Original Article

http://e-cacd.org/ eISSN: 2508-5948

Clinical Archives of Communication Disorders / Vol. 8, No. 1:9-22 / April 2023

Open Access

https://doi.org/10.21849/cacd.2021.00332

Provision of Maintenance Therapy for People Who Stutter Via Telepractice

Patrick Minton Briley[1], Claire Brownlow[2], Charles Ellis[3]

[1]Department of Communication Sciences and Disorders, East Carolina University, Greenville; [2]Department of Communication Sciences and Disorders, East Carolina University, Greenville; [3]Department of Communication Sciences and Disorders, East Carolina University, Greenville, United States

Purpose: People who stutter (PWS) who have completed intensive programs commonly face issues with relapse. A confounding factor to relapse is the availability of speech-language pathologists who specialize in the treatment of stuttering. A possible solution to these issues is a telepractice approach to treatment maintenance following an intensive program. Therefore, the current project examined whether a tele-delivered maintenance program could be utilized to maintain and improve upon speech related outcomes obtained in an intensive treatment program.

Methods: Participants included 6 children who stutter and 4 adults who stutter. Each participant completed a university intensive treatment program and also agreed to take part in 12 tele-delivered maintenance sessions following the intensive program. The Overall Assessment of the Speaker's Experience of Stuttering (OASES) was utilized for outcome measures.

Results: Significant improvement was found on the OASES' overall impact score when comparing pre- and post-telepractice maintenance, (Z=-2.81, p=0.005). Additionally, participants experienced significant improvement in participants' perceptions of their speaking abilities (Z=-2.45, p=0.014) and in overall quality of life (Z=-2.07, p=0.038).

Conclusions: While PWS are faced with challenges when seeking to improve upon communication skills, the current study offers additional evidence that telepractice is a viable delivery option for the maintenance of therapeutic gains.

Keywords: Stuttering, Telepractice, Maintenance

Received: January 22, 2021
Revision: April 28, 2023
Accepted: April 28, 2023

Correspondence:
Patrick Minton Briley

Department of Communication Sciences and Disorders, East Carolina University
3310AC Health Sciences Building, MS 668, Greenville, NC 27834, United States
Tel: +252-744-6111
Fax: +252-744-6109
E-mail: brileypa@ecu.edu

INTRODUCTION

Stuttering is a complex communication disorder whose features include both observable and unobservable behaviors [1]. Collectively, the condition of stuttering is capable of negatively impacting the well-being of people who stutter (PWS) [2,3].

Many treatments to address stuttering include a range of approaches that address overt symptomatology of stuttering [4]. Included in these approaches are behavioral modifications that bring about a new speech pattern to either induce perceptually fluent speech or to help the individual to stutter with less tension. Additionally, some approaches target feelings and attitudes about stuttering, which aim to bring about more positive reactions and responses to stuttering. These additional approaches are necessitated for a condition such as stuttering that includes a range of unobservable behaviors that contribute to avoidance behaviors and potentially, impacted well-being [5].

PWS are faced with numerous barriers throughout the stages of treatment. A common issue that PWS encounter following treatment is relapse [6,7]. To follow, relapse is discussed. Additionally, availability of quality care is specified as a compounding factor to relapse, and a telehealth approach to addressing these issues is introduced.

