three scoring conditions. Results demonstrated no significant main effect by scoring condition, $F(2, 37) = 0.69$, $p > .05$. Cohen's d ranged from 0.09 to 0.19, suggesting that there were minimal effects associated with scoring conditions. The Goldman-Fristoe Test of Articulation-3 classifies severity ratings based on standard scores as average/above average above 85, mild/at-risk −1 SD (between 78 and 85), moderate −1.5 SD (between 71 and 77), and severe −2 SD or lower (70 or below). A chi-square analysis with a Fisher's exact test suggested that there was no association between scoring condition and speech sound severity classification ($p > .05$). There was almost perfect agreement for moderate and severe speech sound disorder classifications for the tele-assessment (built-in mic) versus traditional assessment and tele-assessment (built-in mic) versus tele-assessment (external mic) scoring conditions. However, there were more discrepancies for mild and average classifications for both sets of comparisons. To assess if the tele-assessment conditions could accurately classify a speech sound disorder (i.e., greater than one standard deviation below the mean), agreement with the traditional assessment was calculated.

Of the 39 child participants, the tele-assessment (built-in mic) scoring condition classified 33 children with a speech sound disorder, and six with average speech sound production. The traditional assessment scoring condition classified 32 children as having a speech sound disorder and seven children with average speech sound production, that is, 97% agreement with tele-assessment (built-in mic) scoring. The tele-assessment (external mic) classified 36 children as having a speech sound disorder and three children with average speech sound production, that is, 92% agreement with tele-assessment (built-in mic) scoring.



- Cambell and Goldstein (2022)
- Administration scored in three conditions: traditional, tele-assessment with built-in mic in tablet, tele-assessment with external mic
- Children with SSD and TD children
- Range = 3 - 8 years (mean = 5;10 years)
- N = 39
- Goldman-Fristoe Test of Aarticulation-3 (speech sound disorders)

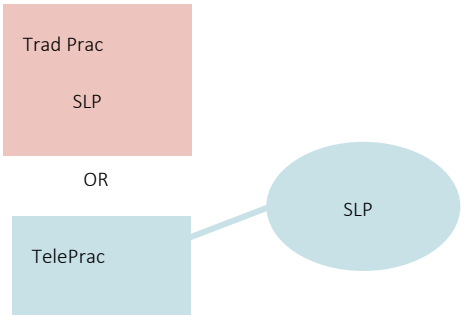
This first study of Waite et al. (2006) conducted a preliminary validation of a tele-assessment of speech disorders in a group of young children. There was a 92% level of agreement between the two assessors across all consonants in all word positions of the Single Word Articulation Test (n = 62, range 50–100%), with more than half (63%) of the targeted consonants reaching an agreement of at least 90%. Six individual sounds (10%) did not reach 70% agreement. Intra-rater agreement for the online assessor was 94% (range 50–100%), with three sounds (5%) not reaching 70% agreement. Inter-rater agreement was 87% (range 17–100%) across all sounds in all positions, with 12 individual sounds (19%) not reaching 70% agreement. A comparison of the speech intelligibility ratings for the two assessment environments (traditional assessment and tele-assessment) revealed 100% agreement within the criterion. Intra-rater agreement was found to be 100% within the criterion, while inter-rater agreement was 83%, with a disagreement of two scale points for one participant. Levels of agreement for oro-motor tasks included 100% (oral structure), 96% (single oral movements), 63% (double oral movements) and 100% (Diadochokinetic rate), with an average overall agreement level of 91%. Overall intra-rater and inter-rater reliability for the oro-motor assessment was 90 and 76%, respectively.



- Waite et al. (2006)
- Two settings at the same time, assessment led by SLP through videoconferencing
- Single Word Articulation Test, speech intelligibility, oro-motor assessment
- Range = 4.3-6.8 years
- N = 6

A second study of Waite et al. (2012) examined the validity and reliability of a tele-assessment of speech intelligibility and oro-motor skills of children with a speech disorder. For speech intelligibility, a 70% exact agreement and a 100% close agreement were obtained, strength k = .86. For the oromuscular assessment, a 73% exact agreement (with a range for individual tasks 33%-100%) and a 96% close agreement (with a range for

individual tasks 83%-100%) were obtained. The agreement was moderate or good for six tasks (k = .48-.74) and fair or poor for four tasks (k = .12-.36). Poor agreement was obtained for tongue protrusion, lateral tongue movement, diadochokinesia Tatata sequence and Pat-a-cake execution.



- Waite et al. (2012)
- One setting (telepractice or traditional), rated by remote SLP and by SLP in the practice
- Oro-motor assessment, speech intelligibility from speech sample
- Range = 4-9 years
- N = 20

Synthesis of the evidence

Three RCTs were conducted to assess speech sound disorders and oromotor skills through telepractice and traditional assessment in children aged 3 to 9 years. For most but not all sounds, the scores between the two assessment settings were similar. The agreement for assigning a severity to the disorder was more difficult for mild disorders than for moderate or severe disorders. It was also more difficult to achieve an agreement on some oromotor tasks, including tongue protrusion and movement, and two diadochokinesia sequences. Having a built-in microphone improved the agreement between tele-assessment and traditional assessment slightly.

From evidence to decision: Assessment of speech sound disorders

Information of this section is also presented in Table 8.

Experts' opinions:

Measurement and observation of speech sounds through tele-assessment is complicated. Even more than for the other assessments, the quality of the assessment depends on noise from the environment, sound quality of the computer and the stability of the internet connection which can make the analysis less accurate. Also, no norms are available for assessment through telepractice.

A test booklet with pictures is often used. This seems relatively feasible to use for an assessment through telepractice. A device with a large screen should be used, as a smaller device, such as a smartphone or tablet, gives pictures less visible to the child. Using concrete material or eliciting spontaneous speech may be more difficult to do.

Benefits and challenges:

Benefits:

- Evidence in the literature shows that an assessment for speech sound disorders and oromotor tasks through telepractice in preschool age children and young primary school children is as accurate as traditional assessment for most sounds and most oromotor tasks (but not all).
- A tele-assessment is easier to schedule for the family and reduces travel time.
- A child usually feels more comfortable in his/her own environment.
- Test material usually consist of pictures and can be easily used for tele-assessment.

Challenges:

- According to evidence in the literature, 10% of sounds did not reach 70% agreement and the strength of agreement was fair or poor for four tasks.
- A parent needs to assist the child when instructional or technical obstacles occur.
- A tele-assessment may be insufficient to assess tongue movement and specific sounds and sequences of sounds.

Feasibility

Assessment of speech sound disorders and oromotor tasks through telepractice could be feasible but is not ideal. If traditional assessment is an option, it is better to have a traditional assessment. A good microphone improves the accuracy of the assessment.

Value & preferences:

Professional preferences:

- SLPs prefer to have a first encounter with a client in real-life to build up a relationship.
- SLPs may lack the confidence to administer a tele-assessment.

Client preferences:

- Young primary school children have not yet learnt to use videoconferencing during the COVID-19 period. Assistance of a parent is essential.
- A lack of confidence in technological skills may prevent a parent to receive tele-assessment for his/her child.

Economic considerations:

- SLP and clients need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Teletreatment: Can telepractice be proposed as an effective alternative for treatment?

3. If it enables you to increase compliance, interaction and adherence, propose teletraining as an effective alternative to
   - educate or train parents in treatment for children (0-12 years). **(1A)**

Evidence is available for the management of hearing aids, education about hearing problems, training in treatment of language disorders, communication in Autism Spectrum Disorders and Other Developmental Disorders, stuttering and speech sound disorders.

Weak evidence shows that treatment duration is shorter or equal than with traditional parent training or education about their child's treatment. Evidence is available for the management of hearing aids, education about hearing problems and communication training in Autism Spectrum Disorders and Other Developmental Disorders. (GRADE 1C → only clarification)

Moderate evidence shows that treatment adherence is equal or better than with traditional parent training or education about their child's treatment. Evidence is available for the management of hearing aids, education about hearing problems and training in treatment of stuttering. (GRADE 1B → only clarification)

   - treat with children (4-12 years). **(2A)**

Evidence is available for treatment of language, reading and speech sound disorders.

Comparative studies between parental teletraining and traditional training indicate in all studies similar results. Comparative studies between child teletreatment and traditional treatment indicate mixed results.

Evidence in the literature: Tele-education or teletraining for parents

Summary of the literature

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

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

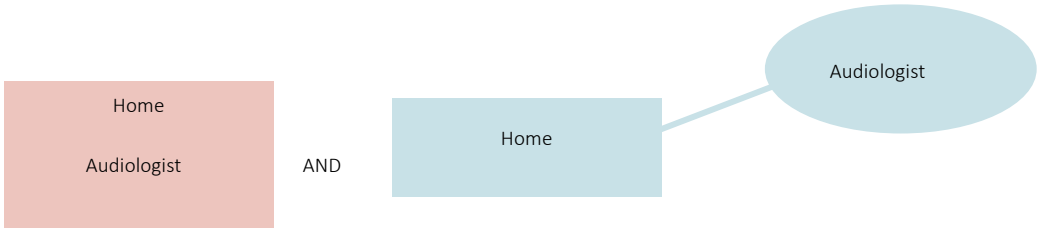
Lau, J. S., Lai, S. M., Ip, F. T., Wong, P. W., Team, W. H., Servili, C., ... & Brown, F. L. (2022). Acceptability and feasibility of the World Health Organization's Caregiver Skills Training Programme (WHO CST) delivered through eLearning, videoconferencing, and in-person hybrid modalities in Hong Kong.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

McDuffie, A., Banasik, A., Bullard, L., Nelson, S., Feigles, R. T., Hagerman, R., & Abbeduto, L. (2018). Distance delivery of a spoken language intervention for school-aged and adolescent boys with fragile X syndrome. *Developmental Neurorehabilitation*, *21*(1), 48-63. https://doi.org/10.1080/17518423.2017.1369189

Muñoz, K., San Miguel, G. G., Barrett, T. S., Kasin, C., Baughman, K., Reynolds, B., ... & Twohig, M. P. (2021). eHealth parent education for hearing aid management: A pilot randomized controlled trial. *International journal of Audiology*, *60*(sup1), S42-S48. https://doi.org/10.1080/14992027.2021.1886354

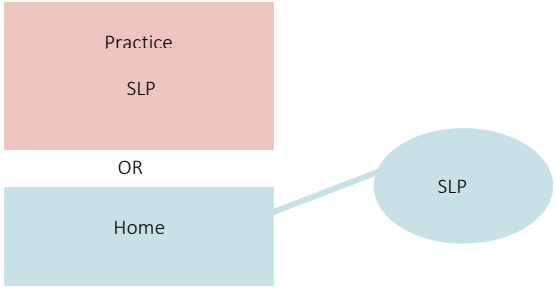
Wainer, A. L., Arnold, Z. E., Leonczyk, C., & Valluripalli Soorya, L. (2021). Examining a stepped-care telehealth program for parents of young children with autism: a proof-of-concept trial. *Molecular Autism*, *12*(1), 32. https://doi.org/10.1186/s13229-021-0443-9

The study of Blaiser et al. (2013) is a randomised controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). The teletreatment group scored statistically significantly higher on the expressive language measure than the traditional treatment group (p = .03). A measure of home visit quality revealed that the teletreatment group scored statistically significantly better on the Parent Engagement subscale of the Home Visit Rating Scales-Adapted and Extended.



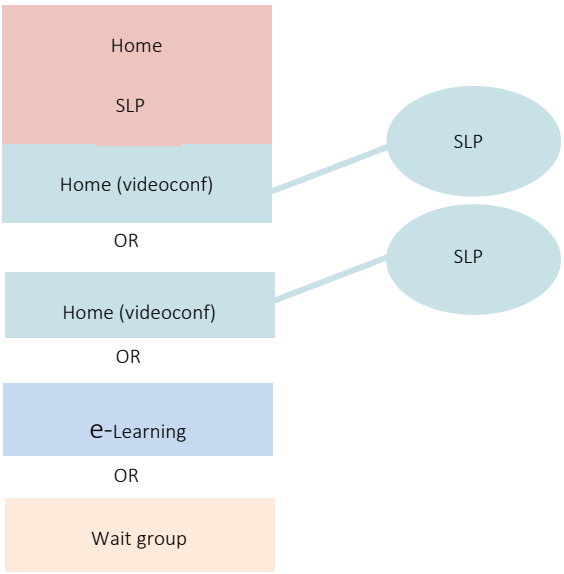
- Blaiser et al. (2013)
- One setting (telepractice hybrid or traditional), performed by remote audiologist or by audiologistat at home
- Hearing impaired children ;parent-implemented language treatment (duration = 6 months)
- Range = Telepractice hybrid 10-28 months ; Traditional 2-33 months
- Telepractice hybrid : N = 13 - Traditional : N = 14 - randomised
- 2 visits per month
- Telepractice hybrid group : one through webcam, one at home
- Traditional group : 2 visits at home

The study of Bridgman et al. (2016) was a parallel, open plan, noninferiority randomized controlled trial of the traditional Lidcombe Program treatment and the experimental Lidcombe Program teletreatment (videoconferencing). Primary outcomes were the percentage of syllables stuttered at 9 months postrandomization and the number of consultations to complete Stage 1 of the Lidcombe Program. Control group and experimental group were comparable. There was insufficient evidence of a post-treatment difference of the percentage of syllables stuttered between the traditional and Lidcombe Program teletreatment. There was also insufficient evidence of a difference between the groups for typical stuttering severity measured by parents.



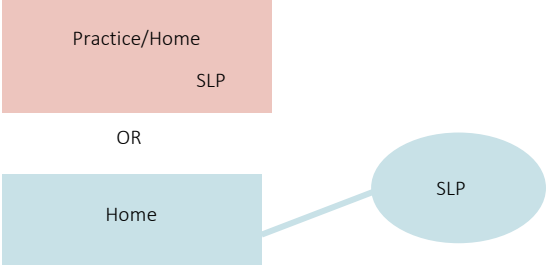
- Bridgman et al. (2016)
- One setting (telepractice or traditional), performed by remote SLP or by SLP at the practice
- Children who stutter ; parent-implemented stuttering treatment
- Range = 3-5 years 11 months
- Telepractice : N = 25 - Traditional : N = 24 - randomised
- Weekly 60-minute sessions
- Results 9 months after starting treatment

The study of Lau et al. (2022) explored the acceptability and feasibility of the World Health Organization's Caregiver Skills Training Programme in alternative delivery modes under new normal and post COVID-19 period. High levels of acceptability and feasibility of the training programme were supported by ratings on comprehensiveness and relevance, agreement with their personal values, duration, and usefulness. Traditional hybrid and teletreatment groups yielded more positive changes than elearning (without therapist) and wait groups with 3, 16, 13, and −3% in General Health Questionnaire-12, −13, −15, −6 and 0% in Difficulties-total, and 36.5, 35.5, 5.8 and 2.4% in Prosocial Scale at Strengths and Difficulties Questionnaire. This was the case for elearning, teletreatment, traditional hybrid, and wait groups respectively from baseline to 12 weeks after intervention. Results from two standardized scales echoed with qualitative observations that the programme helped improve caregivers' well-being, child's communication, and behaviours across intervention groups.



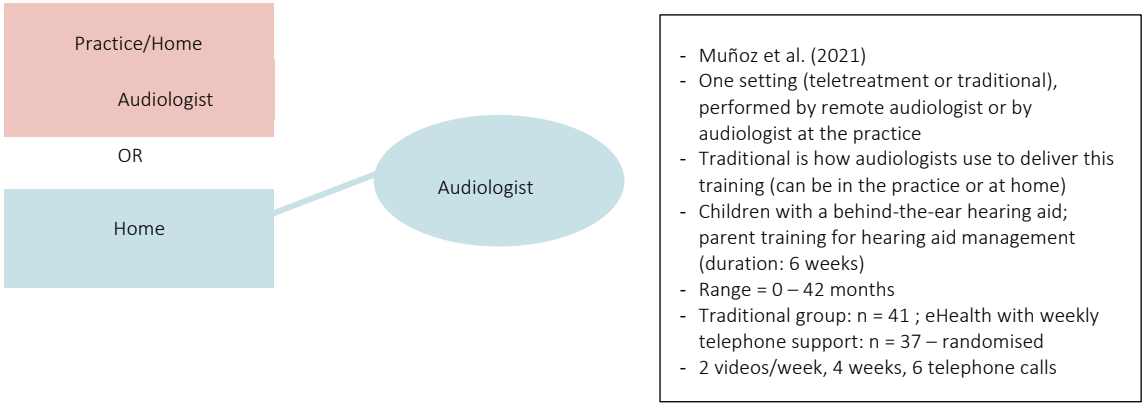
- Lau et al. (2022)
- One setting (traditional hybrid, teletreatment (videoconferencing), eLearning, wait), performed by remote SLP or by SLP at home
- Children with ASD; parent-implemented WHO Parent Skills Training Program
- Range = 2-6 years
- Traditional hybrid: n = 9, Teletreatment : n = 7 - eLearning: n = 9, wait group : n = 9 - randomised
- 9 weekly group sessions, 3 home visits
- Tradiional hybrid group: home visits and 3 one hour skills practice sessions in-person, group sessions through videoconferencing (COVID-19)

In the randomised controlled trial of McDuffie et al. (2018), 20 families of boys between 10 and 16 years old with Fragile X Syndrome received behaviour support, parent education, coaching, homework, clinician feedback and observation sessions over 12 weeks. One group received traditional treatment; the other group received teletreatment. The analyses indicated that mothers in the teletreatment group learned the three targeted intervention strategies (i.e., Recasting, WH-questions, and Fill-in-the-blank prompts). At post-treatment, they used these strategies significantly more often than mothers of children in the traditional treatment group both at home and in the clinic. At post-treatment, boys with Fragile X Syndrome in the teletreatment group spent a significantly longer duration of time engaged in the shared story-telling interaction with their mothers than did the boys in the traditional treatment group.

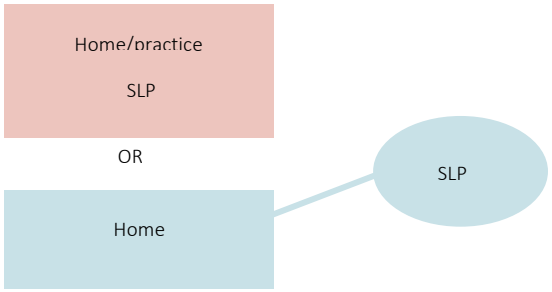


- McDuffie et al. (2018)
- One setting (telepractice or traditional), performed by remote SLP or by SLP at the practice/home
- Children with Fragile X-Syndrome; parent-implemented (spoken) language treatment
- Range = 10-16 years
- N = 20 – randomised in two groups
- Weekly 60-minute sessions, 12 weeks

The study of Muñoz et al. (2021) investigated parent acceptance and (knowledge) outcomes from a 6-week supplemental eHealth education and support program for hearing aid management compared with parents who received traditional treatment only. The eHealth program included watching videos and being engaged in the coaching phone calls. All parents completed questionnaires at four time points (i.e. baseline, 4 weeks, 8 weeks, 12 weeks). Results showed that from baseline to 12 weeks, parents in the teletreatment group had more gains in knowledge, perceptions, confidence, and monitoring related to hearing aid management than parents in the traditional treatment group. Hearing aid use increased over the time points for both groups. Group differences were not significant. These findings from the pilot study suggest that this supplemental eHealth education and support program is beneficial for parents and can improve parents' daily hearing aid management routines.



