A Phase I trial of iLidcombe: Online treatment for young children who stutter

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Declaration of Interest Statement

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Abstract

Aim. The aim of this Phase I trial was to assess the safety, compliance, and potential efficacy of iLidcombe: a standalone internet version of the Lidcombe Program for young children who stutter.

Method. We used a prospective single-group design involving 6 months of access to iLidcombe. Assessments occurred pre-treatment and after 6 months of access. Participants were 20 parents of young children who stuttered.

Results. There was evidence of stuttering severity reduction after using iLidcombe for 6 months. Compliance with the program was favourable, and there was no suggestion of any psychologically adverse impact on children.

Conclusions. The results of this Phase I trial provide a roadmap for further Phase II–IV clinical trial development.

The impact of stuttering

Stuttering onset typically occurs during early childhood in children 2 years of age (Ambrose & Yairi, 1999), at a median of 31 months (Reilly et al., 2013). Around two-thirds to three-quarters of children will recover at some later time because of treatment and/or natural recovery. However, little of that recovery—below 10%—occurs within 18 months post onset (for a review, see Onslow, 2025). Quality-of-life impact of the condition is in a similar range to that for diabetes, cardiovascular disease, and HIV (Norman et al., 2023). Quality-of-life issues commence soon after onset (Briley et al., 2019; McAllister, 2016; Norman et al., 2023; Tığrak et al., 2020). Compared with their peers, 7–12-year-old children who stutter develop social anxiety disorder five times more often (Bernard et al., 2022; Iverach, et al., 2016). School children who stutter are more likely to repeat a grade and have poorer academic outcomes than peers (Berchiatti et al., 2020; Boyle et al., 1994; O'Brian et al, 2011; Williams et al., 1969). Indirect costs of stuttering later in life are social, involving failure to attain full occupational potential (Boyce et al., 2022; Gerlach et al., 2018; Jacobs et al., 2025; Lake et al., 2009; McAllister et al., 2012) and discrimination in the workplace (Boyle & Cheyne, 2024; Gerlach et al. 2018). Direct costs of the condition are considerable. Norman et al (2023) showed that willingness to pay for effective treatment can be 2–4 times the annual family income, and 61% of families report a financial strain because of an adolescent who stutters.

The need for early stuttering intervention

The potential lifelong effects of the condition may have prompted speech-language pathologists (SLPs) from 10 countries ($N = 264$) to rank childhood stuttering as a priority on their waiting lists for receiving treatment. Those SLPs had long waiting lists, on which they gave top priority to children with feeding difficulties, with children who stutter as the next priority (McGill et al., 2021). Eighteen Australian SLPs produced a consistent view (Erickson et al., 2022) by indicating that stuttering is "more debilitating than other communication disorders with the potential for long-

term consequences to be more significant for clients" (p. 5). Participants at a conference with clinicians and researchers from 29 countries indicated that "current evidence … clearly tells us the risks of early stuttering are certain and that they can be serious and potentially lifelong" (Lowe et al., 2021, p. 9).

The Lidcombe Program

The Lidcombe Program, developed by the Australian Stuttering Research Centre and colleagues, is one of many early stuttering interventions. A Cochrane Review found the program to have a large effect size with evidence of effects beyond natural recovery (Sjøstrand, et al., 2021). Initially, the SLP works with parents to individualize the treatment. Treatment involves parents giving feedback about their children's speech during enjoyable daily practice sessions and during everyday conversations. Parents give intermittent feedback for stuttering moments, with the bulk of the feedback being for stutter-free speech. The program does not target changes to the home environment or target altering the child's speech pattern in any way. It consists of two stages. During Stage 1, the SLP and parent work together with a target of attaining no stuttering or nearly no stuttering. During Stage 2, treatment is gradually withdrawn while maintaining no stuttering or nearly no stuttering (Onslow et al., 2025). Progression through the Lidcombe Program is based on parent reports of their children's stuttering severity.