Relapse following treatment

PWS who have experienced improved speech control from stuttering programs are known to often experience a period of increased fluency with minimal effort, followed by an eventual relapse [8,9]. While some programs have been shown to yield immense short-term improvements for PWS, challenges remain in long-term maintenance of gains obtained. Reports of relapse frequent literature surrounding treatment for PWS, and such setbacks have been described as a source of great disappointment and frustration [10]. The reported rate of relapse for PWS ranges from 30% [11] to 84% [12], and such a vast range is likely reflective of variation in understanding and defining relapse. Multiple external and internal contributing factors of relapse have been proposed, including degree of mastery of learned techniques along with person-specific attitudes towards communication and stuttering [13] and severity of stuttering prior to treatment [6]. Other proposed causes of relapse include a perception of time pressure in natural conversations and speaker-perceived unnaturalness when using learned techniques [14]. Recounting the processes of relapse following successful completion of an intensive treatment program, Klassen [8] specified three factors that precipitated the eventual loss of control, including lack of acceptance of stuttering, stressful communicative situations, and failure to maintain a support system. Proposed solutions to counter relapse (i.e., support maintenance of gains) include incorporation of a hierarchy of speech environments beyond the clinic setting into treatment [8], self-reinforcement of speech, desensitization of the PWS to the experience of stuttering, and reduction of anticipation of stuttering [15], and follow-up therapy [16,17].

In a 2003 examination of research outcomes for PWS in school settings, Finn [18] proposed limitations and strategies surrounding generalization and maintenance in schools. According to Finn, a prominent limitation of treatment is the lack of generalization of gains obtained in the therapy room into natural, patient-specific social contexts. One of Finn's proposals is to incorporate real-life situations and everyday communication partners into therapy by using alternative delivery models, thereby promoting maintenance of gains. Finn stated that such alternative delivery models may include meeting with parents and families outside of traditional therapy hours. The authors propose use of telepractice as such a delivery model, as therapy is often completed in the home environment with family nearby. Further, Irani and Gabel [14,16] emphasized use of a "mixed delivery model," specified as intensive treatment followed by follow-up treatment, as a probable solution for relapse. Additionally, they stressed the importance of further research into such a model.

Quality of care

Compounding the issue of relapse is access to quality care for all individuals who stutter. Individuals residing in rural areas potentially suffer from lack of access to health professionals, and consequently, lack of quality care [19,20]. Per the Centers for Disease Control [21], over 46 million individuals, comprising 15% of the U.S. population, reside in CDC determined rural areas. Prior findings have demonstrated that residents of rural areas worldwide lack health care of the quality, consistency, and availability which can be accessed in urban areas [19,20]. Bitsko et al. [22] found that parents of children in rural areas reported a slightly higher prevalence of mental, behavioral, and developmental disorders than those in urban areas, which renders the shortage of rural healthcare providers as especially problematic. Specific to the region of the proposed intervention, eastern North Carolina has known health professional shortages [23] and high rates of poverty in nearly all surrounding counties [24]. The issue of access to care is present in the field of speech-language pathology, as school districts in rural areas experience known difficulty filling and maintaining SLP positions [25]. Rural regions of North Carolina, including the mountains and coastal plains regions, face the greatest shortages of speech-language pathologists in the state, leaving individuals in these areas without services [24,26]. This becomes problematic for individuals who have invested time and money to travel to attend intensive treatment programs and later are in need of additional sessions to revitalize the previously experienced gains [27]. Further complicating the access to care issue is prior research suggesting that when treating PWS, the intervention approaches of speech-language pathologists (SLPs) do not always consider all aspects of the disorder [28]. As a result, accessibility of an SLP does not necessarily translate to comprehensive care. Contributing to this outcome is an overall lack of confidence in the management of stuttering [29-31] and limited knowl-

edge of the disorder [32,33]. When such circumstances persist, potential consequences for PWS residing in these areas include care that is less frequent, less specialized, or no care at all; the latter of which would result in an untreated communication disorder. Therefore, in situations when a PWS experiences relapse following treatment, available options to counter relapse may be limited. A potential solution for addressing these barriers is telepractice [34].