The 15-week, randomized proof-of-concept study of Wainer et al. (2021) explored the acceptability of a parent mediated intervention online reciprocal imitation teletraining (a naturalistic developmental behavioural intervention) and compared it to a traditional treatment on parent and child outcomes. After adjusting for baseline scores, there were significant differences in post-intervention outcomes between the two groups on the Social Communication Checklist Total scores $F(1,12)=4.863$, $p = .048$, Cohen's $d=1.27$. Post hoc analyses were performed with a Bonferroni adjustment. Post-intervention Social Communication Checklist Total scores were significantly higher in the teletreatment group relative to the traditional treatment group (Mdiff=17.267, 95% confidence interval [0.160,34.374], $p = .048$). No statistically significant differences were found between the two groups on the Unstructured Imitation Assessment ($F(1,12)=4.75$, $p = .050$). Acknowledging challenges with estimating effect sizes from small studies, effect sizes favour reciprocal imitation teletraining for Unstructured Imitation Assessment (Cohen's $d=1.26$). Given the observed effect size favouring the Unstructured Imitation Assessment, the Leeds Reliable Change Index was used to assess for significant changes on an individual level in imitation performance across the sample. Results suggested that 3 out of the 7 children in teletreatment demonstrated reliable improvement in performance on the Unstructured Imitation Assessment while no children from the traditional treatment group showed similar reliable improvement. Further, one participant from the traditional treatment group demonstrated a reliable decline in Unstructured Imitation Assessment performance. None of the children in the teletreatment group showed a reliable decline in Unstructured Imitation Assessment performance.



- Wainer et al. (2021)
- One setting (teletreatment or traditional), performed by remote SLP or by SLP at the home/practice
- Children with ASS; parent-implemented Reciprocal Imitation Training (duration : 15 weeks)
- Range = 18 -60 months
- N = 20 – randomised in two groups
- Traditional : 15 weeks of keeping current interventions stable
- Teletreatment : web-based platform, parent coaching sessions through videoconferencing, video conferencing if necessary

Synthesis of the evidence

Six RCTs investigated tele-education or teletraining for parents compared to traditional education or training about the treatment for their child. These were conducted in the domains of hearing disorders, stuttering, Autism Spectrum Disorders and Fragile X syndrome. One study (about stuttering intervention) reported no difference in child outcome between the two treatment settings. One study (comparing hybrid caregiver skills training, teletraining and e-training) reported no difference in outcome between hybrid and teletraining, but reported better results in these two groups than in the e-training and wait groups, implying the importance of the presence of a SLP. The other four studies reported better child outcomes or parent outcomes in the teletraining and tele-education groups that in the traditional treatment groups.

From evidence to decision: tele-education and teletraining for parents

Information of this section is also presented in Table 9.

Experts' opinions:

It is feasible to organise parent teletraining in our current Belgian health care context. Parent training is reimbursed up to 10 sessions. It is often easier to communicate to parents through a screen than with children, especially if no additional observation is necessary. Successful implementation depends on many factors including family context, intellectual capabilities of the parents, if a child/parent wears hearing aids, the age of the child, presence of co-morbidities, … and should be evaluated before telepractice is suggested as an option. It is possible that SLPs and audiologists need specific training to deliver telepractice. Currently SLPs and audiologists are only trained to provide traditional treatment. They, and also parents, may need additional training.

A combination of telepractice and traditional treatment (hybrid delivery) allows clinical demonstrations of the SLP or audiologist compared with telepractice exclusively.

Besides parent training, also evaluation sessions and sessions in which advice is given are suited to be organised through telepractice. Telepractice can also be used to coach teachers for example, on attending to a preschooler with speech sounds disorders or a preschooler who stutters.

Benefits and challenges:

Benefits:

- Evidence in the literature shows similar or better parent and child outcomes when parents receive training or education through telepractice.
- A teletreatment is easier to schedule for the parent and the child and reduces travel time.
- Parents are concentrated when they receive tele-education or teletraining
- Parents appreciate the opportunity to blend in treatment in their home context (for example, responding adequately to a child's behaviour in the home context). The level of family-centredness is enhanced.

Challenges:

- Teletraining or tele-education may feel less personal.
- Technical issues may cause delays during the teletraining or tele-education.
- ICT illiteracy may prevent the use of teletraining or tele-education.
- Good internet quality is necessary to enable the delivery of teletreatment.

Feasibility

Teletraining and tele-education for parents can easily be organised in the current health system. They are well fit to be conducted through telepractice.

Value & preferences:

Professional preferences:

- SLPs and audiologists may prefer traditional parent training or education for various reasons including a lack of skills or confidence to deliver them through telepractice.
- SLPs and audiologists may prefer teletraining or tele-education for various reasons including increased convenience for the parent and therapist, and easier reaching out to clients because geographical factors don't have an impact on the intervention.

Client preferences:

- Parents may prefer traditional parent training or education for various reasons including a lack of ICT skills or missing the personal contact with the SLP or audiologist.
- Parents may prefer teletraining or tele-education for various reasons including increased convenience to schedule the sessions, more efficient communication with the SLP or audiologists (focus on the training or education and/or no interruptions of the child in case the child does not need to be present.

Economic considerations:

- If teletraining or tele-education for parents leads to better child or parent outcomes, it will decrease the cost for the parent and the therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Treatment with the child

Summary of the literature

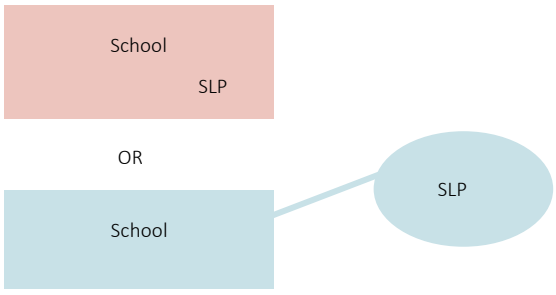
Cameron, C. A., & Hutchison, J. (2009). Telephone-mediated communication effects on young children's oral and written narratives. *First Language*, *29*(4), 347-371. https://doi.org/10.1177/014272309105313

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

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

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

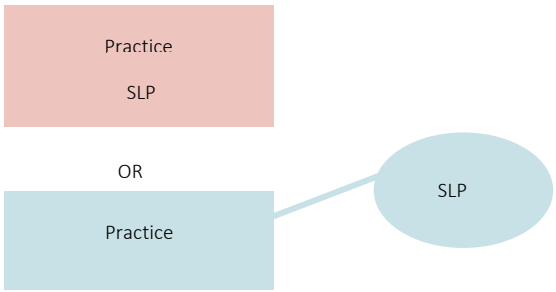
The training study of Cameron and Hutchison (2009) investigated the effects of an intensive telephone intervention on oral narratives compared with traditional intervention. Moreover, it investigated whether the same telephone intervention yield transfer effects on written expression. Significant context differences were not evidenced at pre-test; however at post-test, there were context differences favouring the telephone. Significant pre-test/post-test differences favouring post-test were shown for the traditional intervention group. Context interacted with time on number of oral different words. Overall, post-test performance on these oral indices was stronger for the telephone than for the traditional intervention group. Evidence of greater narrative skill was demonstrated at post-test for the telephone group; pre-/post-test differences in the traditional intervention group favoured post-test on total oral narrative elements. However, larger post-test effects were found in the telephone group. The traditional intervention group and the telephone groups differed on this measure at post-test only. Essentially, after the intervention, children produced more narrative elements in their oral story reproductions. However, strongest performance on this measure was shown at post-test in the telephone group. Significant context differences as a function of time were evidenced on oral goal-directed content. The telephone group produced more goal-directed content at post-test than at pre-test, whereas the traditional intervention group failed to do so. Context differences were significant at post-test only. Essentially, telephone-experienced children became more skilled over time at including goal-directed content in their oral narratives. For the written narratives, significant interactions between context, grade, and time were established in the total number of written utterances, with significant pre-test/post-test differences for the oldest children in the telephone group.



- Cameron and Hutchison (2009)
- One setting (telepractice or traditional), performed by remote SLP or by SLP at the school
- Telepractice was telephone intervention
- Typically developing children
- Range = 4 years 9 months-8 years 1 month
- Telepractice : N = 17 - Traditional : N = 16 - randomised
- Three times per week, 12 training modules
- Results 4 weeks after starting treatment

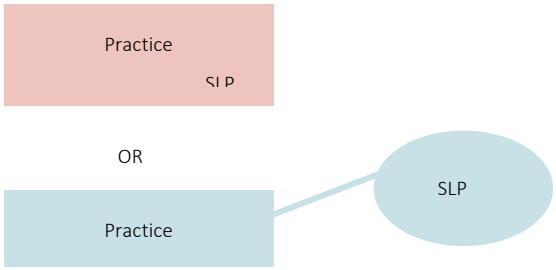
The randomized controlled trial of Cancer et al. (2021) investigated treatment in two groups of children with reading disabilities. Both children received the same treatment program on a computer. In the traditional treatment group, the therapist was sitting with the child facing the same screen. In the telepractice group, the

child and therapist were connected through videoconferencing and the therapist shared her screen with the child. Reading speed and reading accuracy improved after training in both conditions, as confirmed by significant phase main effects. Conversely, the interaction effect between Phase and Condition was nonsignificant for both reading outcomes, thus showing no difference between the telepractice group versus the traditional treatment group. As for the secondary outcome measure, similar results were found for Rapid Automatised Naming speed, with a significant phase main effect and a nonsignificant Phase and Condition interaction effect.



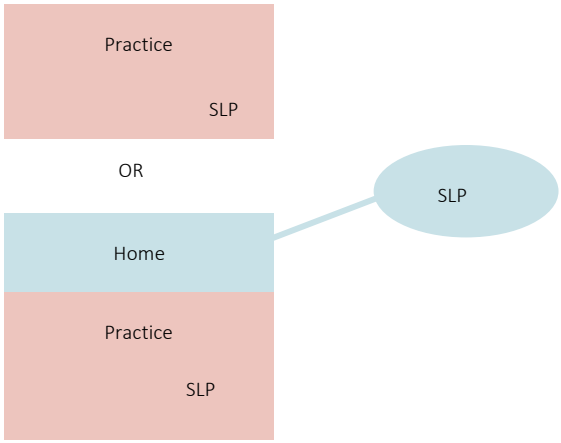
- Cancer et al. (2021)
- One setting (telepractice or traditional), performed by remote SLP or by SLP at the practice
- Children with specific reading disorder or dyslexia
- Range = 8-13 years
- Telepractice : N = 15 - Tradional : N = 15 - randomised
- Biweekly 45-minute sessions
- Results 10 weeks after starting treatment

The study of Grogan-Johnson et al. (2013) compared the effects of a 5-week speech sound intervention delivered through traditional treatment with teletreatment in school-aged children with speech-sound disorders. All participants received speech sound intervention. The treatment sessions lasted 30 minutes and followed a standard protocol. Review of results on the Goldman-Fristoe Test of Articulation-2 indicated there were no significant differences between the two groups on the postintervention raw scores. A repeated measures ANOVA showed no significant difference between the two groups' performance on the Goldman-Fristoe Test of Articulation-2 post-intervention, but there was a statistically significant change in test scores from pre- to post-intervention for both groups. In addition, the effect sizes reported for these analyses were low suggesting that the two groups were similar in their performance. There was no statistically significant difference between the mean judgments for the side-by-side and telepractice groups on the pre-test. Results indicated a statistically significant difference in mean listener judgments across time for both groups, but no significant difference between mean listener judgments for the two groups in the amount of change across time. Thus, both groups benefited from intervention and that benefit was the same regardless of type of intervention. This result is further supported by the reported low effect sizes for the listener judgments before and after intervention suggesting that the children who received teletreatment performed similarly to the children who received traditional intervention.



- Grogan-Johnson et al. (2013)
- One setting (telepractice or traditional), performed by remote SLP or by SLP at the practice
- Children with speech sound disorders
- Range = 6-10 years
- Telepractice : N = 7 - Tradional : N = 7 - randomised
- Biweekly 30-minute sessions
- Results 5 weeks after starting treatment

In the study of Sweeney et al. (2020), a group of children with speech sound disorders and cleft palate were included in a two-centre, two-phase randomised controlled trial in which a teletreatment hybrid group was compared with a traditional treatment group. There was no evidence of an interaction between Time and Group or an overall statistical difference between groups for Percent Consonants Correct scores. There was a statistically significant difference over time for both groups: Effect sizes were medium for words and small for sentences. For intelligibility and participation (Intelligibility in Context Scale and Focus on Outcomes for Children Under Six questionnaire), there was no evidence of an interaction between Time and Group or an overall statistical difference between treatment groups. A statistically significant difference over time was found for intelligibility and for participation with Focus on Outcomes for Children Under Six questionnaire results indicating clinically meaningful (parent-led group) and significant (control group) change in participation.



- Sweeney et al. (2020)
- One setting (teletreatment hybrid or traditional), performed by remote SLP or by SLP at the practice
- Children with speech sound disorders and cleft palate; parent-implemented speech treatment (duration : 12 weeks and 2 months follow-up)
- Range = 2.9 – 7.5 years
- Traditional group: n = 21 ; telepractice hybrid : n = 23 – randomised
- Traditional: 6 sessions over 12 weeks with parent and child
- Teletreatment hybrid: 2 days training in practice, 2 videoconferencing sessions and 1 in-person session

Synthesis of the evidence

Four RCTs compared traditional treatment with teletreatment in children aged between nearly 3 years and 13 years, in the domains of reading disorders, language disorders, developmental speech sound disorders and speech disorders due to cleft palate. In most studies, there was no difference between both groups, indicating that teletreatment is a viable alternative. In one study in which the teletreatment was a telephone treatment, better oral narrative skills were observed after the telephone intervention.

From evidence to decision: Treatment with the child

Information of this section is also presented in Table 9.

Experts' opinions:

It is feasible to organise teletreatment with children. Older children often prefer to have the teletreatment session without the parent besides them. Parents, however, should be around (e.g., in the same room) in case something goes wrong, as the child may panick or may need help.

When the SLP or audiologist shares her screen, the child cannot see the SLP anymore and that has an impact on the treatment experience. This could be solved by connecting a second device. The SLP or audiologist and child cannot play a game in which physical presence is necessary as in traditional treatment sessions. This makes the

treatment session a little less personal. Other types of games, however, are really wel suited for telepractice such a barrier games. Sometimes the image on the screen moves or the internet connection is not stable.

Benefits and challenges:

Benefits:

- Evidence in the literature shows similar or better child outcomes when children receive teletreatment then traditional treatment.
- Teletreatment sessions are easier to schedule for the parent and the child and reduces travel time.
- Children may be more concentrated when they receive teletreatment.

Challenges:

- Teletreatment sessions may feel less personal for a child than traditional treatment sessions.
- Technical issues may cause delays during teletreatment sessions.
- Especially older primary school children have learnt to use videoconferencing during the COVID-19 period. This familiarity with videoconferencing helps them to make a more realistic decision when they are offered teletreatment.
- Tangible resources cannot be used in teletreatment sessions.
- Good internet quality is necessary to enable the delivery of teletreatment.
- A parent needs to be present to assist the child in case of technical or practical difficulties.

Feasibility

Teletreatment is feasible, depending on the type of disorder, the characteristics of the child and family, and characteristics of the SLP or audiologist.

Value & preferences:

Professional preferences:

- SLPs and audiologists may prefer traditional treatment for various reasons including a lack of skills or confidence to deliver them through telepractice, additional work or the lack of using tangible resources.
- SLPs and audiologists may prefer teletreatment for various reasons including increased convenience for the family.

Client preferences:

- Children may prefer traditional treatment for various reasons including a lack of ICT skills or missing the personal contact with the therapist.
- Children may prefer teletreatment for various reasons including the use of mouse or other digital applications in tasks on the computer or the increased independence.

Economic considerations:

- If teletreatment leads to better child outcomes, it will decrease the cost for the parent and for the therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Telepractice dosage

Summary of the literature

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

Muñoz, K., San Miguel, G. G., Barrett, T. S., Kasin, C., Baughman, K., Reynolds, B., ... & Twohig, M. P. (2021). eHealth parent education for hearing aid management: A pilot randomized controlled trial. *International Journal of Audiology*, *60*(sup1), S42-S48. https://doi.org/10.1080/14992027.2021.1886354

The study of Bridgman et al. (2016) compared the traditional Lidcombe Program treatment with the Lidcombe Program teletreatment. An unpaired t-test showed a statistically significant difference in the mean duration in minutes of Stage 1 consultations for participants who had completed Stage 1 at 18 months postrandomization: traditional treatment group (N = 16; M = 40.4, SD = 5.2) and the teletreatment group (N = 15; M = 33.4, SD = 4.7);t(29) = 3.9, $p < .001$, 95% confidence interval [3.4, 10.7]. The mean teletreatment group consultation duration was 17% shorter than the mean traditional consultation duration.

The study of Muñoz et al. (2021) investigated parent acceptance and (knowledge) outcomes from a 6-week supplemental eHealth education and support program for hearing aid management compared with parents who received traditional treatment only. The parent reported time in the traditional treatment group varied from 7.6 hours to 8.4 hours. The parent reported time in the teletreatment group varied from just over 9 hours to almost 9.5 hours. This difference is statistically not significant.

Synthesis of the evidence

Two RCTs compared treatment duration between the teletraining group and the traditional training group. In one study about stuttering intervention for preschool age children, the teletreatment group obtained the same results but the treatment process required 17% less time than the traditional treatment group. In the other study, in which parents received tele-education about hearing aid management, no difference between the groups was found. Both studies investigated teletraining (or tele-education) to parents about the treatment for their child.

From evidence to decision: Telepractice dosage

Information of this section is also presented in Table 9.

Experts' opinions:

SLPs and audiologists confirm that treatment through telepractice usually takes less time. Especially sessions in which advice is given are more efficiently through telepractice as therapist and parent or child tend to stay more to the point. Perhaps less time goes into small talk when meeting online. A conversation is more structured, it's not possible to give a hug and there is less occasion to talk about peripheral issues (e.g. weather, putting on or taking off coats), ...

Benefits and challenges:

Benefits:

- Evidence in the literature shows similar or shorter treatment duration when parents receive teletraining.
- Teletraining is easier to schedule for the parent and reduces travel time.
- Parents may be more concentrated when they receive teletreatment.

Challenges:

- Technical issues may cause delays during teletraining.

Feasibility

Teletraining and tele-education for parents can easily be organised in the current health system. They are well fit to be conducted through telepractice.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional parent training or education for various reasons including a lack of skills or confidence to deliver them through telepractice.
- Therapists may prefer teletraining or tele-education for various reasons including increased convenience for the parent and themselves, or fewer cancelations of sessions. Illness, being late or transportation problems often lead to cancelation of a traditional session, whereas it would not if delivered through telepractice.

Client preferences:

- Parents may prefer traditional parent training or education for various reasons including a lack of ICT skills or missing the personal contact with the therapist.
- Parents may prefer teletraining or tele-education for various reasons including increased convenience to schedule the sessions, more efficient communication with the therapist (focus on the training or education and/or no interruptions of the child in case the child does not need to be present).