Barriers to accessing the Lidcombe Program

There are global barriers to Lidcombe Program access. The prevalence of early stuttering is around 10% (Månsson, 2000; Reilly et al., 2013; Yairi, 1983), which is challenging for the SLP workforce globally. Governments recognize that SLP workforces are not equipped to deal adequately with such a prevalent condition (I CAN, & Royal College of Speech and Language Therapists, 2018; Senate Community Affairs Committee Secretariat, 2014). A recent analysis of the United States Early Childhood Longitudinal Study database indicated that 75% of children who stuttered did not receive treatment (Briley & Jacobs, 2025). Caldera et al. (2023) reported that the

United Kingdom and Australia have, respectively, 35.9 and 23.7 SLPs per 100,000 of population. However, most children reside in countries where the SLP profession is not as well resourced: Caldera et al. figures for India, Malaysia, and Sri Lanka are 0.17, 0.95, and 0.44 per 100,000 respectively. Those access issues are compounded by only 55% of the world's population living in urban areas (United Nations, 2018), where SLP services are the most accessible.

iLidcombe

iLidcombe is an online eHealth adaptation of the Lidcombe Program that requires no SLP. It adapts the work by Van Eerdenbrugh et al. (2016), who established that parents can be trained in the Lidcombe Program treatment procedures with an online eHealth treatment. As with the Lidcombe Program, iLidcombe treatment is administered by parents. It is based on previous eHealth programs for stuttering (Erickson et al., 2012, 2016; Gunn, et al. 2019; Helgadóttir et al., 2009; Menzies et al., 2016; Van Eerdenbrugh et al., 2016) developed by researchers at the Australian Stuttering Research Centre and colleagues.

iLidcombe was developed to reflect the treatment process of the face-to-face Lidcombe Program. Hence, the program features the voice of an SLP presenting information that supplements respective pages of content. Pages include written information, diagrams, pictures, and video examples of treatment procedures. The purpose of the SLP voice is to simulate a real clinical interaction between an SLP and parent, where the SLP guides the treatment, providing instructions, explanations, and encouragement. On each page of iLidcombe there is a "Feeling Sad?" button. If clicked, it displayed the following text, with a link to local clinical psychology services: "If you are feeling overwhelmed by doing this program, or you believe that you are becoming depressed, we strongly encourage you to contact a clinical psychologist or medical practitioner in your area" As with the Lidcombe Program, iLidcombe consists of two stages, described below.

Stage 1

Stage 1 comprises 18 modules and weekly logins that continue until the child's severity ratings have reached criterion levels of no stuttering or nearly no stuttering. *Module 1* provides an overview of the essential components of iLidcombe. *Modules 2–6* focus on stuttering measurement. Parents are taught what stuttering is and how to identify moments of stuttering in childhood speech. They are then introduced to the Lidcombe Program severity rating scale (0 = *no stuttering*, 1 = *extremely mild stuttering*, 10 = *extremely mild stuttering*) and how to use the inbuilt daily severity rating tool. *Modules 7–10* explain the structure and function of practice sessions, and parents are given examples of suitable activities to use and taught how to structure conversations during these activities. *Modules 11–12* focus on how verbal feedback for stutter-free speech should be given. In *Modules 13–15*, video examples illustrate the three components of a practice session: the activity, the structure of the conversation, and the feedback. Practical considerations for implementing the daily treatment are highlighted, and parents are requested to trial a practice session with their child, giving feedback for stutter-free speech.

Logins begin during *Modules 16–18* after *Modules 1–15* have been completed. The program recommends that a consultation is completed each week. Parents can either log in to iLidcombe daily to add severity ratings, or upload ratings for the entire week during their weekly consultation. During these logins, parents are asked to answer a range of yes/no questions. These questions relate to aspects of the treatment with their child, such as whether the child is enjoying treatment, frequency of practice sessions, and type and frequency of feedback. After each consultation, parent answers to these questions are used to generate a set of individualized recommendations and to determine if further modules will be unlocked. Examples are: "Is your child happy to participate in the practice sessions?" "Is your child comfortable with the feedback for smooth speech?" and "Are you confident that you are rating your child's stuttering severity accurately?"