Research has shown that telepractice is capable of being utilized to effectively treat PWS, and success in using telepractice can be experienced across various age ranges and treatment approaches [35]. In preschool children, telepractice has been shown successful in delivery of the Lidcombe Program, an early intervention for children who stutter (CWS) which operates under the construct of operant conditioning [36-40]. A modified version of the Lidcombe Program was tele-delivered to 2 male children and 1 female child [39,41]. During this tele-delivered version of the Lidcombe Program, the clinician spent the majority of time instructing parents and less time interacting with the children. Outcomes, including percent of syllables stuttered and parent reports of their child's speech outcomes, improved from pre-treatment to 6 months following Stage 1 of the program [41]. Bridgman et al. [42] examined possible difference in outcomes of the Lidcombe Program when administered in its typical format versus when tele-delivered. Results from the study provided support for a telepractice approach, as there were no significant differences in speech-related outcomes when comparing the 17 children who completed the traditional format to the 16 receiving the tele-delivered version.

Telepractice has been examined in adolescents who stutter [43,44], and more specifically, for delivery of the Camperdown Program [17,45,46]. The Camperdown Program differentiates itself from other speech restructuring treatments by its ability to instate a fluent speech pattern without the direct labeling of specific pattern changes, such as light articulatory contacts and easy onset of phonation [47]. As an alternative, a model of prolonged speech is presented on a video, and clients are instructed to use any aspects of the model that they perceive as necessary to imitate the model. Individual results varied; however, group reductions in 14 adolescent males were found in observable stuttering behaviors, avoidance behaviors, and self-reported impact when comparing pre-treatment levels to one-year following initiation of the maintenance phase [45]. Participants in this study reported an overall reduction in severity following 25 tele-delivered sessions. As noted by the authors, participant self-reported severity is critical data, as this outcome measure is likely to capture stuttering severity across various contexts.

Successful tele-delivery of the Camperdown Program has also been shown among adults who stutter (AWS). O'Brian et al. [17] and Carey et al. [48] found comparable outcomes when examining speech-related outcomes between a tele-delivered version of the Camperdown Program versus traditional in-person delivery. Similar in design and purpose to the current project, Irani and Gabel [16] presented a case study of a 21-year-old male who completed an intensive stuttering program at Bowling Green State University followed by a 12-month tele-delivered maintenance phase. The intervention targeted improved control of stuttering and acceptance of stuttering. Results indicated an overall decrease in stuttering across several speaking contexts. While a spike in stuttering was seen from the 6-month follow-up period to the 12-month follow-up period, percentage of stuttered syllables was still reduced from pre-treatment levels [16]. Additionally, outcome measures used to assess the less observable characteristics of stuttering indicated similar trends among each of the instruments used. While informative, Irani and Gabel [16] acknowledged the limitation of generalizability due to the case study design. Irani et al. [49] provided longitudinal data from participants attending the Intensive Stuttering Clinic for Adolescents and Adults (ISCAA), where two of the participants were involved in a telepractice only delivery of the follow-up stage. Comparing measures from pre-intensive program to follow-up (which varied in duration for each participant), both participants demonstrated improvements. Haynes and Langevin [50] provided anecdotal evidence of telepractice successfully being utilized for a 5-year-old boy receiving the Lidcombe Program, a college student receiving maintenance sessions following a three-week intensive program, and an 8-year-old boy also receiving maintenance sessions. Similar utilization of telepractice to address maintenance following intensive programs have been employed by others [51,52]. In addition to positive outcomes experienced, many participants in the aforementioned studies reported satisfaction with tele-delivery [44,45,48]. Further, some report a preference to this model of delivery [45].

While telepractice has been shown to be an effective approach for the treatment of stuttering, there have been limited reports examining effectiveness of tele-delivered maintenance sessions following an in-person intensive program [16,49-52]. The purpose of this project was to add to the exist-

ing evidence by studying the effectiveness of an approach to combat relapse, through tele-delivered maintenance sessions, following an in-person intensive treatment program. Specifically, this study sought to determine if telepractice is an approach that is able to maintain and/or improve upon speech related outcomes following completion of an in-person, intensive treatment program for PWS. A telepractice service delivery model that addresses relapse to treatment and access to quality care has the potential to improve outcomes for individuals who stutter.