Economic considerations:

- If teletraining or tele-education for parents leads to a shorter treatment process, it will decrease the cost for themselves and for the SLP or audiologist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Treatment adherence in telepractice

Summary of the literature

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

Muñoz, K., San Miguel, G. G., Barrett, T. S., Kasin, C., Baughman, K., Reynolds, B., ... & Twohig, M. P. (2021). eHealth parent education for hearing aid management: A pilot randomized controlled trial. *International Journal of Audiology*, *60*(sup1), S42-S48. https://doi.org/10.1080/14992027.2021.1886354

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

The study of Lau et al. (2022) explored the acceptability and feasibility of the World Health Organization's Caregiver Skills Training Programme in alternative delivery modes. Both traditional treatment and teletreatment groups achieved a high attendance (95% and 100% respectively), which was recorded by the therapists during each session. Coupling with high attendance, the completion rate of these two groups was also high (100% and 78% respectively). The low attendance of the elearning group, on the contrary, resulted in the lowest completion rate (64%), suggesting that the asynchronous mode favors participants with more self-discipline to learn regularly and complete the programme. Caregivers' adherence to home practice was evaluated by the feedback in the Caregiver Diary on the frequency and the daily time the participants practiced *Skills and Strategy* in daily activities at T1 and T2. The average practice frequency with the children per week for elearning, traditional treatment, and teletreatment groups were 3.1 (SD = 4.2), 5.1 (SD = 4.0), and 7.4 (SD = 6.2) at T1, and were 3.2 (SD = 4.1), 6.9 (SD = 5.5), and 4.6 (SD = 4.5) at T2, respectively. The average minutes practiced with the children per week for elearning, traditional, and teletreatment groups were 50.6 (SD = 67.1), 78.6 (SD = 94.4), and 139.3 (SD = 137.1) at T1, and were 47 (SD = 63.7), 83.8 (SD = 91.3), and 65.6 (SD = 56.9) at T2, respectively. The duration of practice time per week dropped for both elearning and teletreatment groups. Although the percentage dropped in both practice frequency and duration per week for the teletreatment group was substantially large (-38% and −53% respectively), the change was not significant due to widespread use of the data. This dramatic drop in teletreatment was mainly because two caregivers reduced the practices from twice a day (14 times per week) to 5–6 times a week. However, it was found that there was an increase in both practice frequency and duration per week in the traditional treatment group.
The intervention fidelity of group sessions was reported by observers in rating the participants' degree of comfort, enthusiasm/interest, and level of involvement in planning home practice. The average rating of the four components in both groups was >4 (out of five), suggesting that the intervention fidelity of group sessions was relatively high for both delivery modes.

The study of Muñoz et al. (2021) investigated parent acceptance of and (knowledge) outcomes from a 6-week supplemental eHealth education and support program for hearing aid management compared with parents who received traditional treatment only. The eHealth program was conducted with a high level of fidelity among coaches, and parents in the teletreatment group were responsive to the eHealth program. They watched the videos and engaged in the coaching phone calls.

The 15-week, randomized proof-of-concept study of Wainer et al. (2021) explored the acceptability of a parent mediated intervention online reciprocal imitation teletraining and compared it to a traditional treatment on parent and child outcomes. The acceptability and feasibility of reciprocal imitation traditional training and teletraining were rated highly. ANCOVAs were run to determine the effect of the stepped-care model of the reciprocal imitation teletraining on post-intervention parent variables after controlling for baseline scores on these same variables. After adjusting for baseline scores, there were significant differences in post-intervention outcomes between groups on ratings of parent fidelity, $F(1,12)=44.59$, $p < .001$, Cohen's $d=3.86$, and Early Intervention Parenting Self-Efficacy Scale scores, $F(1,12)=6.185$, $p = .029$, Cohen's $d=1.44$. Post hoc analyses were performed with a Bonferroni adjustment and indicated that post-intervention parent fidelity ratings were significantly greater for the reciprocal imitation teletraining relative to the traditional treatment (Mdiff=2.56, 95% confidence interval [1.72,3.39], $p < .001$). Post-intervention Early Intervention Parenting Self-Efficacy Scale scores were also significantly greater for the reciprocal imitation teletraining versus traditional treatment (Mdiff=9.86, 95% confidence interval [1.22, 18.50], $p = .029$). This parent met the parent fidelity threshold (i.e., ≥80% on the reciprocal imitation training – Parent Fidelity Form) and demonstrated increases in self-efficacy (i.e., reported gains on the Early Intervention Parenting Self-Efficacy Scale) and therefore did not receive coaching. Two parents who met criteria for fidelity of reciprocal imitation training reported slight declines in self-efficacy from baseline

to post-website, and therefore received coaching. Four additional parents received coaching as they did not meet reciprocal imitation training fidelity threshold. After receiving coaching, five of the six parents achieved fidelity and increased ratings of self-efficacy from baseline to post-intervention.

Synthesis of the evidence

Three RCTs compared the treatment adherence to teletreatment or traditional treatment. This was measured in three different ways: (1) through duration of practice at home, (2- attendence and completion rate, (3) treatment fidelity and fidelity ratings. The three studies involved parent training of education about skills to manage communication behaviour and hearing aids. The teletraining groups scored better or the same for treatment fidelity, better for parent fidelity ratings, and the same for attendance and completion rate. The attendance and completion rate decreased significantly in the e-learning group when no therapist was involved. The duration of home practice was lower in the teletreatment group than in the traditional group. This seemed to be a consequence of a decision taken in the program, and the results did not show a statistical difference.

From evidence to decision: Treatment adherence in telepractice

Information of this section is also presented in Table 9.

Experts' opinions:

Compliance to teletreatment in Belgium is perceived as equally well as to traditional treatment, on the condition that adjustments are done by the therapist. Ideally, therapists should be supported to do this (e.g., by in-service training, by recommendations) to make sure it is evidence-based.

Many factors can affect compliance and compliance can vary over time. For example, during busy periods at home or in a single parent family. A few rules, clear communication, parent involvement and client well-being (e.g. personal contact, using stimulating materials and activities) seem incredibly important to promote compliance.

Setting out the expectations is essential, for example about parental proximity during teletreatment sessions. Clear communication can be hindered in teletreatment (e.g., less technical knowledge of parents, less opportunities to use visual support, the therapist cannot model certain things), or can be promoted in teletreatment (e.g., because an informal interpreter or both parents are present).

Benefits and challenges

Benefits:

- Evidence in the literature shows that, especially in teletraining with parents, the treatment seems to be done by the parents in a way that is expected, even better than in traditional training.
- If clear rules are set, the client and his/her family comply with the expectations of the treatment.

Challenges:

- Teletreatment sessions may seem to be more casual to clients and parents. Clients and parents may not be prepared when the sessions starts (need to look for the necessary documents, …), may show inappropriate behaviour (eating, doing other activities such as cooking) or may have other people around who disturb the session.

Feasibility

Teletreatment (including teletraining) is feasible according to the current Belgian legislation.

Values & preferences

Professional preferences:

- Therapists may prefer teletreatment knowing that it needs to have clear expectations and adaptations.
- Therapists may prefer to combine teletreatment with traditional treatment as physical gestures are important to build up the relationship.
- Therapists may prefer traditional treatment due to various reasons, including limited technical skills of the client and family or lack of confidence of the therapist or client and family.

Client preferences:

- Clients may prefer traditional treatment or teletreatment. It is important to find out what the best fit it to achieve the best adherence to treatment.

Economic considerations

- If teletreatment leads to better adherence, the treatment is more effective than traditional treatment, or the ther way around. The best fit for the client and family will lead to the most cost-effective situation.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Teletreatment: How to establish a good adherence to teletreatment?

4. Combine telepractice with traditional intervention, considering the preference of the parents, children and you as therapist. **(GPP)**
5. Propose telepractice if it is a good fit for a child and family. **(GPP)**

Weak evidence shows that parents are more actively involved during telepractice sessions which increases treatment adherence. Evidence also shows that older children become more autonomous and experienced with technical equipment and this can increase adherence. Finally, weak evidence suggests that the quality of life is the same in parents who were educated or trained through telepractice as those through traditional education or training. Evidence for the latter is available for training in treatment of communication in Autism Spectrum Disorders and other developmental disorders.

Evidence in the literature: Interactive methods increase parent adherence

Summary of the literature

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

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

Parsons, D., Cordier, R., Vaz, S., & Lee, H. C. (2017). Parent-mediated intervention training delivered remotely for children with Autism Spectrum Disorder living outside of urban areas: Systematic review. *Journal of Medical Internet Research*, *19*(8), e198. https://doi.org/10.2196/jmir.6651

The study of Blaiser et al. (2013) is a randomized controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). The most significant benefit reported by families was that telepractice facilitated family engagement during sessions and it put the family in the driver's seat. Caregivers reported that they learned how to help their child more through telepractice than in traditional intervention, and that they were more involved in the telepractice sessions.

Based on a review of existing reviews, Law et al. (2022) critically analysed the relevant literature related to intervention with children with communication disabilities drawing on the Capability-Opportunity-Motivation-Behaviour-model. Parents play an active role in teletreatment, even before/after the sessions as they interact with the therapist to exchange information about procedures, materials and setting. Telepractice offers many possibilities for parental involvement and provides the opportunity for parents to actively participate in the sessions with their children and to gain greater understanding of their child's communication difficulty.

Parsons et al. (2017) reviewed the existing evidence presented by studies on parent-mediated intervention training, delivered through telepractice for parents having children with Autism Spectrum Disorders and living outside of urban areas. They provided an overview of current parent training interventions used with this population and provided an overview of the method of delivery of the parent training interventions used with this population. Interventions included mostly self-guided websites: with and without therapist assistance, with training videos, written training manuals, and videoconferencing. More interactive methods of delivery, such as

videos and regular therapist contact for training have been proven to (1) improve adherence, (2) increase completion rates, and (3) improve fidelity in parent-mediated interventions.

Synthesis of the evidence

Three SRs evaluated telepractice and considered the interaction between therapist and parent as one of the most essential factors in teletreatment. As one study put it: "*Telepractice puts the family in the driver's seat*", more than traditional treatment.

From evidence to decision: Interactive methods increase parent adherence

Information of this section is also presented in Table 9.

Experts' opinions:

Increased involvement of a parent during teletreatment may increase the adherence of the parent to implement the treatment as is expected.

Benefits and challenges

Benefits:

- Evidence in the literature shows that parents who are involved actively deliver treatment more accurately.
- Parents who are actively involved, understand the disorder and the progress of their child well and will act adequate during the treatment process.
- Therapists are required to actively involve the parent during teletreatment, more than during traditional treatment.

Challenges:

- Parents who do not understand the disorder or treatment, may be harder to redirect in the right direction during telepractice.

Feasibility

Involving parents actively is feasible during telepractice. It is possible that therapists need additional training to do this.

Values & preferences

Professional preferences:

- Therapists usually involve (or should involve) parents actively in the treatment of young children in both teletreatment and in traditional treatment, despite the disorder of the child.

Client preferences:

- Parents do not always realise that active involvement is required during speech, language, hearing or other communication-related treatment at the start of treatment. This is required in traditional treatment and in teletreatment.

Economic considerations

- Better understanding (parents) and acting more promptly and adequately (therapist) may lower the total treatment cost, as treatment may be organised more efficiently.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Teletreatment with older children can increase adherence

Summary of the literature

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

Based on a review of existing reviews, Law et al. (2022) critically analysed the relevant literature related to intervention with children with communication disabilities drawing on the Capability-Opportunity-Motivation-Behaviour model. It is mentioned that telepractice can be associated with added advantages when compared with traditional interventions for adolescents, as their increased autonomy and experience with technical equipment can foster treatment adherence.

Synthesis of the evidence

One SR mentioned that older children (in the study they refer to adolescents) enjoy the greater independence resulting through teletreatment.

From evidence to decision: Teletreatment with older children can increase adherence

Information of this section is also presented in Table 9.

Experts' opinions:

Teletreatment is likely to promote adherence of older children to the treatment because they are given more autonomy and experience with technical equipment.

Benefits and challenges

Benefits:

Giving older children more autonomy may lead to better motivation and adherence to the treatment.

Challenges:

- It is still necessary to have a parent around to assist the child if problems occur. If the parent is too involved, it may compromise the feeling of autonomy of the child.
- If the child is expected to do tasks that are too difficult or technological problems occur, it may lead to feelings of frustration and demotivation.

Feasibility

It is feasible to deliver teletreatment to older school age children if the necessary assistance is available (technical support, training if necessary and having a parent in the neighbourhood).

Values & preferences

Professional preferences:

- Therapists may prefer teletreatment or traditional treatment for various reasons, including limited ICT skills or a lack of confidence.

Client preferences:

- Children may prefer teletreatment because they are given more autonomy. Other children may prefer traditional treatment, for example because of the physical presence of the therapist.

Economic considerations

- If children receive treatment that best fits them, it will increase treatment adherence. This will lower the total treatment cost.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Combine teletreatment and traditional treatment

Summary of the literature

Boisvert, M., Lang, R., Andrianopoulos, M., & Boscardin, M. L. (2010). Telepractice in the assessment and treatment of individuals with autism spectrum disorders: A systematic review. *Developmental Neurorehabilitation*, *13*(6), 423-432. https://doi.org/10.3109/17518423.2010.499889

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

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

Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021). Evaluating the use of telepractice to deliver pediatric feeding assessments. *American Journal of Speech-Language Pathology*, *30*(4), 1686-1699. https://doi.org/10.10.1044/2021_ajslp-20-00323

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

The systematic review of Boisvert et al. (2010) provided a systematic analysis of studies in which telepractice procedures were used in the assessment or treatment of individuals with Autism Spectrum Disorder. One study reported no group differences in therapist and parent satisfaction between telepractice and traditional intervention.

The study of Grant et al. (2022) identified the attitudes and perspectives of allied health professionals (SLPs, occupational therapists and physiotherapists) towards using telepractice for service delivery to children with developmental delays. Two studies reported participant views that telepractice was similar to or even better than traditional services in some situations. Another study reported views that telepractice was facilitative of pre-and post-operation planning for children with cerebral palsy and that telepractice was an effective adjunct to traditional services.

McGill et al. (2019) reviewed peer-reviewed articles investigating teletreatment methodologies for stuttering. In one study, one parent reported a preference for hybrid treatment, stating that, while telepractice was convenient, direct contact with the therapist was important. Of the two children, one preferred teletreatment and one preferred traditional treatment. Therapists reported that telepractice sessions were ''less personable than contact in traditional treatment, and they could not develop personalized transfer activities,'' despite also reporting that the telepractice sessions allowed easier transfer to natural environment using participants' families.

The study of Raatz et al. (2021a) determined if acceptable levels of interrater reliability could be achieved conducting pediatric feeding and swallowing assessment through telepractice compared with traditional assessment. Seven parents provided free-text comments about their child's telepractice appointment. Four parents provided positive feedback about the telepractice appointment. Two reported their preference for both telepractice and in-person appointments for their child's future care, and one reported that whilst they saw the benefits of the telepractice appointment for families who did not have easy access to in-person services, their personal preference remained to access traditional care.

The review of Tully et al. (2021) outlines the implementation issues for incorporating telepractice to paediatric services generally, or how users perceive these issues. Qualitative findings include that some therapists reported using telepractice, which often meant working out of their own homes, was sometimes isolating and that the inability to run cases, issues and ideas past colleagues in the clinical environment was a drawback. Four studies assessed attitudes to telepractice as an alternative to traditional treatment among families who had not yet experienced telepractice and found high (95%, 151/159) to moderately high (58% 148/256; 57%, 588/1032) preference for traditional teatment, despite openness to trying telepractice. For studies in which telepractice had been tested, reported acceptability of telepractice ranging from 79 to 100%. One study also reported that telepractice is useful if the child is doing well, otherwise traditional intervention is preferable.

Synthesis of the evidence

Five SRs evaluated the preference of therapists, clients and families about treatment setting. Findings indicate that when teletreatment and traditional treatment groups are compared, there is no difference in parent satisfaction between the groups. Four SRs showed mixed preferences of participants and therapists for teletreatment, traditional treatment or a combination of both. Participants are usually positive about the teletreatment and see it as an addition to traditional treatment. One SR reported mixed feelings about teletreatment because of the lack of physical presence of the therapist, and treatment sessions felt less personal.

From evidence to decision: Combine teletreatment and traditional treatment

Information of this section is also presented in Table 9.

Experts' opinions:

Preference for treatment format depends on many factors. Physical contact seems important to explore, e.g., in the context of the therapeutic relationship. Some children or parents need regular physical contact of the therapist, while others don't need it that much. Parent involvement is very important. Depending on the individual factors of each family, decisions should be made.

Benefits and challenges

Benefits:

- Following preferences or combining teletreatment and traditional treatment is likely to result in increased treatment adherence.

Challenges:

- If therapists have a clear preference for teletreatment or traditional treatment only, or misread the preference of the client, it may lead to delivering treatment that is not preferred by the client. This may result in decreased treatment adherence.

Feasibility

It is feasible to deliver teletreatment, traditional treatment or a combination of both according to the current Belgian legislation.

Values & preferences

Professional preferences:

- Therapists may prefer teletreatment or traditional treatment over the other for various reasons.

Client preferences:

- Clients may prefer teletreatment or traditional treatment over the other for various reasons.

Economic considerations

- If clients receive treatment in the format that they prefer, it will increase treatment adherence. This will lower the total treatment cost.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Telepractice can be a better fit for a client and family

Summary of the literature

Ellison, K. S., Guidry, J., Picou, P., Adenuga, P., & Davis III, T. E. (2021). Telehealth and autism prior to and in the age of COVID-19: A systematic and critical review of the last decade. *Clinical Child and Family Psychology Review*, *24*(3), 599-630. https://doi.org/10.1007/s10567-021-00358-0

Maluleke, N. P., Khoza-Shangase, K., & Kanji, A. (2021). An integrative review of current practice models and/or process of family-centered early intervention for children who are deaf or hard of hearing. *Family & Community Health*, *44*(1), 59-71. https://doi.org/10.1097/fch.0000000000000276

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

Ellison et al. (2021) provided an overview of the literature regarding telepractice for children and adolescents with Autism Spectrum Disorder over the last decade with regards to the type, recipients, and outcomes of the services and provided a recent evidence base upon which therapists and researchers alike might base ongoing and future services and research. Four studies explored the feasibility and acceptability of parent implemented interventions based on the Early Start Denver Model and the effect on different child behaviours (e.g., communication, imitation). Across these studies, parent fidelity in implementation increased through intervention and maintained through follow-up.

The aim of Maluleke et al.'s study (2021) documented current evidence reflecting trends in family-centred early intervention for children who are deaf or hard of hearing by identifying and describing current practice models and processes of family-centred early intervention for these children. One study reported that all parents expressed satisfaction with the service, with 89% reporting that receiving early intervention services through videoconferencing was a better alternative to traveling for regular traditional sessions. Generally, there is sufficient evidence for family-centred early intervention, with parents indicating the need for full involvement in their children's care. Methods of parent involvement (coaching and information sharing) need to be culturally and linguistically appropriate, with sensitivities around time and manner. This increases parent satisfaction with intervention programs and improves outcomes for children who are deaf or hard of hearing.

The 15-week, randomized proof-of-concept study of Wainer et al. (2021) explored the acceptability of a parent mediated intervention online reciprocal imitation teletraining (a naturalistic developmental behavioural intervention) and compared it to a traditional treatment on parent and child outcomes. Responses on the Scale of Treatment Perceptions indicated strong acceptability of reciprocal imitation training as a skill building intervention. Participants rated reciprocal imitation training as very safe and effective, and endorsed items such as it being a good fit for their child and family.

Synthesis of the evidence

Three SRs reported that for certain families, teletreatment is better suited than traditional treatment. Reasons include the convenience of not having to travel, and the positive outcomes of telepractice for family-centred care. Telepractice intervention needs to be adapted culturally, linguistically, and practically to fit a family. This results in high treatment adherence and fidelity which favours a child's treatment process.

From evidence to decision: Telepractice can be a better fit for the client and family

Information of this section is also presented in Table 9.

Experts' opinions:

This topic was not elaborated on during the discussions.

Benefits and challenges

Benefits:

- If the treatment format fits the client and his/her family, it is likely to result in increased treatment adherence.

Challenges:

- If therapists impose a treatment setting that does not fit the client and his/her family, it may result in decreased treatment adherence.

Feasibility

It is feasible to deliver teletreatment, traditional treatment or a combination of both, depending on the best fit for the client and family.

Values & preferences

Professional preferences:

- Therapists may prefer teletreatment or traditional treatment over the other for various reasons.

Client preferences:

- Clients may prefer teletreatment or traditional treatment over the other for various reasons.