Modules 16–18 present information about parent feedback for stuttering during practice sessions, feedback for stutter-free speech in everyday conversations, and feedback for stuttering in everyday conversations. In addition to generating recommendations for how the parent should do the

treatment, the consultation questions also ensure that the parent only progresses with iLidcombe if the child is enjoying the treatment and the parent is feeling confident about administering it. If this is not the case, additional modules remain locked and iLidcombe refers the parent to in-person SLP services.

Stage 2

As with the Lidcombe Program, progression through iLidcombe is based on parent severity ratings. Criteria for admission to Stage 2 reflect the in-person Lidcombe Program: parent severity ratings of 0–1 for three consecutive weeks. As with the Lidcombe Program, Stage 2 of iLidcombe is designed to maintain treatment gains while gradually withdrawing logins. Stage 2 logins consist of two parts. The first requires parents to enter severity ratings. Based on those scores, iLidcombe determines the time between logins. During the second part of the consultation, the program provides recommendations to parents based on their answers to several questions and the severity ratings entered. Email reminders are sent to parents to prompt them to log in for the prescribed Stage 2 "consultations." The time between logins increases if the program criteria are met. If program criteria are not met, the parent is directed back to a previous step in Stage 2. If this occurs for three consecutive occasions, iLidcombe sends a recommendation to discontinue using the program and seek consultation from in-person SLP services.

User testing

Prior to the Phase I clinical trial reported here, iLidcombe was user tested with three cycles of standard iterative methods (Currie et al., 2010; Obigbesan et al. 2024; Thornton et al., 2021) that the team has used previously (Alateras et al., 2025). These cycles involve a think-aloud interview method and structured surveys. The end users in these cycles were six SLPs with experience working with children, and 10 parents of young children who stuttered. Based on user feedback, iLidcombe was modified to improve ease of navigation, clarity, acceptability, and efficiency.

Method

Aim

The aim of this Phase I trial was to assess the safety, compliance, and potential efficacy of iLidcombe. The trial was approved by the University of Technology Sydney Human Research Ethics Committee ETH22-7772. All participants gave informed consent before taking part.

Design

We used a prospective single-group design involving 6 months of access to iLidcombe. The 6-month study period was considered sufficient to assess safety and compliance and to detect any signs of treatment response. Assessments occurred pre-treatment and after 6 months of access.

Participants

Participants were 20 parents of children who stuttered. Inclusion criteria were as follows: (a) child 3–7 years of age, (b) a video recording of the child showing identifiable stuttering, (c) the family located in Australia, (d) family access to an internet connection, and (e) parents with functional English for reading and understanding the information provided in iLidcombe. Exclusion criteria were as follows: (a) the child receiving any clinical interventions for stuttering at the time of recruitment, and (b) the parent having been previously trained in any way to use Lidcombe Program procedures.

Safety screening

Child wellbeing was monitored each week with a safety screening survey to identify any children who might need to be withdrawn from the study. Parents were asked to respond “yes” or “no” to nine statements about their child’s behavior for the prior week, as shown in Table 1.

INSERT TABLE 1 ABOUT HERE

If the answer was "yes" for any statement from the survey, the parent was then asked to complete the Child Behaviour Checklist (Achenbach & Rescorla, 2001). This checklist assesses child emotional and behavioral functioning. A raw total score between 0 and 51 is within the usual range. If scores were above 51, the parent was interviewed in a video conference by two team members (a clinical psychologist and an SLP) to determine if the changes in the child's behavior might be attributable to iLidcombe. If the answer "yes" was given for questions 1, 4, or 7 of the safety screening survey, the parent was interviewed regardless of Child Behaviour Checklist scores.

Stuttering severity and parent satisfaction with the child's communication

At pre-treatment and 6 months later, stuttering severity was measured by parent report of the child's typical stuttering severity for the previous week. At those times, parents also reported their satisfaction with the child's communication in everyday speaking situations using an adaptation of the Karimi et al. (2018) 9-point scale, where 1 = *extremely dissatisfied* and 9 = *extremely satisfied*.