METHODS

Participants

Participants of the current study were enrolled in both a university intensive treatment program and a tele-delivered maintenance phase of the program. Inclusion criteria necessitated that participants complete the university-based intensive treatment program and commit to complete the tele-delivered maintenance sessions. Included were 6 CWS and 4 AWS. The sample consisted primarily of male PWS (70%), and mean age for study participants was 16.57 (6.80) years, ranging from 8 years, 4 months to 28 years, 9 months. As defined by the Census Bureau [53], three of the ten participants reside in what is considered to be an urban area. The remaining seven participants either reside in surrounding rural areas or live over 30 miles away from the service provider, restricting access to maintenance services following completion of the in-person intensive program. This study was reviewed and approved by East Carolina University's Institutional Review Board (IRB). See Table 1 for a breakdown of demographic data for all study participants.

Description of intensive program

The intensive program lasted 4 hours per day for 14 days. One of the current authors was director and lead supervisor of the intensive program. An additional trained clinical supervisor assisted in supervision of graduate student clinicians. All participants attended the intensive program at the same time, and none of the participants missed any program dates. The intervention for the current study is intended to address both observable and unobservable behaviors of stuttering and is grounded in two primary goals: 1) to increase control of speech through teaching participants to behaviorally respond differently to moments of stuttering and anticipation of stuttering and 2) to decrease avoidance behaviors in communicative contexts. The integration of both fosters reduction of communication barriers that otherwise may impede the PWS from pursuing their ideal of life to the fullest.

Treatment of observable behaviors of stuttering

Essential features of the behavioral component of the intervention include identification of loci of stuttering as the initiation of phonation [54] and application of principles of motor learning [55] to facilitate learning of a new speech pattern. Through instating a new motoric speech plan and repeated practice of such, the goal is more prompt accessing and execution of this new speech pattern as a response to moments of stuttering. Specific to the current treatment, prolongations of the first vowel, of the first syllable, of the first word of an utterance were taught to be used to commence phonation. Simply put, prolongations of initial vowels are taught to initially

Table 1. Demographic Data for Study Participants

Participant	Age	Gender	Race	Participation in Previous Therapy	Months Post-Treatment for Initiation of Maintenance Phase	Duration of Maintenance Phase
1	28 yr., 9 mo.	Female	Non-Hispanic Black	Yes	2 mo., 6 days	2 mo., 5 days
2	8 yr., 4 mo.	Female	Hispanic	Yes	21 days	3 mo., 8 days
3	27 yr., 4 mo.	Male	Non-Hispanic White	No	2 mo., 13 days	2 mo., 11 days
4	18 yr., 7 mo.	Male	Non-Hispanic White	Yes	2 mo., 13 days	2 mo., 8 days
5	13 yr., 5 mo.	Male	Non-Hispanic White	Yes	4 mo., 3 days	4 mo., 11 days
6	12 yr., 4 mo.	Male	Non-Hispanic White	Yes	2 mo., 26 days	4 mo., 14 days
7	18 yr., 8 mo.	Male	Non-Hispanic White	Yes	3 mo., 24 days	2 mo., 28 days
8	13 yr., 8 mo.	Male	Non-Hispanic White	Yes	2 mo., 21 days	2 mo., 9 days
9	12 yr., 1 mo.	Male	Non-Hispanic White	Yes	4 mo., 10 days	3 mo., 0 day
10	12 yr., 7 mo.	Female	Non-Hispanic White	Yes	5 mo., 23 days	2 mo., 20 days