Economic considerations

- If clients receive treatment in the setting that best fits them, it will increase treatment adherence. This will lower the total treatment cost.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: The effect of teletreatment on the quality of life

Summary of the literature

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

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

The study of Lau et al. (2022) explored the acceptability and feasibility of the World Health Organization's Caregiver Skills Training Programme in alternative delivery modes. A two-way ANOVA was conducted for the Strengths and Difficulties Questionnaire, which assesses children's mental health. The main effect of time points was significant, with $F(1,30) = 5.55$, $p < .05$, partial eta squared = 0.16. The main effect of conditions was also significant, $F(3,30) = 3.21$, $p < .05$, partial eta squared = 0.24. The interaction between time points and condition

was not significant, F < 1. Descriptive analyses showed that there was an overall improvement (decrease in problematic behaviours and increase in prosocial behaviours) in all treatment groups, while the total difficulties score of the waiting group remained unchanged. In particular, the two treatment groups with facilitators (traditional treatment and teletreament) gained greater improvements (with 13% and 15% decrease in Difficulties-total, and 36.5% and 35.5% increase in Prosocial Scale for traditional and teletreatment groups, respectively) than the group without a facilitator (elearning group without therapist), with only 6% decrease in Difficulties total and 5.9% increase in Prosocial Scale. This suggests that the presence of a therapist can be a factor in the decrease in problematic behaviours and increase in prosocial behaviours among children.

The 15-week, randomized proof-of-concept study of Wainer et al. (2021) explored the acceptability of a parent mediated intervention online reciprocal imitation teletraining and compared it to a traditional treatment on parent and child outcomes. No statistically significant differences were found between the two groups on the Family Quality of Life ($p > .05$).

Synthesis of the evidence

Two RCTs compared the impact of teletreatment on the quality of life, both in treatment for children with Autism Spectrum Disorders. As expected, no statistiscal difference was found between the teletreatment group and the traditional treatment group. Interestingly but also not surprising, the results on the quality of life in the treatment groups (teletreatment and traditional treatment) were greater than in the wait group. The presence of the treating professional is considered essential to improve the quality of life.

From evidence to decision: The effect of teletreatment on the quality of life

Information of this section is also presented in Table 9.

Experts' opinions:

No specific information was shared about the quality of life of children or parents, linked to telepractice.

Benefits and challenges

Benefits:

- Teletreatment could provide access to specialised therapists. By starting up treatment, the quality of life usually improves.

Challenges:

- If clients cannot be treated because a therapist has no time to initiate treatment, the quality of life will remain low.

Feasibility

Teletreatment can be a solution to improve access to clients who cannot be treated by a specialised therapist in their geographical region. Teletreatment is feasible, depending on the type of disorder, the characteristics of the child and family, and characteristics of the therapist.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment for various reasons including a lack of skills or confidence to deliver them through telepractice, additional work or the lack of using tangible resources.
- Therapists may prefer teletreatment for various reasons including increased convenience for the family.

Client preferences:

- Clients may prefer traditional treatment for various reasons including a lack of ICT skills or missing the personal contact with the therapist.
- Clients may prefer teletreatment for various reasons including the use of mouse or other digital applications in tasks on the computer or the increased independence.

Economic considerations:

- If teletreatment leads to better access to therapists and consequently improved quality of life, it will decrease the cost for the client and SLP or audiologist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Telepractice: How to establish a good interaction between child-parent and therapist during telepractice?

6. Evaluate the quality of the relationship and interaction with the child in telepractice not only through observation but also through child and parent report. **(GPP)**
7. Make sure a parent is available to help the child and to communicate with you. **(GPP)**
8. Do not use telepractice for interventions that require active child participation of:
    a. children with severe physical disabilities, as they have difficulty using technology **(GPP)**
    b. children with severe communication difficulties, when they have difficulty communicating through a screen **(GPP)**
9. Evaluate the child's, the parent's and your own motivation and satisfaction about the use of telepractice after each session. **(GPP)**

Weak evidence shows that therapists, families and others involved can be doubtful at first when starting with telepractice. Usually everyone become very motivated to use this delivery format.

Evidence in the literature: Evaluate the quality of the relationship and interaction

Summary of the literature

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

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

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

Molini-Avejonas, R. D., Rondon-Melo, S., de La Higuera Amato, C. A., & Samelli, A. G. (2015). A systematic review of the use of telehealth in speech, language and hearing sciences. *Journal of Telemedicine and Telecare*, *21*(7), 367-376. https://doi.org/10.1177/1357633x15583215

Monica, S. D., Ramkumar, V., Krumm, M., Raman, N., Nagarajan, R., & Venkatesh, L. (2017). School entry level tele-hearing screening in a town in South India–Lessons learnt. *International Journal of Pediatric Otorhinolaryngology*, *92*, 130-135. https://doi.org/10.1016/j.ijporl.2016.11.021

Raman, N., Nagarajan, R., Venkatesh, L., Monica, D. S., Ramkumar, V., & Krumm, M. (2019). School-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

Waite, M. C., Theodoros, D. G., Russell, T. G., & Cahill, L. M. (2010a). 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)

The study of Blaiser et al. (2013) is a randomized controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). Parents reported challenges with keeping their child engaged and they felt that the telepractice session was less personal than the traditional treatment session. Recordings of sessions independently scored by an author of the Home Visit Rating Scales-Adapted and Extended indicated that average ratings favour the telepractice group. All differences favour the telepractice group except child engagement, though differences in child engagement are quite small. Additionally, the group difference for Parent Engagement during Home Visit was statistically significant ($p < .05$), indicating that parents in the telepractice group were more engaged during the telepractice session than parents in the comparison group during the home visit.

The study of Hodge et al. (2019) determined whether literacy assessments can be administered reliably through tele-assessment compared with traditional assessment. Assessors reported high levels of comfort regarding the use of telepractice to deliver assessments. Many of the open-ended statements relating to the tele-assessment experience reflected a high degree of acceptability. Parents of participants reported overall positive behaviours in the children.

Based on a review of existing reviews, Law et al. (2022) critically analysed the relevant literature related to intervention with children with communication disabilities drawing on the Capability-Opportunity-Motivation-Behaviour-model. Parents play an active role in teletreatment, even before/after the sessions as they interact with the therapist to exchange information about procedures, materials and setting. This liaising process between the parent and therapist can happen in different forms, such as text-messaging, additional e-mails and/or phone calls. Hence, telepractice offers many possibilities for parental involvement and provides the opportunity for parents to actively participate in the sessions with their children and to gain greater understanding of their child's communication difficulty.

A total of 23 peer-reviewed publications were included in the review of McCarthy et al. (2019) about telepractice delivery of family-centred intervention for children who are deaf or hard of hearing. Therapists described increased engagement from the primary caregiver as well as incidental participation from siblings or other members of the family.

The study of Molini-Avejonas et al. (2015) provided a systematic review on telehealth applications within the domain of speech, language and hearing sciences. They reported that parents felt comfortable or as comfortable as they did with traditional treatment situations when discussing matters with the therapist during teletreatment sessions and they were satisfied or as satisfied as they are with traditional treatment situations with their level and their child's level of interaction/rapport with the therapist.

The study of Monica et al. (2017) assessed the feasibility of telescreening in a small town in India. To do so, authors compared traditional hearing screening at school to those obtained by telescreening. Being in a familiar environment (school) might have facilitated cooperation. All 31 children complied for telescreening and appeared comfortable with the screening experience. During traditional screening, the children interacted with a new therapist. During the telescreening condition, the child was tested in the presence of a schoolteacher (facilitator) who they knew. Notably, during the telescreening, almost all the children showed additional curiosity and excitement to interact with the therapist while videoconferencing.

The study of Raman et al. (2019) explored the feasibility of conducting school-based language screening using telepractice to expand its scope for providing speech-language pathology services in India. Child-related factors

influenced telescreening of language skills. Two children were tired and distracted, leading to the need of extra prompting to respond. Frequent breaks during the assessment were required.

The study of Waite et al. (2010a) examined the validity and reliability of an internet-based telehealth system for assessing childhood language disorders on the four core components of a standardized language assessment (CELF-4 Australian version). As mentioned for the clinical subquestion about the feasibility of tele-assessment, reported child-related issues concerned the interaction between child and SLP (no requests for repetition after breakup, no requests for self-correction).

Synthesis of the evidence

Eight studies, of which most SRs, evaluated the interaction between therapist and the child and family. Four studies evaluated the interaction from the perspective of the child. One study reported that all children felt comfortable in the telepractice setting. One study reported a slightly lower engagement of the child in the teletreatment group compared to the traditional treatment group. One study mentioned that the telesetting (at the local school, in a small town in India) was familiar for the children and they felt comfortable. The fourth study reported less engaged behaviour, probably due to the timing of the telepractice intervention which was performed after a school day.

Two studies evaluated the interaction from the perspective of the parent. In one study, parents from a teletreatment group were compared to parents from a traditional treatment group. They reported similar levels of satisfaction for their and their child's interaction and rapport with the therapist. The other study specifies that the liaison between therapist and parent can be established in various way, including email conversations and text messages.

A final study evaluated the interaction from the perspective of the therapist. The therapist reported increased interaction from the parent with the child or siblings during telepractice. One reported concern about the interaction, as there were no requests for repetitions or self-corrections.

From evidence to decision: Evaluate the quality of the relationship and interaction

Experts' opinions:

The interaction between therapist and child and between therapist and parent during telepractice can be compromised. Non-verbal communication is partly lost. When the therapist shares the screen, the child no longer sees the therapist's face. Some children or adults need physical contact to put them at ease or simply to reassure them.

On the other hand, it seems that this concern also can be an apprehension. Therapists report that the interaction was not a real obstacle when teletreatment was replacing the traditional treatment at the start of COVID-19 or at the transfer back after COVID-19. Some clients even preferred to receive teletreatment.

When only considering the interaction between child and therapist, it is usually easier to deliver traditional intervention. Physical or communication disorders as well as a parent's lack of skills can make telepractice more difficult.

Benefits & challenges

Benefits

- A good interaction between therapist, parent and child will affect the treatment progress.

Challenges

- Engaging a child is more challenging during telepractice than during traditional treatment. The lack of physical presence and not being able to work with tangible resources from the therapist impact on the ease to engage with a child.

Feasibility

Establishing a good interaction and relationship with child and parent during teletreatment is challenging but feasible.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment for various reasons including being able to use tangible gestures and materials.
- Therapists may prefer teletreatment because they realise that with many clients and families, good interaction is possible during teletreatment.

Client preferences:

- Clients and families may prefer traditional treatment for various reasons including the physical contact with the therapist.
- Clients may prefer teletreatment for various reasons including being in their home environment with their parent.

Economic considerations:

- A good interaction with the child is essential and will decrease the treatment cost for client and therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Make sure a parent is available

Summary of the literature

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

The study of Blaiser et al. (2013) is a randomized controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). Parents reported that they learned how to help their child more through telepractice than in traditional intervention, and that they were more involved in the telepractice sessions. In addition to difficulties with

technology, parents reported challenges with keeping their child engaged and they felt that the telepractice session was less personal than the traditional treatment session.

Synthesis of the evidence

One study mentioned the role of the parents during teletreatment. They were more involved in the entire treatment process, but also during treatment sessions to keep their child engaged. This was more challenging, and treatment was less personal than in traditional treatment.

From evidence to decision: Make sure a parent is available

Experts' opinions:

Parents enable the possibility of relation building between therapist and the child during telepractice. It is important that parents of young children (up to the second year of primary school) attend the telepractice session with their child. They help the child when s/he is expected to display certain behaviour, similarly to what happens in traditional treatment. Involvement of parents is not only focused on the content of the intervention, but also on the practical course of the intervention.

Benefits & challenges

Benefits

- Being able to keep the child engaged during teletreatment will benefit the treatment process.

Challenges

- Keeping the child engaged is more challenging during telepractice than during traditional treatment. Depending on various factors, including the temperament of the child and the relationship between parent and child, this may be challenging for the parent.
- Parents may be overwhelmed at first by the various tasks that co-occur during teletreatment if they also have to keep the child engaged. In traditional treatment, the therapist usually keeps the child engaged.

Feasibility

Keeping the child engaged during teletreatment is challenging but feasible. The child does not have to be engaged the entire treatment session, as parents usually also need some time to discuss issues with the therapist.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment for various reasons including being able to use tangible gestures and materials.
- Therapists may prefer teletreatment because they realise that with many clients and families, it is possible to keep the child engaged during teletreatment.

Client preferences:

- Clients and families may prefer traditional treatment for various reasons including the physical contact with the therapist which keep a child engaged more easily.
- Clients and their family may prefer teletreatment for various reasons including being in their home environment with their parent or receive treatment advice about the child's daily activities by the therapist.

Economic considerations:

- Keeping the child engaged during teletreatment and traditional treatment is essential and will decrease the treatment time and consequently the treatment cost for client and therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Do not use teletreatment in certain situations

Summary of the literature

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

Ellison, K. S., Guidry, J., Picou, P., Adenuga, P., & Davis III, T. E. (2021). Telehealth and autism prior to and in the age of COVID-19: A systematic and critical review of the last decade. *Clinical Child and Family Psychology Review*, *24*(3), 599-630. https://doi.org/10.1007/s10567-021-00358-0

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

Boisvert and Hall (2014) conducted a review of studies in which telehealth procedures were used in the training or coaching of parents with young children (aged 6 years and under) who were diagnosed with Autism Spectrum Disorder were reviewed. One study reported that parents demonstrated a gain in engagement toward their child.

Ellison et al. (2021) provided an overview of the literature regarding telepractice for children and adolescents with Autism Spectrum Disorder over the last decade with regards to the type, recipients, and outcomes of the services and provided a recent evidence base upon which therapists and researchers alike might base ongoing and future services and research. One study found that parent stress decreased in the telepractice group (received coaching for video conferencing) but not the control group, which further supports the use of telepractice as a means to deliver intervention to children with Autism Spectrum Disorder. Three studies evaluated the effectiveness of ImPACT, a parent-mediated telepractice for children with Autism Spectrum Disorder, implemented through self-directed and therapist-assisted delivery models. These studies all found that parents were engaged in both conditions but therapist assistance increased engagement and acceptability of the program.

The study of Grant et al. (2022) identified the attitudes and perspectives of allied health professionals (SLPs, occupational therapists and physiotherapists) towards using telepractice for service delivery to children with developmental delays. Therapists perceived that some client groups could not be provided services through telepractice. They specified those client groups as children with profound disabilities, those with Autism Spectrum Disorders and other communication disorders and children with feeding difficulties. Concerns were that children with profound disabilities would not physically be able to use the videoconferencing technology and that children with communication difficulties could not engage through the screen. Also concerns around efficacy and safety of tele-assessment for children with feeding difficulties were reported. The inadequacy of telepractice to replace traditional treatment was reported as a barrier in several studies. Two reasons reported for this were the inappropriateness for certain client groups and the lack of physical touch available in a telepractice session. Three studies simply referred to unsuitability of telepractice as a replacement to traditional treatment.

Participants in four studies reported that telepractice negatively impacted their therapeutic relationship with the child. Relationships and collaboration with parents and educators were reported to be improved through telepractice in seven studies. Allied health professionals perceived that they had an improved collaboration with teachers and improved relationships and upskilling of parents when using telepractice. Another study reported perceptions that telepractice was more successful when it was supported by local providers and other stakeholders such as parents and teachers.

Synthesis of the evidence

Three SRs reported mixed findings about the suitability of telepractice for certain client groups. The main mixed finding was about children with Autism Spectrum Disorder. In one SR, telepractice was not considered to be appropriate for children with Autism Spectrum Disorder. In two other SRs, it was found to be appropriate for this group of children. One SR reported from the perspective of the therapist, which was besides the perspective of SLPs, also those of occupational therapists and physiotherapists. It is possible that this results in findings that are not entirely accurate for SLPs and audiologists. In conclusion, telepractice is not suited for populations with severe communication of physical disorders. However, it is possible to work with parents or with other therapists through telepractice for the treatment of these children.

From evidence to decision: Do not use teletreatment in certain situations

Experts' opinions:

The stakeholders agree that in some situations, telepractice is not suited. They did not specify the populations for whom telepractice is unsuited. To work directly with the child, telepractice works better with older children.

Benefits & challenges:

Benefits

- Knowing for which populations or situations telepractice does not work well, benefits the treatment process as therapists should not propose telepractice to them.

Challenges

- Sometimes it is difficult to assess if a client is unsuited for telepractice. If the therapist finds out about this during the treatment process, it is more time-consuming to change treatment formats as new routines will have to be found.

Feasibility

It seems feasible to recognise the potential of clients and families for whom telepractice is suited or not.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment for various reasons including the suitability of the treatment format for a particular client.
- Therapists may prefer teletreatment because they know that it is a treatment format that is suited for a particular client.

Client preferences:

- Clients and families may prefer traditional treatment for various reasons including receiving physical assistance from the therapist during treatment.
- Clients and their family may prefer teletreatment for various reasons including being in their home environment with their parent and being able to receive treatment advice about the child's daily activities.

Economic considerations:

- It is essential not to start telepractice with clients and families for whom this treatment format is unsuited as it would increase the treatment cost for client and therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Evaluate motivation and satisfaction

Summary of the literature

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., Lang, R., Andrianopoulos, M., & Boscardin, M. L. (2010). Telepractice in the assessment and treatment of individuals with autism spectrum disorders: A systematic review. *Developmental Neurorehabilitation*, *13*(6), 423-432. https://doi.org/10.3109/17518423.2010.499889

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

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

Dahiya, A. V., DeLucia, E., McDonnell, C. G., & Scarpa, A. (2021). A systematic review of technological approaches for Autism Spectrum Disorder assessment in children: Implications for the COVID-19 pandemic. *Research in Developmental Disabilities*, 109, 103852. https://doi.org/10.1016/j.ridd.2021.103852

Edwards, M., Stredler-Brown, A., & Houston, K. T. (2012). Expanding Use of Telepractice in Speech-Language Pathology and Audiology. *Volta Review*, *112*(3). htpps://doi.org/10.17955/tvr.112.3.m.704

Ellison, K. S., Guidry, J., Picou, P., Adenuga, P., & Davis III, T. E. (2021). Telehealth and autism prior to and in the age of COVID-19: A systematic and critical review of the last decade. *Clinical Child and Family Psychology Review*, *24*(3), 599-630. https://doi.org/10.1007/s10567-021-00358-0

Furlong, L., Serry, T., Bridgman, K., & Erickson, S. (2021). An evidence-based synthesis of instructional reading and spelling procedures using telepractice: A rapid review in the context of COVID-19. *International Journal of Language & Communication Disorders*, *56*(3), 456-472. htpps://doi.org/10.1111/1460-6984.12619

Govender, S. M., & Mars, M. (2017). The use of telehealth services to facilitate audiological management for children: A scoping review and content analysis. *Journal of Telemedicine and Telecare*, *23*(3), 392-401. https://doi.org/10.1177/1357633x16645728

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

Maluleke, N. P., Khoza-Shangase, K., & Kanji, A. (2021). An integrative review of current practice models and/or process of family-centered early intervention for children who are deaf or hard of hearing. *Family & Community Health*, *44*(1), 59-71. https://doi.org/10.1097/fch.0000000000000276

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

Molini-Avejonas, R. D., Rondon-Melo, S., de La Higuera Amato, C. A., & Samelli, A. G. (2015). A systematic review of the use of telehealth in speech, language and hearing sciences. *Journal of Telemedicine and Telecare*, *21*(7), 367-376. https://doi.org/10.1177/1357633x15583215

Monica, S. D., Ramkumar, V., Krumm, M., Raman, N., Nagarajan, R., & Venkatesh, L. (2017). School entry level tele-hearing screening in a town in South India–Lessons learnt. *International Journal of Pediatric Otorhinolaryngology*, *92*, 130-135. https://doi.org/10.1016/j.ijporl.2016.11.021

Parsons, D., Cordier, R., Vaz, S., & Lee, H. C. (2017). Parent-mediated intervention training delivered remotely for children with Autism Spectrum Disorder living outside of urban areas: Systematic review. *Journal of Medical Internet Research*, *19*(8), e198. https://doi.org/10.2196/jmir.6651

Raatz, M., Ward, E. C., Marshall, J., & Burns, C. L. (2021). Evaluating the use of telepractice to deliver pediatric feeding assessments. *American Journal of Speech-Language Pathology*, *30*(4), 1686-1699. https://doi.org/10.10.1044/2021_ajslp-20-00323

Schepers, K., Steinhoff, H. J., Ebenhoch, H., Böck, K., Bauer, K., Rupprecht, L., ... & Hagen, R. (2019). Remote programming of cochlear implants in users of all ages. Acta Oto-Laryngologica, 139(3), 251-257. https://doi.org/10.1080/00016489.2018.1554264

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., Hodge, A., Drevensek, S., Lee, S., Silove, N., & Roberts, J. (2017). Telehealth language assessments using consumer grade equipment in rural and urban settings: Feasible, reliable and well tolerated. *Journal of Telemedicine and Telecare*, *23*(1), 106-115. https://doi.org/10.1177/1357633x15623921

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

Sutherland, R., Trembath, D., Hodge, M. A., Rose, V., & Roberts, J. (2019). Telehealth and autism: Are telehealth language assessments reliable and feasible for children with autism? *International Journal of Language & Communication Disorders*, *54*(2), 281-291. Https://doi.org/10.1111/1460-6984.12440

Taylor, O. D., Armfield, N. R., Dodrill, P., & Smith, A. C. (2014). A review of the efficacy and effectiveness of using telehealth for paediatric speech and language assessment. *Journal of Telemedicine and Telecare, 20*(7), 405-412. htpps://doi.org/10.1177/1357633x14552388

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

The study of Blaiser et al. (2013) is a randomized controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). Post-test data revealed that, compared with the onset of the study, parents felt that teletreatment services were helpful in reducing the number of visits missed due to illness or bad weather and did not interfere with their relationships and interactions with therapists. After about three months, parents in the teletreatment group rated their satisfaction a 6.9 on a 10-point scale with 10 being highly satisfied.