6-month survey

After 6 months, access to the program ceased. All parents were sent a survey that requested the following information: (a) whether the child received treatment for stuttering from anywhere other than the iLidcombe program during the 6-month trial period, (b) how likely the parent would be to seek further professional help for their child's stuttering with the next 12 months, and (c) how likely the parent would be to seek professional help for any problems associated with their child's stuttering (for example, anxiety or social withdrawal) within the next 12 months. Parents responded using the scale *very unlikely*, *unlikely*, *neutral*, *likely*, and *very likely*.

The survey also assessed parent satisfaction with iLidcombe by asking (a) what they liked and disliked about it, (b) what aspects they found helpful or unhelpful, (c) whether they did the treatment as recommended by the program, (d) whether they completed the daily practice tasks as recommended by the program, (e) whether the program provided enough information and guidance, (f) whether the program provided enough information to problem-solve when needed, and (g) how

easy or difficult it was to remain motivated to continue with iLidcombe. Parents selected from a checklist of options and also typed responses in free-field text boxes (see appendix for a copy of the survey).

Results

The flow chart of the trial is presented in Figure 1. Thirty-six parents expressed interest in the trial, but 16 were excluded as ineligible because they did not meet the inclusion criteria (see "Participants"). Twenty parents were recruited, but five withdrew from the trial 10–16 weeks after gaining access to iLidcombe. Their reported reasons were that the child was no longer stuttering, family illness, being offered treatment elsewhere, recent birth in the family and subsequent relocation, and a doctor advising the parent that stuttering would resolve without treatment. The 15 children remaining in the study were of ages between 3 years 2 months to 7 years 10 months at recruitment (mean 4 years 5 months). Nine were boys and six were girls.

INSERT FIGURE 1 ABOUT HERE

Safety

No safety issues emerged that required any participant to be withdrawn from the study. Eleven participants answered "yes" to a statement on the safety survey and consequently completed the Child Behaviour Checklist. No participants scored over 51 to trigger an interview. However, eight participants responded "yes" to question 1, 4, or 7 and were consequently interviewed by the clinical psychologist and SLP. Interviews revealed that there was no reason to believe that the "yes" responses were related to iLidcombe treatment.

Compliance

Twenty parents commenced the trial, but five withdrew before completing 6 months of treatment. Fourteen of the 20 parents completed *Modules 1–15*. Of the six parents who did not complete *Modules 1–15*, five remained in the trial for the entire 6 months. Of the 14 parents who did complete *Modules 1–15*, four were from the five parents who withdrew from the trial prior to completing 6 months of treatment. Two of these 14 parents completed *Modules 1–15* within 2 weeks of gaining access to iLidcombe, a total of eight completed them within 5 weeks, and all 14 parents completed them within 10 weeks. Seven parents unlocked and completed *Module 16* four to 14 weeks after gaining access to iLidcombe. Six of these seven parents progressed and completed *Module 17*, and one of these progressed to complete *Module 18*. Only one parent progressed to Stage 2 after 19 weeks of access to the program.

Potential efficacy

Nine of the 15 parents who remained in the trial provided both pre-treatment and 6-month data. For each of these nine participants, there was evidence of a reduction of typical stuttering severity after 6 months access to iLidcombe (see Figure 2).

INSERT FIGURE 2 ABOUT HERE

For eight of the nine participants, there was also evidence of improved parent satisfaction with the child's communication in everyday speaking situations after 6 months access to iLidcombe (see Figure 3).

INSERT FIGURE 3 ABOUT HERE

iLidcombe evaluation survey

The iLidcombe evaluation survey (see Appendix) was sent to all participating parents 6 months after commencing the trial, including those who withdrew from the trial. Ten participants in total completed the survey: nine who had completed the trial and one who had withdrawn. The majority of them (seven of 10) indicated that the program helped to reduce their child's stuttering: four indicated "a lot" and three indicated "a moderate amount". All ten parents indicated that they would recommend it to other parents with children who stutter. Most parents (nine of 10) indicated that the program gave them enough information and guidance to keep doing the treatment: seven responded "yes" and two responded "mostly".