engage the larynx, allowing for speech to be initiated with control. Once phonation becomes initiated, voluntary motoric adaptations of laryngeal muscles are taught, enabling participants to circumvent the observable behaviors of a moment of stuttering throughout the remaining portions of the utterance by sustaining engagement of the larynx. Simply put, once the larynx has been engaged by way of voluntary prolongation of the initial vowel, the participant is taught to continually engage the larynx throughout the spoken utterance. Regarding motor speech processes, this is accomplished by way of temporal and spatial adaptations of the speech motor plan. Reduction of voice initiations are accomplished through spatial and temporal adaptations of laryngeal muscles, which maintain the vocal folds in an approximated position (spatial adaptation) for extended periods of time (temporal adaptation), while also continuing a forward airflow (i.e., maintaining sufficient subglottal air pressure through syllabic transitions) (temporal adaptation). Clinicians and clients referred to these motoric adaptations as "continual engagement of the larynx." Accomplishing these spatial and temporal adaptations disallows full reset of the laryngeal muscles (i.e., complete abduction), which prevents subsequent initiations of phonation (from an abductor/adductor muscle(s) point of view). By disallowing full reset of the larynx, voice initiations (i.e., loci of stuttering) are reduced, thereby reducing observable behaviors of stuttering. While increasing periods of phonation have been used historically (i.e., continuous phonation) [56-58], clients were taught that controlled speech through continual engagement of the larynx do not require a perpetual phonatory pattern. Instead, the focus is on disallowing full reset of laryngeal muscles and continuing a forward airflow, which enables speech control across productions of both voiced and voiceless sounds. With that being said, before transitioning to usage of continual engagement of the larynx, continuous phonation was utilized at the beginning of treatment to allow robust sensory feedback, increasing clients' self-monitoring skills to recognize positioning of vocal folds, primarily during syllabic transitions. In short, prolongations were taught to initiate phonation and continual engagement of the larynx were utilized to reduce exposures to further voice initiations. Lastly, a controlled rate of speech was taught in order for the participants to focus attention on the hypothesized mechanism of change (i.e., continual engagement of the larynx). These motoric adaptations were taught using a linguistic hierarchy and at decreasing durations of the initial prolongation, representing 3 levels. Level 1 included usage of a 2-second prolongation, followed by continual engagement of the larynx in monosyllabic words, multisyllabic words, phrases, sentences, continuous reading, and conversation. Level 2 and level 3 followed this same linguistic hierarchy but at initial prolongations of 1 second and "nearest normal", respectively. Though the intervention focused on adaptation of the speech pattern, the program addressed stuttering beyond just the participants' overt symptomatology.

Treatment of unobservable behaviors of stuttering

While clients were taught behavioral adaptations that facilitate a reduction of observable symptoms of stuttering, it was also made clear that these adaptations do not represent an elimination of stuttering. This was emphasized by directly stating to participants that the presence of observable behaviors of stuttering is not a sign of failure. Instead, successful outcome measures include the participants saying exactly what they wanted to say, facilitated by more positive responses and reactions to stuttering. These positive responses to moments of stuttering included both motoric adaptations and anti-avoidance practices. With fear of negative evaluation [59,60] being a potential contributor to avoidance behaviors in PWS, and fear of negative evaluation being a social construct, a group design was implemented as part of the intensive intervention. For the majority of the intensive program, children and adults met in groups with their age-matched peers. Specifically, participants under the age of 18 years were considered children. A strategy of this treatment design was to promote and foster healthy relationships between participants [61] and to serve as an adversary to fear of negative evaluation. Additional approaches were implemented to address avoidance behaviors and encourage adjustments to affective and cognitive reactions to stuttering. Specifically, a scaffolding approach of increasingly challenging communicative situations was utilized to combat communication anxiety.

Clients were encouraged and led to incrementally confront communication-related contexts outside of individually identified comfort zones. Collectively, an approach of decreasing the overall impact of stuttering was the goal by targeting an increase in speech control and a reduction of avoidance behaviors.