The systematic review of Boisvert et al. (2010) provided a systematic analysis of studies in which telepractice procedures were used in the assessment or treatment of individuals with Autism Spectrum Disorder. One study reported no group differences in therapist and parent satisfaction between telepractice and traditional intervention.

Boisvert and Hall (2014) conducted a review of studies in which telepractice procedures were used in the training or coaching of parents with young children (aged 6 years and under) who were diagnosed with Autism Spectrum Disorder were reviewed. One study reported a high level of parental satisfaction. Parents felt the services delivered through telepractice at home were valuable. This increased parental confidence.

The study of Campbell et al. (2020) identified the scope of literature describing telepractice of allied health services to rural children and identified the extent to which implementation of such intervention has been investigated. One study reported a moderate to high satisfaction of intervention. Another study reported a high intervention satisfaction, rated by parent and teacher and a third study reported largely positive satisfaction of tele-assessment.

The review of Dahiya et al. (2021) synthesized papers using communication and information technology (including video conferencing) to identify Autism Spectrum Disorder signs or symptoms. In one study, parents reported high satisfaction ratings in both traditional or telepractice conditions. Another study reported satisfaction and comfort with the telepractice screening tool. In a third study, remote therapists (80%) and families (91%) reported high levels of satisfaction with the tele-assessment.

As telepractice becomes a standard mode of conducting diagnostic and treatment services in speech, language, and hearing disorders, Edwards et al. (2012) found it essential to assure that research supports its application in the field. They found one study in which therapists and parents reported high satisfaction about telepractice.

Ellison et al. (2021) provided an overview of the literature regarding telepractice for children and adolescents with Autism Spectrum Disorder over the last decade with regards to the type, recipients, and outcomes of the services and provided a recent evidence base upon which therapists and researchers alike might base ongoing and future services and research. One study reported high parents' satisfaction with tele-assessment. The parents also indicated that their children felt either somewhat or definitely comfortable with the procedures as well. Another study also reported high parent satisfaction for telepractice and traditional conditions. High level of satisfaction with telehealth implementation and interventions were found to be acceptable in five studies. Three studies specifically used parents to implement social communication intervention programs in children with Autism Spectrum Disorder. All three studies concluded that parents were satisfied with the social communication intervention they received through telepractice. Three studies who directly assessed social validity indicated high satisfaction with the delivery of the intervention through telepractice. Overall, the use of telehealth, specifically videoconferencing and coaching, has been found to be a feasible and satisfactory means to deliver a variety of interventions to children and adolescents with Autism Spectrum Disorder.

The study of Furlong et al. (2021) investigated the nature and outcomes of studies examining instructional reading and spelling procedures delivered through telepractice to school-aged students. Four studies suggested that children were engaged in their telepractice sessions and wanted to attend. They showed an increased interest in reading following telepractice instruction. Parents were satisfied with gains made during intervention. For telepractice delivery of reading and spelling assessments, parents were generally satisfied and acknowledged the benefits of telepractice for delivering tele-assessment to families in remote areas.

The systematic review of Govender and Mars (2017) conducted a scoping review and content analysis of the use of telepractice services for children with hearing loss. One study provided Auditory-Visual therapy through Skype to children aged 6 months to 6.5 years, and parents completed a satisfaction survey. All parents felt comfortable with the use of Skype both to discuss issues with their therapist as well as for their child to receive therapy. Family members in another study reported a high level of satisfaction with videoconferencing.

Based on a review of existing reviews, Law et al. (2022) critically analysed the relevant literature related to intervention with children with communication disabilities drawing on the Capability-Opportunity-Motivation-Behaviour-model. Parents play an active role in teletreatment, even before/after the sessions as they interact with the therapist to exchange information about procedures, materials and setting. The satisfaction of parents and therapists with telepractice services is reported in eight reviews. Levels of acceptance from parents are reported as high in seven studies. Five studies reported that parents are comfortable engaging with the therapists online and satisfied with their child's level of interaction with their therapist. There is only one brief report on children's satisfaction. In this review, two children were asked whether they prefer telepractice or traditional intervention. One selected telepractice whereas the other preferred face-to-face intervention

The aim of Maluleke et al.'s study (2021) documented current evidence reflecting trends in family-centred early intervention for children who are deaf or hard of hearing by identifying and describing current practice models and processes of family-centred early intervention for these children. One study reported that all parents expressed satisfaction with the service, with 89% reporting that receiving early intervention services through videoconferencing was a better alternative to traveling for regular traditional sessions.

McGill et al. (2019) reviewed peer-reviewed articles investigating teletreatment methodologies for stuttering. In one study, most therapists reported that they were satisfied, moderately satisfied, or highly satisfied with clinical quality related to the interactions between SLPs and children with behavioural challenges. Other studies reported about the various preferences of the participants. One study reported that most clients and their families rated both the technical quality and the therapist interaction as highly satisfactory.

The study of Molini-Avejonas et al. (2015) provided a systematic review on telehealth applications within the domain of speech, language and hearing sciences. Overall, the clients with speech disorders and their families were satisfied with this mode of treatment. In general, most of the studies (57.14%) assessed the user's satisfaction with telepractice. Most users felt comfortable with it. The results revealed that telepractice improved the quality of care, resulting in a good level of satisfaction from the users. Telepractice was also considered similar to the traditional approach in most cases.

The study of Monica et al. (2017) assessed the feasibility of telescreening in a small town in India. To do so, authors compared traditional hearing screening at school to those obtained by telescreening. The school reported the interest and enthusiasm of the school management.

Parsons et al. (2017) reviewed the existing evidence presented by studies on parent-mediated intervention training, delivered through telepractice for parents having children with Autism Spectrum Disorder and living outside of urban areas. One study reported that parents rated the importance and significance of telepractice coaching sessions as high. Another study rated the overall satisfaction of intervention as high. No statistically significant difference was observed in overall intervention satisfaction between groups. In another study, all parents reported satisfaction with the support and ease of the telepractice learning intervention. In general, the

studies who investigated parent satisfaction all reported that parents were satisfied with the teletraining they received.

The study of Raatz et al. (2021a) determined if acceptable levels of interrater reliability could be achieved conducting pediatric feeding and swallowing assessment through telepractice compared with traditional assessment. Therapists were highly satisfied with the telepractice appointments and for almost every child (93%). They reported they would re-offer telepractice services again. In free-text comments, therapists reported improved assessment ability within the infant's natural, home environment as a perceived benefit of the telepractice appointment. Overall, parents reported high satisfaction with the telepractice sessions. They also reported positive perceptions about telepractice both before and after the appointment.

The study of Schepers et al. (2019) investigated the telemetry values of cochlear implant users of all ages differ depending on if the fitting session was conducted in a traditional fitting or in a tele-fitting. Questionnaire results indicated that the local host, the remote audiologists, and cochlear implant users reported high levels of satisfaction with the process and results of telefitting. Children and parents were more satisfied than adult clients. The remote audiologist and local host had higher satisfaction and quality responses for fittings done with adults than with children.

Sheikhtaheri and Kermani (2018) reviewed and introduced different telepaediatric services and the consequences of using this type of services and providing an overview of systematic reviews conducted in this domain. The studies that included students, families, SLPs and school principals showed a high satisfaction with telepractice services.

The study of Sutherland et al. (2017) determined whether, within an existing service, a web-based telehealth application using consumer grade, commercially available computer equipment could be used to provide a formal language assessment that is 1) feasible, 2) reliable and 3) well-tolerated by participants and their families. All parents described their child and themselves as being 'somewhat comfortable' or 'definitely comfortable' with the tele-assessment. Parents indicated that their child found the telepractice a positive experience and several parents reflected positively on their own experience or opinion of the tele-assessments. Two parents expressed concern.

Another study of Sutherland et al. (2018) investigated the nature and outcomes of studies examining telehealth assessment and/or intervention in Autism Spectrum Disorder. Parent satisfaction was a reported outcome for nine of the 14 studies. All studies reported high levels of program acceptability and parent satisfaction with the tele-assessment or teletreatment. In addition, two studies that involved direct telepractice with individuals on the spectrum reported high participant satisfaction with the methods used.

A third study of Sutherland et al. (2019) investigated the reliability of tele-assessment using core language subtests of the CELF-4 for children with autism. Ten of the 13 parents completed and returned the satisfaction surveys. All parents (100%) felt 'definitely' comfortable with the tele-assessment, and all agreed that their child felt 'definitely' or 'somewhat' comfortable with the assessment.

Taylor et al. (2014) reviewed the literature relating to the use of telepractice for paediatric speech and language assessment. One study reported high parent satisfaction of communication screening through telepractice. Parents indicated that they would be interested in using telepractice again. High levels of satisfaction with sound

and picture quality were reported. Parents indicated a preference for accessing SLP services through telepractice during an existing paediatrician appointment, rather than attending an additional traditional appointment.

The review of Tully et al. (2021) outlines the implementation issues for incorporating telepractice to paediatric services generally, or how users perceive these issues. Overall satisfaction with telepractice was reported among six studies that assessed the client and family perspective, with two of these as part of randomised controlled trials. One study found that parents reported significantly higher satisfaction with a tele-referral system and with care overall compared with traditional care. Another study reported significantly higher adequacy of coordination of care among participants within the intervention group of a three-armed trial testing phone, video and traditional care, compared with baseline. No significant differences were observed between groups. Four studies reported high satisfaction with telepractice received. Therapists' satisfaction with telepractice was reported quantitatively by eight studies, with generally high satisfaction ranging from 91-100% among those for whom the telepractice was used for communication with clients and families. One study found that 46% were at least as confident of diagnoses made through tele-assessment as traditional assessment. This increased to 83% among therapists who had carried out over 50 tele-consultations. High satisfaction with technology for communication between professionals was also reported. One study reported greater satisfaction among parents (4.8/5.0) than among therapists (3.9/5.0).

Synthesis of the evidence

Twenty-three studies (most of them SRs) evaluated satisfaction. Nearly all studies reported high satisfaction levels of parents receiving teletreatment in a variety of disorders. Two studies reported mixed satisfaction levels. When satisfaction levels of parents after teletreatment were compared with those of parents after traditional treatment, higher or similar satisfaction levels were reported. Besides parent satisfaction, two studies reported high satisfaction levels of school management and one study reported mixed child satisfaction levels.

From evidence to decision: Evaluate motivation and satisfaction

Information of this section is also presented in Table 8.

Experts' opinions:

Telepractice during the COVID-19 period garanteed continuation of care. It was, however, forced upon all clients and therapists. Personal circumstances could not be considered. For that reason, the COVID-19 period was not the right moment to be motivated to use telepractice. Reports from therapists from that time confirm this. Also, the COVID-19 period was not long enough to learn to use telepractice well enough. School and work occurred through screens during the COVID-19 period. Primay school children sat in front of the computer for several hours per day. To receive telepractice on top of this, did not lead to increased motivation.

It is more reliable to consider reports from situations when telepractice was chosen for. For example, it was offered as an option besides traditional intervention. In such situations, parents report that teletreatment helps them to implement treatment in daily situations at home. However, it can be more challenging for the therapist to keep the child motivated in front of the screen. Motivation is higher if families have more experience with telepractice applications, for example videoconferencing applications.

Satisfaction about treatment is often related to benefits of the treatment format. With teletreatment, therapists have the opportunity to observe the implementation of the intervention in the family's daily context. A child behaves differently at home which can be an advantage for the therapist, especially if the child shows difficult behaviour. It may be useful to help the parent and child dealing with the stimuli at home. It is however, important to make clear rules about the expectations of the telepractice sessions.

It is extremely important to question the teletreatment with the child itself. Small things can impact a child's satisfaction. Sometimes a child may not like a teletreatment session because s/he expected to use the computer mouse for an exercise and that did not happen.

It is easier to keep young children satisfied in a 30-minute traditional session than in a telepractice session because the sitting can easier be interrupted by a physical activity.

Therapists strongly advocate for a combination of telepractice and traditional intervention, and to choose the families to whom telepractice is offered. This leads to the highest satisfaction in therapist, child, and parent.

Benefits & challenges:

Benefits

- High motivation or satisfaction levels of a child after telepractice sessions results in an improved treatment process.

Challenges

- Sometimes children or families may be demotivated if telepractice occurs at inconvenient times for the child, e.g., after school when the child is tired, or when the telepractice is imposed upon the family against their preference.

Feasibility

It is feasible to evaluate the motivation and satisfaction regularly throughout the treatment process.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment or teletreatment for various reasons.

Client preferences:

- Clients and their family may prefer traditional treatment or teletreatment for various reasons.

Economic considerations:

- Higher motivation and satisfaction levels of clients and families affect the treatment process positively and will decrease the treatment cost for client and therapist.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Evidence in the literature: Implement teletreatment even if doubtful at first

Summary of the literature

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

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

The study of Blaiser et al. (2013) is a randomized controlled trial comparing teletreatment and traditional treatment for early intervention of children (average 18-19 months) with hearing problems (some with cochlear implants). Post-test data revealed that, compared with the onset of the study, providers who used video conferencing technology more in their personal life, felt more comfortable with coaching, and shifted the focus of interactions in sessions from parent-provider interactions to parent-child interactions.

The study of Grant et al. (2022) identified the attitudes and perspectives of allied health professionals (SLPs, occupational therapists, and physiotherapists) towards using telepractice for service delivery to children with developmental delays. Participants in six studies identified lack of self-efficacy related to poor confidence or inadequate training as a barrier to service delivery through telehealth. Adequate training, facilitating improved self-efficacy, was identified by three studies, resulting in easier use of telepractice as a service delivery method.

Synthesis of the evidence

Two studies, one RCT and one SR, reported about the process of building confidence from the perspective of the therapist. The studies emphasize that confidence and skills grow by practice. A lack of confidence can be reduced by adequate training and improved self-efficacy.

From evidence to decision: Implement teletreatment even if doubtful at first

Information of this section is also presented in Table 8.

Experts' opinions:

The stakeholders did not elaborate on this topic during the discussions.

Benefits & challenges:

Benefits

- Telepractice is a new setting for many therapists and their clients. Recognising and accepting a lack of confidence, and not consider it as an obstacle for proposing telepractice, will benefit the treatment process. Usually, clients, families and therapists are satisfied with telepractice once they have tried it, according to the evidence in the literature.

Challenges

- Sometimes it is difficult to decide to initiate telepractice if therapist and client are doubtful about it.

Feasibility

It is feasible to work around the doubt about telepractice of therapist and client.

Value & preferences:

Professional preferences:

- Therapists may prefer traditional treatment for various reasons including being doubtful about telepractice.
- Therapists may prefer teletreatment even though they are not confident to deliver it, knowing that their skills will grow by practice.

Client preferences:

- Clients and families may prefer traditional treatment for various reasons including being doubtful about telepractice.
- Clients may prefer teletreatment even though they are doubtful to receive it because they know that they are supported by the therapist.

Economic considerations:

- It is essential to accept doubts about telepractice but not see them as an obstacle because if telepractice is the best fit for a client and family, it will improve the treatment outcome and will decrease the treatment cost for clients, SLPs or audiologists.
- Therapist and client need stable internet, a device (computer, laptop or tablet) and may need accessories such as a microphone or headphones. This may lead to an increased cost.
- Equity of care increases as telepractice lowers the threshold to access specialised services.

Part IV: Methodological report

Overview of the development process

The guideline was developed over a period of 18 months and followed the steps as outlined in the WOREL manual (January, 2021, p. 24). Figure 1 gives the overview of the steps of this guideline development process:

Figure 1: Steps in the development process

Involvement of the stakeholders and advisory board

Overview of involvement of stakeholders

Purpose, clinical questions, outcome measures, evaluation criteria and implementation plan were developed by the guideline development group. In a later step, stakeholders were asked to give their opinion. Table 1 explains these processes.

Table 1 : Involvement of stakeholders, advisory board, and study participants

Topic	Group that was involved	Outcome
Purpose guideline	Stakeholders (focus = implementation)	Purpose defined[$]
Clinical questions	Stakeholders (focus = implementation)	Showed the importance of each clinical question (general)°
	Advisory board	Approval of the clinical questions
Outcome measures	Stakeholders (focus = implementation)	Showed the importance of each outcome measure (general)°
	Stakeholders (focus = methodology)	Showed the importance of each outcome measure (general)°
	Stakeholders (focus = methodology)	Showed the level of critical significance for each outcome measure
Search terms	Stakeholders (focus = methodology)	Approval of the search terms[$]
Quality of evidence	Stakeholders (focus = methodology)	Validated the reasoning of the two methodological experts
	Member of Advisory board	Validated the reasoning of the grading of the guideline recommendations
Strength of evidence	Stakeholders (focus = implementation)	Supported the implementation of the guideline recommendations
Barriers, facilitators and benefits	Participants of two nominal groups[#]	Identification of barriers, facilitators, and benefits
	Respondents of the survey	Identification of barriers, facilitators and benefits and ranking of importance
Recommendations and Good Practice Points	Stakeholders (focus = implementation)	Approval of the formulation of the recommendations and Good Practice Points
	Stakeholders (focus = methodology)	
Implementation plan	Member of Advisory board	Approval of the implementation plan
Evaluation criteria	Stakeholders (focus = implementation)	Approval of the evaluation criteria
	Stakeholders (focus = methodology)	
	Member of Advisory board	

[$] This decision was taken without a formal procedure. ° In a first phase, the answers were given on a 4-point rating scale. In later steps, the answers were given on a 9-point rating scale. [#] The participants of the nominal groups were not mentioned in this guideline due to confidentiality agreements. An Implementation Study was set up for the development of this guideline. More information about the implementation study is further included.