No parent reported seeking treatment for the child's stuttering while accessing iLidcombe. Two parents indicated they were "very unlikely" to seek professional support for their child's stuttering after 6 months access to iLidcombe, three indicated they were "unlikely", and two were "neutral". One parent reported being "likely", and one was "very likely" to seek professional support after 6 months access to iLidcombe. Five parents indicated they would be "very unlikely" to seek professional support for any problems associated with their child's stuttering within the next 12 months, three indicated "unlikely', and one indicated "very likely". Almost all parents indicated that they liked aspects of iLidcombe. These included nine parents who indicated they appreciated that a specialist team developed the treatment and nine who indicated they liked the convenience of learning how to do the treatment in their own time. Eight indicated that they liked being able to use the treatment for self-determined periods without having to travel, and that there was no cost. In the free-field text box one parent wrote: "Could do together with partner who would not have been able to manage with work. Helped to be on the same page and share the load of treatment".

Nine parents reported they found it helpful that the iLidcombe SLP explained treatment procedures, and eight reported it helpful to read about the treatment procedures and watch videos of other parents doing treatment. Six parents indicated that it was helpful to enter severity ratings and

see trends in the graph. Five found answering the yes/no questions during the logins and receiving recommendations helpful. One parent wrote “Incredible program. We are so grateful for the opportunity”. None of the parents indicated that reading or hearing about treatment procedures or entering the severity ratings unhelpful. One parent wrote “I thought it was all great”, another wrote “We didn’t find anything unhelpful. It was a great program!”

Some parents indicated that there were aspects of iLidcombe they disliked. Four indicated that there was no opportunity for their child to develop clinical rapport with an SLP or to discuss any difficulties they were having with the treatment. Three parents indicated there was no positive or encouraging feedback from a live SLP. No parent indicated that they disliked the absence of treatment demonstration by a live SLP. One parent indicated disliking the limited opportunity for the program to adapt the treatment to their child’s individual needs. That parent wrote “I thought it could have been helpful to have an opportunity to provide a comment on how I was feeling about the treatment to get specific feedback on e.g his stutter was a lot worse on returning to school after being off sick, I wondered if I should have changed anything”[sic]. Two parents reported that they found answering the yes/no questions and receiving recommendations by email unhelpful, and one parent reported watching videos of parents doing treatment unhelpful.

Discussion

This Phase I trial showed that, after 6 months of use, iLidcombe is a safe program for parents to use with their child, with no suggestion of any psychologically adverse impact on children. This is consistent with safety data when the treatment is presented face-to-face by an SLP (de Sonneville-Koedoot et al. 2015; Johnson et al., 2024; Woods et al., 2002). Survey information from parents about iLidcombe was mostly positive. Parent compliance with the program was encouraging, with 14 of the parents who began the trial completing the 15 core training modules, and nine of them providing pre-treatment and 6-months severity rating and satisfaction with communication scores.

However, it is not known how regularly the parents engaged with the treatment procedures of iLidcombe with their children during everyday life.

The Lidcombe Program is designed to attain no stuttering or nearly no stuttering, and there was some indication that, without any input from a live SLP, the program reduced children's stuttering severity with a corresponding increase of parent satisfaction with children's everyday communication. However, the study was not designed to determine whether any of those observed changes were attributable to iLidcombe rather than to natural recovery. The most recent Lidcombe Program clinical trial (Donaghy et al., 2020) involved a mean of 31 weeks to reach Stage 2 for 55 children, yet here, only one child reached Stage 2 after 24 weeks of iLidcombe access. However, based on the data in Figure 2, many more of the children in the trial may eventually have reached Stage 2. Standard Lidcombe Program procedures conducted by an SLP are based on scheduled weekly clinical consultations of around 1 hour. Clinical research data ($N = 995$) show that a median of 17 clinical weekly consultations is required (Onslow, 2025) to reach Stage 2. The iLidcombe model obviates that service delivery format in a fashion that the present participants seemed to have found acceptable. Although not all parents responded to the 6-month survey, it seems that those who responded liked accessing iLidcombe in their own time—often as this suited their lifestyles—without needing to travel to a clinic. The format enabled them to involve a partner in the treatment, which is not typically an option when attending clinic appointments with an SLP. However, we need to acknowledge that this may have been a biased sample and that those who elected not to complete the survey may have been those who did not find it useful.