Description of tele-delivered maintenance phase

The tele-delivered maintenance phase was administered across 12 sessions using Webex (http://www.webex.com/), a cloud-based program which allows real-time video and audio

interaction between users. Tele-delivered sessions were scheduled based on participants' availability, and each sessions lasted for 50 minutes. Sessions were conducted by the director of the intensive program or by a graduate clinician under the director's supervision. All participants completed all 12 sessions of the tele-delivered maintenance phase, which ranged in duration, due to scheduling variations, from 2 months, 5 days to 4 months, 14 days. Essential features of the intensive program were retained and extended for the maintenance phase. Clients were prompted to continually push the boundaries of comfort zones by communicating in increasingly difficult contexts, as identified individually by participants. While the group component of the in-person treatment was not retained during the tele-delivered sessions, increased family and/or parental involvement was sought to support transfer of gains to the participants' everyday environment.

Data outcomes overall assessment of the speaker's experience of stuttering (OASES) overall impact score

The OASES [62] is a comprehensive assessment of stuttering that considers observable and unobservable behaviors of stuttering and the impact of such behaviors on the individual. The OASES consists of 4 sections: a) General Information; b) Speaker's Reactions; c) Daily Communication; and d) Quality of Life [63]. Points from each section are summed and then divided by total items completed, providing an overall impact score, which serves as a measure of severity [62]. Age-appropriate versions of the OASES were given to participants at each of the four assessment timepoints: 1) pre-intensive program, 2) post-intensive program, 3) pre-maintenance, and 4) post-maintenance.

Self-Reported Speech Related Outcomes. A common outcome measure used in stuttering literature is change in pre and post measures of observable symptomatology of stuttering [34,61-65]. However, due to the daily and situational variability of the observable behaviors of stuttering that is common among PWS [66], the current authors decided to take a different approach. Specific self-report measures were taken from items of the OASES to determine change in participants' fluency, speech naturalness, and frequency of saying exactly what they want to say. To address the question of fluency among participants ages 7-12 years and 13-17 years, the following question was used, "How often can you speak fluently (without stuttering)?". Participants ages 18+ years were asked, "How often are you able to speak fluently (without stuttering)?". To address speech naturalness, participants ages 7-12 years were asked, "How often does your speech sound 'natural' to you (like the speech of other kids)?". Participants ages 13-17 years were asked, "How often does your speech sound 'natural' to you (that is, like the speech of other people)?"; and participants ages 18+ years were asked, "How often does your speech sound 'natural' to you (that is, like the speech of other people)?". To address the frequency for which participants say exactly what they want to say, participants of all ages were asked, "How often do you say exactly what you want to say, even if you think you might stutter?".

Critical experiences for the person who stutters

Using network analysis, Siew et al. [67] identified three items of the adult version of the OASES that may best represent the network of the experience of stuttering. These three identified items of the OASES were: a) how one feels about their speaking ability; b) how one's quality of life is negatively affected by stuttering; and c) how stuttering interferes with one's satisfaction with communication in social situations. Siew et al. [67] suggested that these salient items may represent areas to target in a treatment plan. Therefore, these items were included in the pre and post outcome measures for AWS, and items of the OASES most similar for CWS were also included. Specifically, perceptions of speaking ability were measured through the following questions. Participants ages 7-12 years were asked, "In general, how do you feel about your speech overall?". Participants ages 13-17 years were asked, "In general, how do you feel about your speaking ability overall?"; and participants 18+ years were asked, "Overall, how do you feel about your speaking ability?". Impact of stuttering on quality of life was measured among participants ages 7-12 years with the following, "How much is your life negatively affected by your stuttering?". Participants ages 13-17 years were asked, "Overall, how negatively is your life affected by the fact that you stutter?"; and participants ages 18+ years were asked, "How much is your overall quality of life negatively affected by your stuttering?". Lastly, stuttering's interference on social situations was measured among participants ages 7-12 years with, "How much does stuttering get in the way of your ability to participate in social events (like sports teams, sleepovers, parties, etc.)?". Participants ages 13-17 years were asked, "How much does stuttering stop you from saying what you want to say in social situations?"; and participants ages 18+ years were asked, "How much does stuttering interfere with your satisfaction with communication in social situations?".