Consensus process and criteria

Decisions during the process were taken in meetings with the stakeholders or through a Delphi procedure. A Delphi procedure is a frequently applied technique to come to a consensus in guideline development. A 9-point scale was used to evaluate the level of agreement. Scores 1, 2 and 3 referred to a level of low importance, 4, 5 and 6 to a level of importance, but not critical and 7, 8 and 9 to a level of critical importance. Scores 1, 2 and 3 referred to non-agreement of the stakeholder with the positioned statement, while scores 4, 5 and 6 referred to an undecided status of the stakeholder, and scores 7, 8 and 9 to agreement with the statement. This method was applied to determine the *level of significance of the outcomes measures* and to discuss the *recommendations* and the *evaluation criteria*. A consensus to include an item or accept a decision was reached if an agreement of ≥70% for the highest three scores was achieved.

To inform the stakeholders about the Delphi process and the expectations about their involvement, an online meeting was scheduled before the statements were sent to them. During these meetings, the statements were discussed once it was clear what the expectations were. Subsequently, the stakeholders provided their individual and anonymous written feedback through electronic questionnaires in Qualtrics/Question Pro.

From literature to evidence

Search for relevant guidelines

A search was performed to rule out the existence of a guideline for telepractice in this domain. For this search, eight national and international databases were consulted. The inclusion criteria are presented below. No restrictions were set for the publication date.

- Population: include at least one sample of children aged ≤ 12 years
- Intervention: synchronous or hybrid (including synchronous) teleconsultation in the domain of speech-language pathology and audiology
- Publication language: English, Dutch or French

Appendix A presents the findings of this search. For none of the three clinical subquestions a relevant existing guideline was retrieved. Therefore, the ADAPTE-method could not be applied for the development of this guideline and it was decided to develop this guideline using the *de novo* procedure.

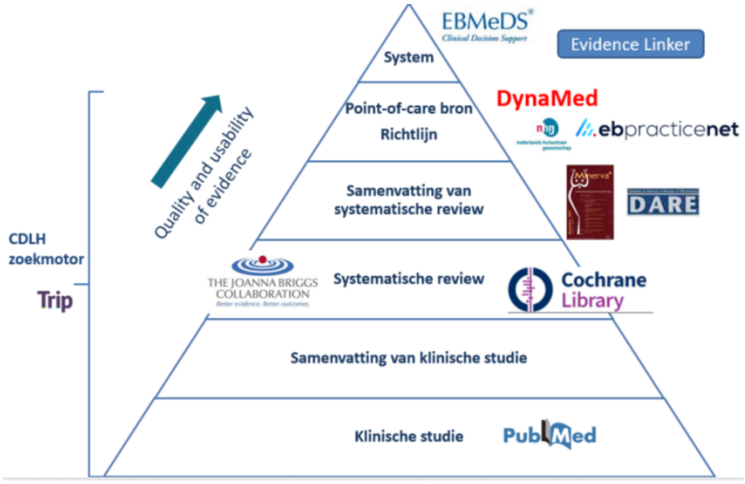
Systematic literature search for individual studies

A systematic literature search was conducted for the *de novo* guideline development procedure. Given the nature of the clinical questions and the expected number of records that could be retrieved on this topic, one overarching search was conducted for all clinical questions. Records were subsequently attributed to one of the clinical questions (clinical question 1, 2 or 3) as part of the two-step evaluation procedure.

The *de novo* search was conducted in March 2022. The systematic search was focused on peer reviewed articles written in English, Dutch or French that were published in the past 20 years, i.e. between January 1, 2002 and March 4, 2022. To be capable of detecting recent publications, the search was updated in December 2022, specifically searching for articles published between September 1, 2021 and December 08, 2022.

In the first step, meta-analyses, systematic reviews (SRs) and RCT's were selected for clinical questions 1 and 2 with the purpose to investigate strong evidence according to the hierarchy of Haynes (Figure 2). For clinical question 3, initially no restrictions were set for the study design. Both research articles and PhD dissertations were allowed, on the condition of being peer-reviewed. Detailed inclusion and exclusion criteria are described below.

Figure 2 : Hierarchy of Haynes for guideline development



From Cebam Digital Library for Health. https://www.cdlh.be/nl

Databases and search terms

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 (Appendix B). 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. The specific search strings per database and the agreement with the original set of search terms are presented in Appendix B. After conducting the systematic literature search in the selected databases, duplicates were removed using the *Zotero* software package.

Selection procedure

An overview of all steps of the screening and selection procedure is given in Figure 3. Records 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.

In the first step, every record was blindly evaluated for inclusion/exclusion by at least two raters, i.e., without knowledge of the decisions made by the other rater (*blind modus on*). The raters included two methodological experts, two documentalists and two trained master students. A set of inclusion and exclusion criteria was applied as described below. A pilot study was conducted to assess the inter-rater reliability on 10% of the total number of records by two documentalists, two methodological experts and two trained master students (Table 2 : Inter-rater reliability outcomes). These two additional raters were students who performed this task as part of their master thesis at UCLouvain. After the blind evaluation by each rater, the inter-rater reliability was established and potential conflicts were discussed by all raters. Inter-rater reliability was considered high when at least 90% overlap was obtained. Once the inter-rater reliability criterion of 90% was obtained, at least two raters proceeded to blindly rate all remaining records. The principal documentalist (Rater 1 in Table 2 : Inter-rater reliability outcomes) screened all records. A more detailed discussion about inclusion and exclusion can be found in Appendix C.

Inclusion criteria:

- The study included at least one population of children ≤ 12 years old (for example, include abstracts that report 'children and adolescents')
- The study used teleconsultation for screening and/or assessment and/or intervention in the domain of speech-language pathology or audiology (web-based assessments are accepted if there is no other reason for exclusion)
- The care provider is a SLP or audiologist. Acceptable terms for screening/assessment are researcher, special need teacher, remedial teacher, special education teacher. Health care provider can also be accepted, if there is a chance it could be an SLP or audiologist. When therapy (speech-language pathology or audiology-related) is provided by a family-member and there is no detailed information about other involved care-providers, the study receives benefit of the doubt. It was verified in the full text screening.
- The study used synchronous or hybrid forms of telepractice (including synchronous delivery) or teleconsultation. In case of unclarity, the benefit of the doubt was given if there were no other reasons to exclude. Telephone interviews could also be indicators of tele-assessment/remote therapy.
- The study was required to compare to traditional care except for clinical question 3.
- Articles needed to be written in English, French or Dutch (including systematic reviews or meta-analyses).

Exclusion criteria:

- Studies with care provided in classroom setting. Sometimes care/assessment was provided in different steps, from which one of them involved telepractice. Studies were only excluded if the only setting was the classroom.
- Studies with care provided in a hospital setting. Sometimes care/assessment was provided in different steps, from which one of them involved telepractice. Studies were only excluded if the only setting was a hospital.
- Studies with care exclusively provided in a non-synchronous manner.
- Non-peer reviewed articles or other formats of research output, such as editorial, thesis or comments of the editor on a journal article.
- The focus of the article was beyond the scope of the clinical questions.
- Studies that provided remote training to improve professional skills of SLPs and audiologists.
- Studies that provided remote assessments of IQ tests (verbal and non-verbal).

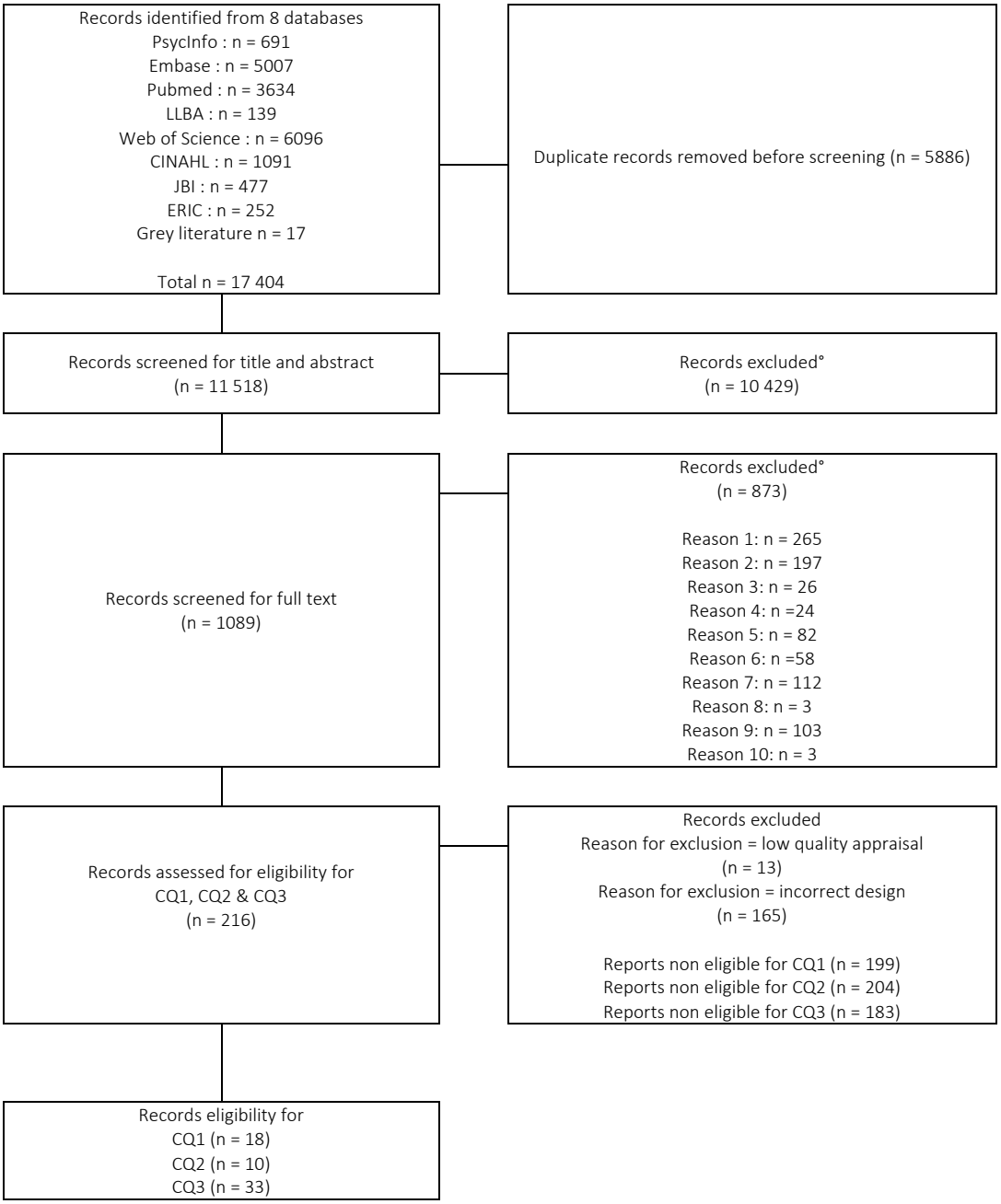
Table 2 : Inter-rater reliability outcomes

Raters (R)	Articles (N)*	Conflicts (N)	Conflicts (%)	Inter-rater reliability (%)
R1 versus R2	1035	58	6	94
R1 versus R3	1031	75	7	93
R2 versus R4	1035	51	5	95
R2 versus R3	1031	50	5	95
R3 versus R4	1031	58	6	94
R1 versus R5	1265	126	10	90
R1 versus R6	1244	122	10	90
R5 versus R6	746	59	8	92

* First 10 articles were not counted as they were used for training purposes; R = Rater.

Figure 3 presents the process of the literature search.

Figure 3 : Flow chart (PRISMA) of the literature search



° Exclusion based on irrelevant content; Reason 1 = no telepractice ; Reason 2 =. Other outcomes; Reason 3 = incorrect focus ; Reason 4 = article is not accessible ; Reason 5 = therapist is not a SLP or audiologist; Reason 6 = incorrect type of article ; Reason 7 = incorrect population ; Reason 8 = incorrect setting ; Reason 9 = incorrect publication date ; Reason 10 = incorrect language ; CQ = Clinical question.

Taken from: Page M. J. et al., (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. British Medical Journal, n71. https://doi.org/ 10.1136/bmj.n71

Appraisal of the records

The included records were appraised for their quality. Given the various research designs that were allowed to answer clinical question 3, the Joanna Briggs Institute tools (JBI, 2021) were considered the most adequate for the quality appraisal of all records. The JBI tools have four boxes: *yes*, *no*, *unclear* and *not appropriate*. If *no* or *unclear* was ticked off, an explanation was noted for later discussion.

In a pilot study, the raters were trained to be aligned (e.g., to know when an item was not applicable in a certain research design, or which situation needed to be scored with *unclear*). A small sample of the included records of clinical question 1 and clinical question 2 were appraised independently by four team members (i.e., one documentalist, one content expert and the two methodological experts). Results were discussed and in case of disagreement, a consensus was sought and agreements about the interpretation of items in the JBI tool were determined. After this pilot study, the raters had the feeling that they were aligned for the apprasials. The remainder of the included records was appraised by two raters.

The first purpose of the appraisal proces was to eliminate the records that had insufficient quality. A record was considered of low quality when ≥ 50% of the items were answered with *no* or *unclear*. To calculate the total percentage, the *not applicable* items were not counted. So, the total number of answers with *yes* were divided by the total number of answers with *yes*, *no* or *unclear*, and were adjusted to a percentage. It is important to note that this is not a JBI-procedure, but an internal working procedure. If a record was of low quality, the record was excluded from further review. If one rater obtained a score of ≥50% and one rater <50%, a third rater (the methodological expert) appraised the record. The score of the third rater and the score of the rater, nearest to the third rater's score, were then middled out to obain the final score.

The second purpose of the appraisal process was to obtain a final score, agreed upon by the two raters. The two raters discussed each item if necessary until they consensed. This resulted in the final JBI-score for each record.

Coding of the outcome

A set of outcome measures of interest were formulated by the guideline development group and stakeholders (methodology). These outcome measures were in a first step evaluated how 'essential' they are.

The outcomes were proposed to the stakeholders to identify how critical the outcomes are. A score on a 9-point scale with 9-8-7 meaning *critical outcome*, 6-5-4 meaning an *important outcome*, and 3-2-1 meaning *an outcome that is not critical nor important*. Consensus was considered if ≥70% of the respondents rated the outcome measure with a score of 7 or more on the 9-point scale. Only the critical outcomes were included in the guideline.

These outcome measures were presented to (and approved by) WOREL and the Advisory Board on the meeting of 11/02/2022.

An overview of the outcome measures per clinical question is presented in Tabel 3.

Tabel 3 : Outcome measures for each research question (N = 19)

Research question	Outcome measure	Consensus on how crucial (%)
Clinical question 1: Is telepractice for screening and assessment of logopaedic and audiological disorders equally effective compared with traditional care?	Outcome measure 1 : Diagnostic accuracy/ Reliability	Critical N = 16 (84,21%, included)
	Outcome measure 2 : Usability/ Feasibility	Critical N = 16 (84,21%, included)
	Outcome measure 3 : Accessibility	Critical N = 12 (63,16%, excluded)
Clinical question 2: Is telepractice for the treatment of logopaedic and audiological disorders equally effective compared with traditional care?	Outcome measure 1 : Improvement of the disorder and/or complaints	Critical N = 18 (94,74,%, included)
	Outcome measure 2 : Quality of life	Critical N = 18 (94,74,%, included)
	Outcome measure 3 : Required dosage of treatment	Critical N = 17 (89,47,%, included)
	Outcome measure 4 : Functioning/participation in society	Critical N = 16 (84,21%, included)
	Outcome measure 5 : Treatment adherence/compliance	Critical N = 15 (73,68%, included)
(included in the previous two clinical questions): For which subpopulation of children of ≤ 12 years is telepractice for the treatment of logopaedic and audiological disorders equally effective compared with traditional care?	Outcome measure 1 : Type of children for whom telepractice is feasible (age, type of disorder)	Critical N = 18 (94,74,%, included)
	Outcome measure 2 : Type of parents for whom telepractice is feasible (age, type of disorder)	Critical N = 16 (84,21%, included)
Clinical question 3: Which obstacles, benefits and experiences are reported by SLPs, audiologists, parents and/or children of ≤ 12 years for the use of telepractice for logopaedic or audiological consultations?°	*Outcome measure 1 : Ease/difficulty to perform procedures and use materials*	Critical N = 13 (68,42%, excluded)
	Outcome measure 2 : Technical obstacles	Critical N = 11 (57,89%, excluded)
	Outcome measure 3 : Interaction SLP-client	Critical N = 15 (73,68%, included)
	Outcome measure 4 : Compliance issues and engagement	Critical N = 15 (73,68%, included)
	Outcome measure 5 (N = 9): Experiences of SLP (time, expertise, work setting...)	Critical N = 12 (63,16%, excluded)
	Outcome measure 3 (N = 9): Experiences of client and family (time, travelling, ...)	Critical N = 16 (84,21%, included)
	Outcome measure 1 (N = 9): Motivation	Critical N = 17 (89,47,%, included)
	Outcome measure 2 (N = 9): Satisfaction	Critical N = 17 (89,47,%, included)
	Outcome measure 3 (N = 9): Emotional experiences	Critical N = 13 (68,42%, excluded)

° Most findings for clinical question 3, as initially formulated, described obstacles, benefits and facilitators and did not lead to recommendations. They were used for the implementation plan. The clinical question was therefore reformulated in a final stage to: How to establish a good interaction between child, parent and therapist? Findings about compliance issues and engagement were added to clinical question 2, outcome 5 (adherence/compliance issues); findings about motivation and satisfaction remained under this clinical question.

Summary of the literature

Findings were summarised in a two-step procedure. In a first step, data about each study were collected in a synthesis sheet. Characteristics about the study were collected, including title, authors, year of publication, age of participants, sample size, sample characteristics, study set-up and telepractice specifications. The results of the studies were transferred to the corresponding outcome measure.

In the second step, the information from the individual synthesis sheets was migrated to an excel file and was grouped per outcome measure. For most outcome measures it was acceptable to combine the findings even though telepractice is used for all domains in speech-language pathology and audiology. For one outcome measure for tele-assessment (diagnostic accuracy) and for one outcome measure for teletreatment (improvement of the disorder), however, the findings required to be split up in subdomains (tele-assessment) and treatment set-up (teletreatment).

From evidence to recommendation

Determining the quality of the evidence

The included records for clinical questions 1 and 2 were graded according to the GRADE methodology (Guyatt et al., 2008; Schünemann et al., 2020a, 2020b). The records for clinical question 3 followed another procedure (explained further).

Clinical questions 1 and 2

The quality of evidence was rated for each outcome measure across studies (i.e., for a body of evidence). The assessment of the quality of a body of evidence occurs in one of four grades (Table 4).

Table 4 : Levels of quality of a body of evidence according to the GRADE-methodology

Certainty of evidence	Explanation
High (A)	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate (B)	We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low (C)	Our confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect.
Very low (D)	We have very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of the effect.

The research design is the starting point to assign one of the four grades. RCTs without important limitations provide high quality evidence in the GRADE methodology. Only evidence from diagnostic studies with comparison between tele-assessment and traditional assessment and randomised controlled trials with comparison between teletreatment and traditional treatment were included to answer clinical questions 1 and 2.

The GRADE methodology stipulates five reasons to possibly rate down the quality of evidence and three to possibly rate up the quality.

Factors that can reduce the quality of the evidence are: (1) study limitations in randomised controlled trials (risk of bias): lack of allocation concealment, lack of blinding, incomplete accounting of clients and outcome events, selective outcome reporting and other limitations; (2) inconsistency of results, (3) indirectness of evidence, (4) imprecision and (5) publication bias. When these factors raise concerns, the grading will be downgraded by one level if the concerns are serious, by two levels when the concerns are very serious. The evaluation outcome can

be *no or no serious concerns*, *serious concerns* or *very serious concerns*. Three factors that can increase the quality of evidence are (1) size of effect, (2) dose-response gradient and (3) rest confounding.