Another advantage of the iLidcombe treatment format is that it eliminates therapist drift (Waller, 2009), which is when a clinician departs from delivering a treatment exactly the way it was designed and manualized. Therapist drift can occur intentionally or unintentionally, and it may involve altering or omitting core treatment components, applying techniques inconsistently, or adapting a treatment to personal style or perceived client needs. Therapist drift may occur for many reasons, such as clinical time constraints, fatigue, and burnout. There is some evidence that it is a

negative influence during face-to-face delivery of the Lidcombe Program (Carr-Swift et al., 2011; O'Brian et al., 2013; Swift et al., 2016). However, iLidcombe will deliver the same treatment, that has been designed by an expert Lidcombe Program team, consistently over time. This aspect of iLidcombe could be particularly useful for inexperienced SLPs to use as a guide when treating children face-to-face.

Even though the present Phase I trial showed potential signs of efficacy, it is unrealistic to project that iLidcombe will prove to be a suitable and efficacious treatment for all parents and children who require Lidcombe Program treatment. As such, one potential contribution of this line of work might lie in future development of guidelines for a stepped care model of early stuttering intervention. The stepped-care model (Bower & Gilbody, 2005) provides, in the first instance, the simplest and most cost-efficient method of health care that is efficacious, and then progressively escalates clients to more resource-intensive, and hence more costly, models of health care should they require it. Adoption of an iLidcombe stepped-care model by speech-language pathology associations worldwide could be a significant and transformative change to practice and policy for early stuttering treatment. The potential economic benefits of standalone treatments for stuttering in a stepped-care model are highlighted by iGlebe, which is a treatment for the anxiety of adults who stutter that was developed by the present team. iGlebe has been publicly available cost-free since June 2020 on the Australian Stuttering research Centre website (https://iglebe.asrc.edu.au). At the time of writing, 2,749 users from 76 countries have saved an estimated $A5.4M ($US3.6M) in the direct cost of illness, based on an Australian clinical psychology consultation rate of $A280 ($US185) per hour.

The promising results of this Phase I trial provide a roadmap for further clinical trial development, the first of which would be a Phase II trial to provide an estimate of effect sizes to prime subsequent Phase III randomized trials. Such trials would compare iLidcombe with standard practice involving an SLP, or they would compare iLidcombe to no-treatment controls. The latter would account for potentially confounding variables such as participant selection

bias, natural recovery, and parent attention to speech. Subsequently, Phase IV trials would explore the rollout of iLidcombe to clinical communities globally, with eventual translations into other languages besides English. Future development of iLidcombe will benefit from incorporation of emerging developments in AI technology, which could involve a clinical interface of avatar clinicians to engage with parents, using natural language processing to provide guidance through treatment. That development could use emerging state-of-the-art developments in stuttering detection (Barrett et al., 2022), potentially integrating video-based facial micro-expression analysis of children (Ben et al., 2021; Wang et al., 2021) that could operate from the user's webcam (Baltrušaitis et al., 2016). The current version of iLidcombe does not require any engagement of children; however, facial analysis of children would require video capture of their speech. Conceivably, that addition would provide the benefit of completely objectifying the iLidcombe treatment process by removing its reliance on parent severity ratings.