The two methodology experts evaluated the quality of the evidence for each factor per each outcome measure. Given the importance of this step in the development of the recommendations and to eliminate subjectivity in this process, the stakeholders (methodology, N = 5) were asked if they agreed with each of these evaluations. Each factor was explained and the available evidence was given. Even though this was not a formal Delphi consensus-proces, agreement was questioned on a 9-point scale. A 1, 2 or 3 referred to disagreement, 4, 5 or 6 to neither disagreement nor agreement and 7, 8 and 9 to agreement. When disagreeing, the methodological experts discussed the issue and came to a consensus between themselves. This way, the decisions on the quality of evidence were supported by a group of methodological experts which reduced the risk of subjectivity.

Table 5 and Table 6 present the final evaluations for each factor per outcome measure.

Table 5 : Evidence profiles per outcome measure for clinical questions 1

Outcome measure	Study and JBI score	Risk of bias	Inconsistency of results	Indirectness of evidence	Imprecision: Difference test accuracy@	Publication bias	Size effect°	Dose-response gradient#	Plausible confounding	Overal quality
Diagnostic accuracy cochlear implant fitting	Study Goehring & Hughes: 66.70% Study Schepers et al.: 66.70%	**Serious concerns** (-1) - poor reporting client selection	No serious concerns (0)	No concerns (0)	**Serious concerns** (-1) - small numbers of participants (N = 44)	No serious concerns (0)	0	NA	0	GRADE C
Diagnostic accuracy hearing screening	Study Ramkumar et al.: 75% Study Krumm et al.: 100% Study Lancaster et al.: 88.89% Study Monica et al.: 88.89%	**Serious concerns** (-1) - recruitment details unclear	Serious concerns (-1) - one study partly different results in the two settings	No concerns (0)	Serious concerns (-1) - small numbers of participants (N = 123)	No serious concerns (0)	+1	NA	+1 - Possible presence of practice effect	GRADE B
Diagnostic accuracy language and literacy assessment	Study Hodge et al.: 100% Study Nelson & Plante:60% Study Raman et al.: 100% Study Waite et al.: 75% Study Waite et al.: 50% Study Sutherland et al.: 85.71% Study Sutherland et al.: 87.50%	**Serious concerns** (-1) - recruitment details unclear	No concerns (0)	No concerns (0)	Serious concerns (-1) - small numbers of participants (N = 93) and one study with moderate correlation	No serious concerns (0)	+1	NA	0	GRADE B
Diagnostic accuracy speech sound disorders	Study Campbell et al.: 100% Study Waite et al.: 57.14% Study Waite et al.: 57.14%	**Serious concerns** (-1) - poor reporting client selection	No concerns (0)	No concerns (0)	Very serious concerns (-2) - small numbers of participants (N = 26) and 6 individual sounds that did not reach agreement and poor correlation for 4 tasks	No serious concerns (0)	0	NA	0	GRADE D
Diagnostic accuracy feeding and swallowing assessment	Study Raatz et al.: 85.71% Study Raatz et al.: 75%	**Serious concerns** (-1) - poor reporting client selection	No concerns (0)	No concerns (0)	Serious concerns (-1) - small numbers of participants (N = 73)	No serious concerns (0)	+1	NA	0	GRADE B
Tele-assessment feasibility	Study Goehring & Highes: 66.70% Study Schepers et al.: 66.70% Study Hodge et al.: 100% Study Raatz et al.: 85.71% Study Raatz et al.: 75% Study Raman et al.: 100% Study Waite et al.: 75% Study Sutherland et al.: 85.71% Study Sutherland et al.: 87.50	**Serious concerns** (-1) - poor reporting client selection	**Serious concerns** (-1) – different types of disorder and different measurements	**Serious concerns** (-1) – very wide age range	**Serious concerns** (-1) – mixed results (N = 247)	No serious concerns (0)	0	NA	0	GRADE D

@ if sample size was smaller than N = 200, serious concerns were raised; ° Size effect can be not large (0), large (+1), very large (+2) – the decision for large effect was taken if the required sample size to obtain a powerful effect with a comparison test (eg t-test, N = 54) or correlation (e.g., Pearson, N = 42) was exceeded; # Dose-response gradient can be absent (0) or present (+1); Plausible confounding can show a reduced effect (+1); NA = Not applicable.

Table 6 : Evidence profiles per outcome measure for clinial question 2

Outcome measure	Study and JBI score	Risk of bias	Inconsistency of results	Indirect-ness of evidence	Imprecision: Difference test accuracy@	Publication bias	Size effect°	Dose-response gradient#	Plausi-ble confoundin g	Overal quality
Improvement of disorder teletraining parent	Study Blaiser et al.: 54.55% Study Bridgman et al.: 72.72% Study Lau et al.: 80% Study McDuffie et al.: 81.81% Study Muñoz et al.: 90% Study San Miguel et al.: 88.89% Study Sweeney et al.: 81.81% Study Wainer et al.: 72.72%	Serious concerns (-1) - random allocation was not clear in one study and groups were not equal in two studies	No concerns (0)	No serious concerns (0)	No serious concerns (0) - (N = 242)	No concerns (0)	+1	NA	0	GRADE A
Improvement of disorder teletreatment children	Study Cameron & Hutchison.: 100% Study Cancer et al.: 81.81% Study Grogan-Johnson et al.: 90.91%	No concerns (0)	No concerns (0)	No serious concerns (0)	Serious concerns (-1) – small numbers of participants (N = 81)	No serious concerns (0)	+1	NA	0	GRADE A
Quality of life	Study Lau et al.: 80% Study Wainer et al.: 72.72%	Serious concerns (-1)	Serious concerns (-1) – in one study, QOL of family was measured, in the other study, QOL of child was measured	Serious concerns (-1) – one study measured quality of life of the child in an indirect way	Serious concerns (-1) – small numbers of participants (N = 54)	No serious concerns (0)	+1	NA	0	GRADE D
Telepractice dosage	Study Bridgman et al.: 72.72% Study Muñoz et al.: 90%	Serious concerns (-1) - selection bias and incomplete reporting	No concerns (0)	Serious concerns (-1) - different populations and interventions	Serious concerns (-1) – small numbers of participants (N = 131)	No serious concerns (0)	+1	NA	0	GRADE C
Adherence	Study Lau et al.: 80% Study Muñoz et al.: 90% Study Wainer et al.: 72.72%	Serious concerns (-1) - selection bias and incomplete reporting in one study	No concerns (0)	Serious concerns (-1) - different populations and interventions	Serious concerns (-1) small numbers of participants (N = 102)	No serious concerns (0)	+1	NA	+1	GRADE B

@ if sample size was smaller than N = 200, serious concerns were raised; ° Size effect can be not large (0), large (+1), very large (+2) – the decision for large effect was taken if the required sample size to obtain a powerful effect with a comparison test (e.g., t-test, N = 54) or correlation (e.g., Pearson, N = 42) was exceeded; # Dose-response gradient can be absent (0) or present (+1); Plausible confounding can show a reduced effect (+1); NA = Not applicable.

Only one study reported findings about functioning and participation in society. Most stakeholders (methodology) (80%) agreed to not include this outcome measure in the guideline.

The recommendation about the feasibility of tele-assessment was supported by very weak evidence; hence, it was decided to add this as a Good Practice Point.

Clinical question 3

The studies, selected for clinical questions 1 and 2 that reported about outcome measures defined for clinical question 3, were included. Besides these studies, also systematic reviews that reported about these outcome measures were included. The systematic reviews were narrative reviews; for this reason, the GRADE methodology could not be used. The CERQual procedure (Booth et al., 2018; Colvin et al., 2018; Glenton et al., 2018; Lewin et al., 2015; Lewin et al., 2018a; Lewin et al., 2018b; Munthe-Kaas et al., 2018; Noyes et al., 2018) could not be applied as the systematic reviews used different ways to present the findings, or the main focus of the study was telepractice in general (and not synchronous telepractice) which resulted in many findings that were not relevant for this guideline. Therefore, a different approach was taken to assess the quality of the evidence for clinical question 3.

For each Good Practice Point, the number of systematic reviews that reported findings for this outcome measure are mentioned. We found it important that all recommendations (also the Good Practice Points) were supported by scienttific evidence and practice evidence. All stakeholders (100%) agreed with this procedure. It is important to emphasize that this is an approach that was applied for this guideline and is not a standard methodology (such as the GRADE methodology).

Table 7 presents the Good Practice Points with the quality of evidence that was given to them.

We added one Good Practice Point that indirectly could be inferred from the findings in the literature, but repeatedly was mentioned by the stakeholders: *Make sure a parent is available to help the child and to communicate with the therapist.*

Table 7 : Evidence underlying the Good Practice Points

Outcome measure[§]	Study and JBI score	Good Practice Point	Number of reviews that report findings (N)
Interaction therapist and child	Study Blaiser et al.[1]: 54.55% Study Grant et al.[1,3,4]: 90% Study Law et al.[3]: 70% Study McGill et al.[1]: 80% Study Molini-Avejonas et al.[1]: 70% Study Monica et al.[1]:88.89% Study Waite et al.[1]: 75%	1. Evaluate the quality of the relationship and interaction with the child in telepractice through child and parent report.	6
		2. Make sure a parent is available to help the child and to communicate with the therapist.	Stakeholders' input
		3. Propose teletreatment as it promotes active parental involvement and upskills parents in implementing the treatment.[&]	2
		4. Do not to use telepractice for interventions that require active child participation of: a. children with severe physical disabilities, as they have difficulty using technology. b. children with severe communication difficulties, when they have difficulty communicating through a screen.	1
		5. Propose tele-assessment as an accurate alternative for traditional assessment of speech sounds in children (4-9 years) but only if the child is intelligible and the mouth can be observed accurately.	Recommendation Clinical Question 1
Treatment adherence	Study Ellison et al.[6]: 80% Study Law et al.[7]: 70% Study Parsons et al.[6]: 90%	6. Propose teletraining since interactive methods used in teletraining lead to an increased parent adherence**.**	2
		7. Propose teletreatment with parents of young children and with older children, as older children become more autonomous and experienced with technical equipment and this can increase adherence.	1
Obstacles (6-9), facilitators (10-12), benefits (13-16)	Study Armoiry et al.[10]: 100% Study Barr et al.[10,15]: 80% Study Blaiser et al.[16]: 54.55% Study Boisvert & Hall[10,17]: 70% Study Campbell et al.[14]: 90% Study Ellison et al.[15]: 80% Study Furlong et al.[10]: 80% Study Grogan-Johnson et al.[10]: 90.91% Study Grant et al.[10,,12,13,15,17]: 90% Study Govender et al.[10]: 60% Study Hodge et al.[10]: 100% Study Jacups et al.[15,16,17]: 60% Study Law et al.[10,11,14,15,17]: 70% Study McCarthy et al.[10,15,17]: 60% Study McGill et al.[8,10,15,18]: 80% Study Molini-Avejonas et al.[8,10,15,16,17]: 70% Study Monica et al.[10]: 88.89% Study Raman et al.[10,11]: 100% Study Sutherland et al. (2017)[8,10,11]: 85.71% Study Sutherland et al. (2018)[15]: 60% Study Sheikhtaheri et al.[15]: 60% Study Tully et al.[8,9,10,12,13]: 70% Study Waite et al.[10]: 75%	8. Obstacles may be encountered. It is known that obstacles often don't present themselves.	4
		9. The therapist may be concerned about children's participation and family privacy (sharing their daily lives). It is known that these are usually not experienced by parents.	1
		10. Anticipate barriers for telepractice: o low internet connectivity o preparation time for the therapist (e.g. adaptation of treatment materials) o development of personalised activities o position of the child (e.g. poor lighting, movements outside the camera angle) o inability to help the child (e.g. computer mouse or headset problems) o additional technological training for the child, family and therapist o logistical planning for treatment at school (e.g. support staff needed for set-up and supervision).	17[#]
		11. Evaluate the feasibility of tele-assessment because reduced attention, decreased intelligibility and a lack of physical presence can obstruct assessment.	2
		12. A frequent use of video conferencing technology increases the therapist's confidence.	2
		13. A training in telepractice increases confidence and self-efficacy.	2
		14. Technical support to the family increases the child's and family's familiarity with telepractice.	2
		15. The following benefits of telepractice are reported: o it reduces travel time and costs for the family. o it can gain time of therapists if they replace home visits (no travel time). o it offers many possibilities to upskill the therapist's therapeutic knowledge and abilities. o it can improve family-centred care because families get a lot of support to implement treatment strategies at home. Teletreatment easily allows transfer of learned skills to the natural environment through family participation. o it provides better access to audiological and speech therapy services for children, including access to specialised therapists. o it enlarges families' choice in therapist and approach to intervention. o clients attend more sessions with telepractice because there are fewer barriers to attendance than with traditional intervention. o planning a teletreatment session is easier for the family than planning a traditional treatment session. o it stimulates support and involvement of the child's network (parents, siblings, …).	10

		16. Educate or train parents in treatment for children (0-5 years) through teletraining or traditional training as the total duration of tele-education or teletraining is equal to or shorter than traditional parent education or training	12°
		17. Telepractice is generally a lower burden on parents.[&]	6
		18. A teletreatment session in between traditional treatment sessions can reassure parents about their child's progress.[§]	1
Motivation	Study Blaiser et al.[19,20]: 54.55% Study Boisvert & Hall[20]: 70% Study Ellison et al.[20]: 80% Study Furlong et al.[19]: 80% Study McCarthy et al.[20]: 60% Study Monica et al.[20]:88.89% Study Raman et al.[19]: 100% Study Tully et al.[19]: 70%	19. Evaluate the motivation and satisfaction about telepractice of the child, parents and therapist after each session.	4
		20. Implement telepractice even if therapists, families and others involved are doubtful at first. They usually become very motivated.	5
Satisfaction	Study Blaiser et al.[21]: 54.55% Study Boisvert et al. (2010)[21]: 70% Study Boisvert & Hall (2014)[21]: 70% Study Campbell et al.[21]: 90% Study Dahiya et al.[21]: 60% Study Edward et al.[21]: 50% Study Ellison et al.[21]: 80% Study Furlong et al.[21]: 80% Study Govender et al.[21]: 60% Study Grant et al.[21]: 90% Study Hodge et al.[21]: 100% Study Law et al.[21]: 70% Study Maluke et al.[21]: 60% Study McGill et al.[21]: 80% Study Molini-Avejonas et al.[21]: 70% Study Parsons et al.[21]: 88.89% Study Raatz et al.[21,22]: 100% Study Sutherland et al. (2017)[21]: 85.71% Study Sutherland et al. (2018)[21]: 60% Study Sutherland et al. (2019)[21]: 60% Study Sheikhtaheri et al.[21]: 60% Study Taylor et al.[21]: 70% Study Tully et al.[21]: 70% Study Wainer et al.[21]: 75%	21. Propose telepractice as therapists and parents often feel that it is a good fit for their child and family.	25
		22. Combine telepractice with traditional intervention, considering the preference of the parents, children and therapists.	1
		23. Educate or train parents in teletreatment for children (18 months -7 years) as an alternative to traditional training as the effect on quality of life is equal for both. *This applies specifically to training in treatment of communication in Autism Spectrum Disorders and Other Developmental Disorders.*	Recommendation Clinical Question 2

[§] The Good Practice Point about telediagnostics was included in Table 5 (GRADE D = GPP); [&]This Good Practice Point was not implemented in the guideline; [#] 8/17 studies reported on internet connectivity; ° For this Good Practice Point, also studies (n = 9) underlying the recommendation about feasibility of tele-assessment are included. [$]This Good Practice Point was implemented under Good Practice Point 22.

Determining the strength of the recommendations

Clinical questions 1 and 2

Two methodological experts determined the strength of each recommendation by assigning the score 1 or 2 based on the input of the stakeholders. The stakeholders were asked how acceptable and feasible telepractice is in the Belgian health care context for each recommendation. A score 1 refers to strongly for or against the recommendation. A score 2 refers to weakly for or weakly against the recommendation. To decide this, the factors in Table 8 and Table 9 were considered.

It is important to understand that the strength of each recommendation was determined based on the perspective that telepractice is proposed as an equal option to receive treatment and not as a solution for a situation in which the client otherwise would not be able to receive treatment (such as during COVID-19). Supporting information for these decisions can be found in the sections *From evidence to decision* for each recommendation.

Table 8 : Evidence-to-decision framework for the recommendations of clinical question 1

Recom-mendation	Is using telepractice a priority?	What are benefits of telepractice?	What is the harm of telepractice?	What is the general cer-tainty of the evi-dence?	Are users uncertain about the important outcomes about teleprac-tice?	Do the benefits outweigh the harm?	Are the costs the same for teleprac-tice?	What is the impact of telepractice on equity of care?	Is telepractice accepted by the therapists and the children and families?*	Is telepractice feasible to implement?*	Strength of the recom-menda-tion#
Tele-assess-ment safety/ feasibility	Varying, circumstantial	No significant difference between the traditional and telepractice setting	Session time was slightly delayed for literacy assessment; Language tele-assessment resulted in decreased behavioural responses.	D	Probably	Uncertain	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	It is usually feasible	2
Diagnostic accuracy feeding and swallowing assess-ment	Varying, circumstantial	High correlations between most measurements in the traditional and telepractice setting	The items that failed to meet agreement criteria were difficult to complete in traditional and telepractice setting	B	Probably not	Probably yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Probably yes	It is feasible if life video recording of swallowing is possible	1
Diagnostic accuracy cochlear implant fitting	Varying, circumstantial	No significant difference between the traditional and telepractice setting	Not reported	C	Probably not	Probably yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Not in babies for the first fitting. It is feasible for annual check-ups in children of 4 years or older	1
Diagnostic accuracy hearing screening	Varying, circumstantial	No significant difference between the traditional and telepractice setting	Connectivity issues and some school related issues	B	Probably not	Probably yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Probably yes	It may be feasible but there is no or little added value to perform telepractice in babies and primary school children in the Belgian health care context	2
Diagnostic accuracy language and literacy assessment	Varying, circumstan-tial	High correlations between measurements in the traditional and telepractice setting	On some occasions, there were technical difficulties and child-related factors that impacted on the telescreening	B	Probably not	Uncertain	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Probably yes	It is more feasible to perform this with older children (final years of primary school) than with younger children. It is usually not preferred if traditional assessment is possible	2
Diagnostic accuracy speech sound disorders	Varying, circumstan-tial	High correlations between most measurements in the traditional and telepractice setting	10% of sounds did not reach 70% agreement; strength of agreement was fair or poor for four tasks (4/10)	D	Probably	Probably not	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Probably yes	It may be feasible, but it is usually not preferred if traditional assessment is possible	2

* Acceptability and feasibility were discussed with the stakeholders (implementation); # Strength of the evidence can be strong (1) or weak (2).

Table 9 : Evidence-to-decision framework for the recommendations of clinical question 2

Recommendation	Is using telepractice a priority?	What are benefits of telepractice?	What is the harm of tele-practice?	What is the gene-ral cer-tainty of the evi-dence?	Are users uncertain about the important outcomes about telepractice?	Do the benefits outweigh the harm?	Are the costs the same for telepractice?	What is the impact of telepractice on equity of care?	Is telepractice accepted by the therapists and the children and families?°	Is telepractice feasible to implement?°	Strength of the recom-menda-tion#
Parent teletraining	Varying, circumstantial	Same or better results in teletreatment versus traditional treatment	Not reported	A	Probably not	Yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Yes	1
Child teletreatment	Varying, circumstantial	Same or better results in teletreatment versus traditional treatment	Not reported	A	Probably not	Yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Yes	2
Required telepractice dosage	Varying, circumstantial	Same or better results in teletreatment versus traditional treatment	Not reported	C	Probably not	Yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Yes	1
Adherence	Varying, circumstantial	Same or better results in teletreatment versus traditional treatment	Not reported	B	Probably not	Yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Yes	1
Quality of life	Varying, circumstantial	No differences between the two settings	Not reported	D	Probably not	Yes	Probably yes	Equity of care probably increases; telepractice lowers the threshold to access specialised services	Yes	Yes	1

° Acceptability and feasibility were discussed with the stakeholders (implementation); # Strength of the evidence can be strong (1) or weak (2).