Early stuttering is a global health problem with a significant quality-of-life impact and cost of illness burden. The global speech-language pathology workforce is not equipped to deal with a disorder of such prevalence, where most children who stutter live in countries that have limited speech-language pathology services. The iLidcombe research project foreshadows a means to prevent this cost of illness by providing early stuttering intervention through global access to treatment. The projected long-term outcome of this research could be effective, cost-free, automated early stuttering intervention available to families globally who have internet access, regardless of their location or their socioeconomic status.

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Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of Interest Statement

The author reports no conflict of interest.

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Captions:

Table 1. Safety screening survey

Table 1. Safety screening survey

1	Unusual displays of low mood (e.g., excessive tearfulness or distress)
2	Easily frustrated
3	Unusual displays of anger
4	Aggressive behaviour toward self or other (e.g., kicking, hitting, biting)
5	Negative reactions to the treatment (e.g., your child says “don’t tell me to do that”, or “don’t talk like that”, or “stop saying that”)
6	Refusing to do the treatment
7	Refusing to talk or a significant reduction in talking
8	Withdrawing from interacting or playing with other children
9	A deteriorating relationship between you and your child

591 Figure 1. Trial flow chart. SCESS = parent satisfaction with the child's communication in everyday
592 speaking situations

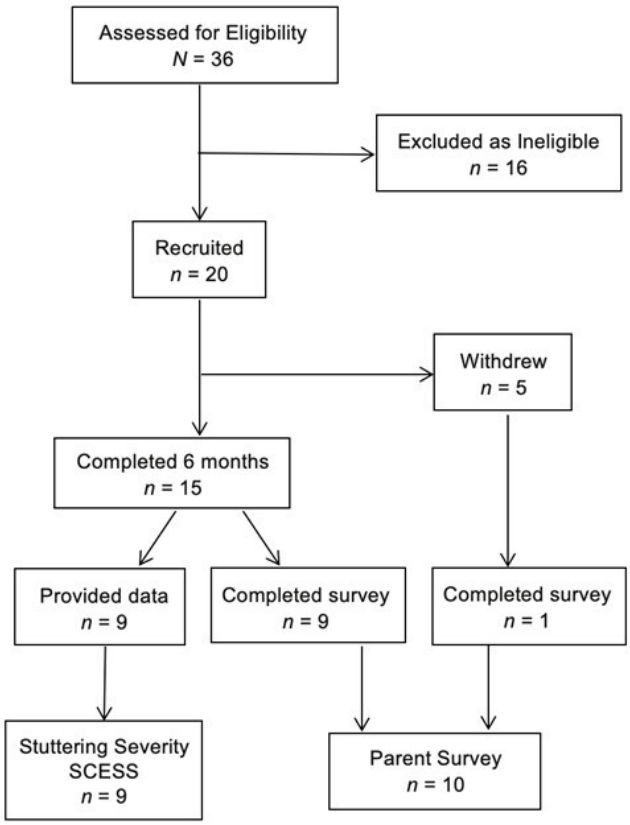

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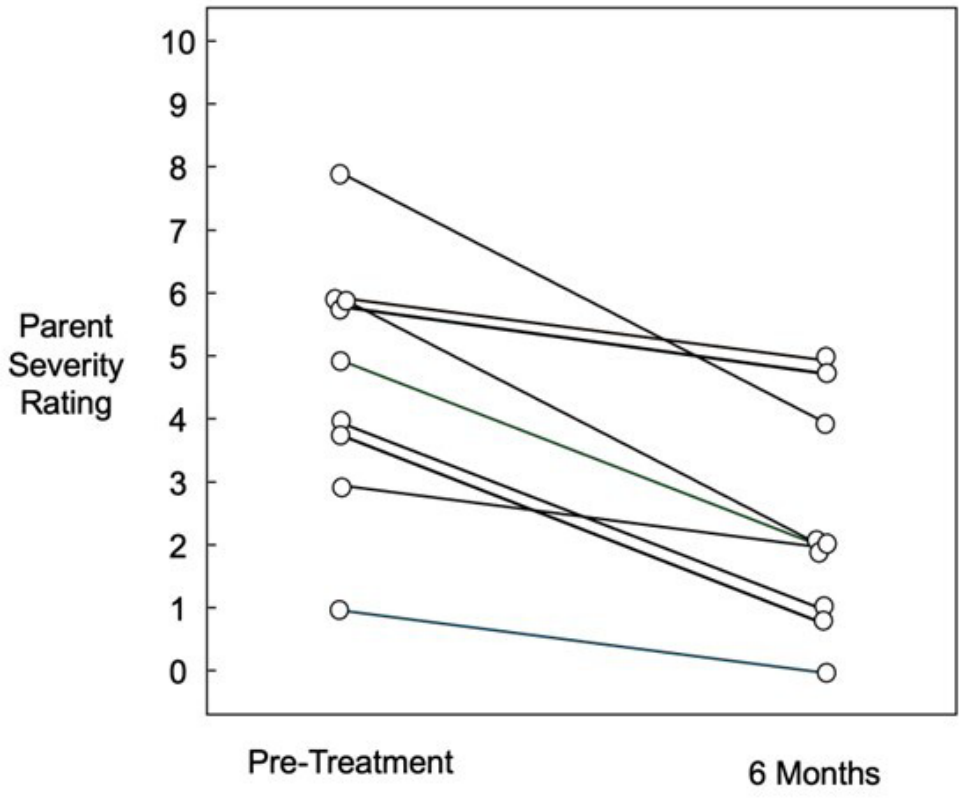
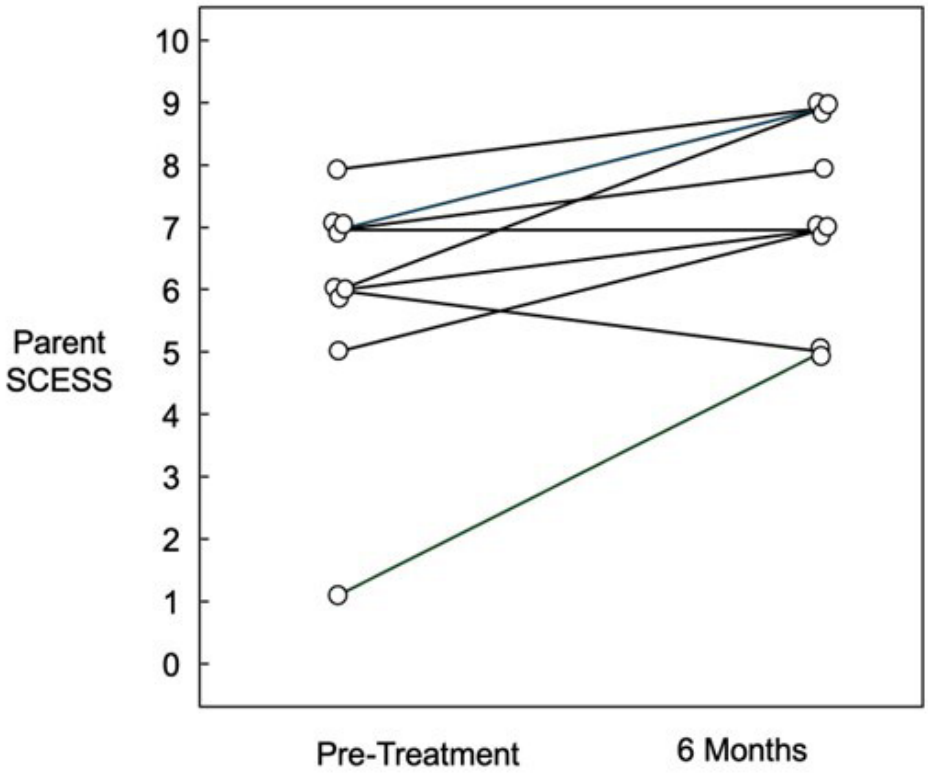
Figure 2. Parent reported typical stuttering severity rating



596 Figure 3. Parent-reported satisfaction with the child's communication in everyday speaking
597 situations.



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