Clinical question 3

For clinical question 3, the strength of the recommendation could not be determined as a different approach was taken.

Formulation of the recommendations

The recommendations were fomulated with the imperative verb form. The strength is mentioned at the end of the recommendation.

The recommendations were approved by the stakeholders with a consensus ≥ 70%.

Some weak recommendations were added as clarification but not as recommendation.

Appendices

Appendix A. Preliminary search for guidelines about telepractice with children

Database	Type of database	Search terms	Results	Guidelines & scope	Outcome (assessment of scope)
Evidence Maps, ASHA	A database that collects the evidence based on research design. They include guidelines, systematic reviews and randomised clinical trials	Suggested term (choice of predefined terms): "Telepractice" combined with "Children"	17 articles of which 3 guidelines 14 Systematic reviews	Guidance on voice and upper airway disorders in the context of COVID-19 in adult and paediatric services, (2020). Royal College of Speech-Language Therapists Guidance. "This document has been developed in response to the growing number of speech and language therapists (SLPs) working in voice and upper airway disorders seeking guidance on how to safely and effectively deliver care [during the pandemic]" (p.2).	The guideline is not in line with the scope of the guideline that will be developed: ▪ The target population is limited to voice clients ▪ The implementation of telepractice is focused on safety during COVID-19 ▪ The methodology used to develop the guideline was not reported in the guideline
				Thai-Van, H. et al. (2020). Telemedicine in Audiology. Best practice recommendations from the French Society of Audiology (SFA) and the French Society of Otorhinolanryngology-Head and Neck Surgery (SFORL).	The guideline is not in line with the scope of the guideline that will be developed: ▪ The target population is limited to clients with hearing disorders ▪ A narrative summary of the literature and best practices ▪ The methodology used to develop the guideline was not reported in the guideline
				Standards for post-concussion care, (2017). Ontario Neurotrauma Foundation.	The guideline is not in line with the scope of the guideline that will be developed: ▪ The target population is limited to patients who had a concussion ▪ The guideline mainly provides recommendations for physical care (not telepractice)
NICE (National Institute for Health and Care Excellence)	Database with guidelines focused on medical disorders	The "browse per topic" did not include "telepractice" or synonyms. These guidelines are out of scope as the focus is on medical care	No results	No results	
G-I-N (guidelines international network)	Database with guideline focused on medical disorders	No guidelines for speech therapy 1 guideline for language therapy: not relevant (no telepractice) No guidelines for telepractice 15 guidelines for COVID-19: not relevant	No results	No results	

Database	Type of database	Search terms	Results	Guidelines & scope	Outcome (assessment of scope)
WOREL	Database with guidelines developed or contextualised for the Belgian health care setting	No guidelines for speech/speech therapy/audiology No guidelines for language therapy No guidelines for telepractice No guidelines for COVID-19	No results	No results	
Ebpracticenet	Database with point-of-care recommendations	No guidelines for telepractice	No results	No results	
Guideline Central	Database with clinical guidelines	The "browse per topic" on speech-language pathology (audiology was not presented)	33 guidelines 32 guidelines focused on physical intervention 1 guideline recommends telepractice	Best evidence statement (BESt)-Speech therapist directed use of video modelling for clients with Autism Spectrum Disorder, (2012). Cincinnati Children's Hospital Medical Center	The guideline is not in line with the scope of the guideline that will be developed: ▪ The telepractice is an asynchronous service
Australian Clinical Practice Guidelines	Database with clinical guidelines	No guidelines for telepractice/telehealth	No results	No results	

Appendix B. General search terms for the research questions

Concept	Search string
Population	(speech OR language OR stutter* OR stammer* OR swallow* OR dysphagia OR voice OR "learning disord*" OR communication OR dyslexia OR "developmental language disord*" OR DLD OR SLI OR dysphasia OR "speech delay" OR "language delay" OR bilingual* OR multilingual* OR deaf OR "hard of hearing" OR "hearing impair*" OR "hearing loss" OR "hearing disord*" OR "vestibular disord*" OR "vestibular impair*" OR "balance disord*" OR "balance impair*" OR vertigo OR hearing OR tinnitus OR "hearing aid*" OR "hearing implant" OR "cochlear implant" OR audiolog* OR "central auditory processing disord*" OR "visual impair*" OR "visual disord*" OR blind OR "language"NEAR/3 impair* OR "language"NEAR/3 disord* OR "speech"NEAR/3 disord* OR "learning"NEAR/3 impair* OR "speech"NEAR/3 therap* OR "speech"NEAR/3 patholog* OR "language"NEAR/3 therap* OR "language"NEAR/3 patholog* OR "communication"NEAR/3 therap*) AND (child* OR preschool OR infant OR toddler OR kindergart* OR "school age*" OR preadolescen* OR preteen* OR developmental OR pediatr*)
Intervention	(telepractice OR webcam OR online OR telerehabilitat* OR teletherapy* OR telehealth OR tele* OR web-based OR remot* OR home-based OR hybrid OR videoconferenc* OR teleconsultation OR synchronous OR telemedic* or tele-audiology OR e-health OR e-medic* OR e-consult* OR e-practice OR e-rehabilitat* OR e-counsel* OR e-care OR e-healthcare OR e-therap* OR "mobile health" OR m-health) AND (screening OR screener* OR assess* OR diagnos* OR evaluat* OR intervention* OR therap* OR treatment* OR remediat* OR identif*)
Publication year	2002-2022
Publication language	English-French-Dutch
Publication type	Peer-reviewed

For PsycInfo, LLBA and ERIC:

(MESH("Oral Communication" OR language OR "Communication Disorders" OR dysphagia OR "learning disorders" OR multilingualism OR "hearing disorders" OR "ear disorders" OR vertigo OR "hearing aids" OR audiology OR "vision disorders" OR "speech language pathology") OR AB,TI(communication OR "developmental language disord*" OR DLD OR dysphasia OR "speech delay" OR "vestibular impair*" OR "balance disord*" OR "balance impair*" OR hearing OR "hearing implant" OR "central auditory processing disord*" OR "language"NEAR/3 impair* OR "language"NEAR/3 disord* OR "speech"NEAR/3 disord* OR "learning"NEAR/3 impair* OR "speech"NEAR/3 therap* OR "speech"NEAR/3 patholog* OR "language"NEAR/3 therap* OR "language"NEAR/3 patholog* OR "communication"NEAR/3 therap*))

AND

(AB,TI(child* OR preschool OR infant OR toddler OR kindergart* OR "school age*" OR preadolescen* OR preteen* OR developmental OR pediatr*))

AND

(MESH("electronic health services" OR videoconferencing) OR AB,TI(telepractice OR tele* OR web-based OR remot* OR home-based OR hybrid OR synchronous OR tele-audiology OR e-medic* OR e-consult* OR e-practice OR e-rehabilitat* OR e-counsel* OR e-care OR e-healthcare OR m-health))

AND

(MESH(screening OR diagnosis OR rehabilitation) OR AB,TI(screener* OR assess* OR evaluat* OR intervention* OR therap* OR remediat* OR identif*))

AND la.exact("English" OR "French" OR "Dutch")

For Web Of Science:

(AB=(speech OR language OR "Communication Disorders" OR stutter* OR dysphagia OR stammer* OR multilingualism OR swallow* OR voice OR "learning disord*" OR communication OR dyslexia OR "developmental language disord*" OR DLD OR SLI OR dysphasia OR "speech delay" OR vertigo OR "language delay" OR bilingual* OR multilingual* OR deaf OR "hard of hearing" OR "ear disord*" OR "hearing impair*" OR "hearing loss" OR "hearing disord*" OR "vestibular disord*" OR "vestibular impair*" OR "vestibular impair*" OR "balance disord*" OR "balance impair*" OR hearing OR tinnitus OR "hearing aid*" OR "hearing implant" OR "cochlear implant" OR audiolog* OR "central auditory processing disord*" OR "visual impair*" OR "visual disord*" OR "vision disord*" OR blind OR "language"NEAR/3 impair* OR "language"NEAR/3 disord* OR "speech"NEAR/3 disord* OR "learning"NEAR/3 impair* OR "speech"NEAR/3 therap* OR "speech"NEAR/3 patholog* OR "language"NEAR/3 therap* OR "language"NEAR/3 patholog* OR "communication"NEAR/3 therap*))

AND

(AB=(child* OR preschool OR infant OR toddler OR kindergart* OR “school age*” OR preadolescen* OR preteen* OR developmental OR pediatr*))

AND

(AB=(telepractice OR webcam OR online OR telerehabilitat* OR teletherapy* OR telehealth OR tele* OR web-based OR remot* OR home-based OR hybrid OR videoconferenc* OR teleconsultation OR synchronous OR telemedic* or tele-audiology OR e-health OR e-medic* OR e-consult* OR e-practice OR e-rehabilitat* OR e-counsel* OR e-care OR e-healthcare OR e-therap* OR “mobile health” OR m-health OR “electronic health services”))

AND

(AB=(screening OR screener* OR assess* OR diagnos* OR evaluat* OR intervention* OR therap* OR treatment* OR remediat* OR identif* OR rehabilitation))

AND (DOP=(2002-01-01/2022-01-01))

AND LA=(English OR French OR Dutch)

For PubMed:

(Speech[Mesh:no exp] OR Language[Mesh] OR "Communication Disorders"[Mesh] OR "Deglutition Disorders"[Mesh] OR "Voice Disorders"[Mesh] OR "Speech-Language Pathology"[Mesh] OR Multilingualism[Mesh] OR "Hearing Disorders"[Mesh] OR "Vestibular Diseases"[Mesh] OR "Hearing Aids"[Mesh] OR "Cochlear Implants"[Mesh] OR Audiology[Mesh] OR Audiologist[Mesh] OR "Vision Disorders"[Mesh] OR communication[Title/Abstract] OR dysphasia[Title/Abstract] OR "balance disord*"[Title/Abstract] OR hearing[Title/Abstract] OR "hearing implant"[Title/Abstract] OR "language impair*"[Title/Abstract] OR "language disord*"[Title/Abstract] OR “speech disord*”[Title/Abstract] OR "learning impair*"[Title/Abstract] OR "speech language therap*"[Title/Abstract] OR "speech therap*"[Title/Abstract] OR "speech patholog*"[Title/Abstract] OR "language therap*"[Title/Abstract] OR "language patholog*"[Title/Abstract] OR "communication therap*"[Title/Abstract])

AND

(Child[Mesh] OR Infant[Mesh] OR toddler OR kindergart*[Title/Abstract] OR "school age*"[Title/Abstract] OR preadolescen*[Title/Abstract] OR preteen*[Title/Abstract] OR developmental[Title/Abstract] OR pediatr*[Title/Abstract])

AND

(Telemedicine[Mesh] OR "Internet-Based Intervention"[Mesh] OR Videoconferencing[Mesh] OR “distance counseling”[Mesh] OR telepractice[Title/Abstract] OR webcam[Title/Abstract] OR online[Title/Abstract] OR teletherapy*[Title/Abstract] OR tele*[Title/Abstract] OR web-based[Title/Abstract] OR home-based[Title/Abstract] OR hybrid[Title/Abstract] OR synchronous[Title/Abstract] OR tele-audiology[Title/Abstract] OR e-medic*[Title/Abstract] OR e-consult*[Title/Abstract] OR e-practice[Title/Abstract] OR e-rehabilitat*[Title/Abstract] OR e-care[Title/Abstract] OR e-healthcare[Title/Abstract] OR m-health[Title/Abstract])

AND

(Diagnosis[Mesh] OR Rehabilitation[Mesh] OR screener*[Title/Abstract] OR assess*[Title/Abstract] OR evaluat*[Title/Abstract] OR intervention*[Title/Abstract] OR therap*[Title/Abstract] OR treatment*[Title/Abstract] OR remediat*[Title/Abstract] OR identif*[Title/Abstract])

For Embase:

(Speech/de OR (Language OR "Communication Disorder" OR "Speech Disorder" OR Dysphagia OR "Learning Disorder" OR Multilingualism OR "Hearing Disorder" OR "Balance Disorder" OR "Hearing Aid" OR "Auditory Implant" OR Audiology OR "Visual Disorder" OR "Speech-Language Pathologist" OR Audiologist)/exp OR (communication OR hearing OR language NEAR/3 impair* OR language NEAR/3 disord* OR speech NEAR/3 disord* OR learning NEAR/3 impair* OR speech NEAR/3 therap* OR speech NEAR/3 patholog* OR language NEAR/3 therap* OR language NEAR/3 patholog* OR communication NEAR/3 therap*):ab,ti)

AND

(Child/exp OR (kindergart* OR "school age*” OR preadolescen* OR preteen* OR developmental OR pediatr*):ab,ti)

AND

((Telehealth OR "Web-Based Intervention" OR Videoconferencing OR “e-counseling”)/exp OR (telepractice OR tele* OR web-based OR remot* OR home-based OR hybrid OR synchronous OR tele-audiology OR e-medic* OR e-practice OR e-therap* OR “mobile health” OR m-health):ab,ti)

AND

((Screening OR “Dagnostic Procedure” OR Rehabilitation)/exp OR (screener* OR assess* OR evaluat* OR intervention* OR therap* OR treatment* OR remediat* OR identif*):ab,ti)

For JBI:

(Speech OR Language OR Communication Disorders OR Deglutition Disorders OR Voice Disorders OR Speech-Language Pathology OR Multilingualism OR Hearing Disorders OR Vestibular Diseases OR Hearing Aids OR Cochlear Implants OR Audiology OR Audiologist OR Vision Disorders OR communication OR dysphasia OR balance disord* OR hearing OR hearing implant OR language impair* OR language disord* OR speech disord* OR learning impair* OR speech language therap* OR speech therap* OR speech patholog* OR language therap* OR language patholog* OR communication therap*)

AND

(Child OR Infant OR toddler OR kindergart* OR school age* OR preadolescen* OR preteen* OR developmental OR pediatr*)

AND

(Telemedicine OR Internet-Based Intervention OR Videoconferencing OR distance counseling OR telepractice OR webcam OR online OR teletherapy* OR tele* OR web-based OR home-based OR hybrid OR synchronous OR tele-audiology OR e-medic* OR e-consult* OR e-practice OR e-rehabilitat* OR e-care OR e-healthcare OR m-health)

AND

(Diagnosis OR Rehabilitation OR screener* OR assess* OR evaluat* OR intervention* OR therap* OR treatment* OR remediat* OR identif*)

For CINAHL:

((MM "Oral Communication") OR (MM language) OR (MM "Communication Disorders") OR (MM dysphagia) OR (MM "learning disorders") OR (MM multilingualism) OR (MM "hearing disorders") OR (MM "ear disorders") OR (MM vertigo) OR (MM "hearing aids") OR (MM audiology) OR (MM "vision disorders") OR (MM "speech language pathology") OR (AB communication) OR (AB "developmental language disord*") OR (AB DLD) OR (AB dysphasia) OR (AB "speech delay") OR (AB "vestibular impair*") OR (AB "balance disord*") OR (AB "balance impair*") OR (AB hearing) OR (AB "hearing implant") OR (AB "central auditory processing disord*") OR (AB "language" N3 impair*) OR (AB "language" N3 disord*) OR (AB "speech" N3 disord*) OR (AB "learning" N3 impair*) OR (AB "speech" N3 therap*) OR (AB "speech" N3 patholog*) OR (AB "language" N3 therap*) OR (AB "language" N3 patholog*) OR (AB "communication" N3 therap*))

AND

((AB child*) OR (AB preschool) OR (AB infant) OR (AB toddler) OR (AB kindergart*) OR (AB "school age*") OR (AB preadolescen*) OR (AB preteen*) OR (AB developmental) OR (AB pediatr*))

AND

((MM "electronic health services") OR (MM videoconferencing) OR (AB telepractice) OR (AB tele*) OR (AB web-based) OR (AB remot*) OR (AB home-based) OR (AB hybrid) OR (AB synchronous) OR (AB tele-audiology) OR (AB e-medic*) OR (AB e-consult*) OR (AB e-practice) OR (AB e-rehabilitat*) OR (AB e-counsel*) OR (AB e-care) OR (AB e-healthcare) OR (AB m-health))

AND

((MM screening) OR (MM diagnosis) OR (MM rehabilitation) OR (AB screener*) OR (AB assess*) OR (AB evaluat*) OR (AB intervention*) OR (AB therap*) OR (AB remediat*) OR (AB identif*))

Details per database

March 2022

- CINAHL: Peer reviewed, date 2002-2022, specified for language (Dutch, French, English): n = 988
- Embase: date 2002-2022, specified for language (Dutch, French, English): n = 4398
- ERIC: Peer reviewed, date na 1-1-2002, specified for language (Dutch, French, English): n = 236
- JBI: date 2002-2022: n = 460
- LLBA: Peer reviewed, date after 1-1-2002, specified for language (Dutch, French, English): n = 121
- PsycInfo: Peer reviewed, date 2002-2022, specified for language (Dutch, French, English): n = 660
- PubMed: date 2002-2022, specified for language (Dutch, French, English): n = 3331
- Web Of Science: all-in free tekst fields, not indicated for Peer reviewed (no option), date after 1-1-2002, specified for language (Dutch, French, English): n = 5457

TOTAL N = 15 651

Update search 1/3/2022 - 8/12/2022:

- CINAHL: n = 103
- Embase: n = 609
- ERIC: n = 16
- JBI: n = 17
- LLBA: n = 18
- PsycInfo: n = 31
- Pubmed: n = 303
- Web of Science: n = 639

TOTAL N = 1736

Appendix C. Inclusion/exclusion in the literature selection process

Below, important discussion/decision points of the meeting about the first 681 screened titles and abstracts are listed:

- Digital storytelling on its own is not enough, if there is no telepractice aspect involved.
- The term "'Web-based assessment/web-based screening" gets the benefit of the doubt if there is no other reason to exclude.
- The term "narrative assessment" can be accepted as a term related to speech-language pathology.
- The term "mental health" is no reason to exclude, in case there is too little information provided (e.g., no abstract available). There are for example many articles about Autism Spectrum Disorder who discuss mental health within the framework of problems related to speech-language pathology. However, when the abstract only discusses mental health issues tackled by psychologist/psychiatrists, article can be excluded.
- When an abstract discusses "health promotion projects" without specifying what they promote exactly, it can get the benefit of the doubt (it might be something involving speech-language pathology or audiology).
- Cleft palate : always check the outcome of the described therapy. It might also describe dentist-related therapies (and not speech-and language interventions).
- Remembering/recognizing voices is not considered speech-language pathology.
- Tele-interventions to promote executive functioning is still accepted in the domain of speech-language pathology.
- Abstracts that describe the development of a speech-language pathology or audiological intervention-game get the benefit of the doubt, since the full text might describe benefits/experiences of tele-intervention.
- Abstracts describing emotion-related interventions/social behaviour get the benefit of the doubt, since SLP's sometimes also provide this kind of therapy in children with Autism Spectrum Disorder. Only if the paper clearly describes that the therapy is not provided by an SLP, the paper can be excluded.
- Within the framework of hearing research, video otoscopy and telemetry are both methods that can only be executed in real-life; so it is not a form of telepractice.
- If there is doubt on the use of telepractice, but the year of publication falls within COVID-period (2020-2022), the article can get the benefit of the doubt if there is absolutely no other reason to exclude.
- E-learning methods at school within COVID-period (2020-2022) can still be included, since the article might also discuss extra care services (SLP) which occurred online at that time.
- Abstracts which describe media-use for therapy/assessment reasons can be included, since the full text might describe benefits and pitfalls of telepractice in speech-language pathology and audiology.
- The use of wording such as "online / offline comparison" get benefit of the doubt, since it is not always clear what authors mean with these terms.