Client satisfaction

Participants' satisfaction was measured specifically for the tele-delivery portion of the treatment. The Client Satisfaction Questionnaire (CSQ-8) [68] was administered following completion of all telepractice sessions. The CSQ-8 consists of 8 questions, where low scores (e.g., 1) are indicative of low satisfaction and high scores (e.g., 4) are indicative of high satisfaction. The max score for the CSQ-8 is 32.

Data analysis

Descriptive statistics were used to describe the sample, to detail OASES scores for participants, and to report on client satisfaction. Due to the small sample size and non-normal distribution, a non-parametric analysis approach was utilized to test for outcomes measures across timepoints. A Friedman test was performed to compare overall impact scores of the OASES at each timepoint. The dependent variables were overall impact scores of the OASES; self-reported speech-related outcome measures; and measures indicating critical experiences for PWS, and these variables were measured at each timepoint of therapy (pre-intensive, post-intensive, pre-maintenance, and post-maintenance). Additionally, a Wilcoxon Singed Rank Test was performed to assess differences between timepoints.

RESULTS

OASES overall impact score

The Friedman test showed a statistically significant difference in overall impact scores of the OASES across timepoints $X^2(3) = 16.680$, $p = 0.001$. Post hoc testing was conducted using the Wilcoxon Signed Rank Test, indicating significant improvement in overall impact scores from pre- to post-intensive program ($Z = -2.60$, $p = 0.009$). Significant improvement was also found when comparing pre- and post-telepractice maintenance ($Z = -2.81$, $p = 0.005$). See Table 2 for overall and participant-specific breakdowns of overall impact scores of the OASES.

Self–reported speech related outcomes

Group means indicated overall improvements in self-reported speech related outcomes from pre-intensive treatment to post-intensive treatment and from pre-maintenance to post-maintenance. See Table 3 for overall and participant specific breakdowns. A Wilcoxon signed-rank test showed that participants experienced statistically significant changes in speech naturalness from pre-maintenance to post-maintenance (Z-2.07, $p = 0.038$). While the remaining two self-reported speech related outcomes did not reach statistical significance, improvements were seen in each from pre-maintenance to post-maintenance.

Critical experiences for the person who stutters

Overall improvements were seen on measures of critical experiences for PWS from pre-intensive treatment to post-intensive treatment and from pre-maintenance to post-maintenance. See Table 4 for overall and participant specific breakdowns. From pre-maintenance to post-maintenance, a Wil-

Table 2. OASES Scores for Study Participants Across Timepoints

Participant	Overall Impact Scores			
	Pre-Intensive	Post-Intensive	Pre-Maintenance	Post-Maintenance
1	2.80	2.16	2.15	1.82
2	3.10	2.55	2.70	2.28
3	3.25	2.15	2.07	2.01
4	2.93	1.62	1.80	1.55
5	3.45	2.50	2.28	1.91
6	1.92	1.97	2.35	1.93
7	2.92	2.39	2.35	1.78
8	2.49	1.60	2.98	2.10
9	3.07	2.44	2.03	1.93
10	2.32	2.30	2.36	2.16
Mean (SD)	2.82 (.46)*	2.17 (.34)*	2.31 (.34)**	1.95 (.21)**

*Change from pre- to post-intensive significant at $p < 0.009$; **Change from pre- to post-maintenance significant at $p < 0.005$.

Table 3. Self-Reported Speech Related Outcome Measures for Study Participants Across Timepoints

Participant	Self-Reported Speech Related Outcomes Across Timepoints											
	Fluency				Naturalness				Says Exactly What They Want			
	A	B	C	D	A	B	C	D	A	B	C	D
1	3	2	2	2	3	2	3	2	3	2	2	2
2	3	3	3	4	4	3	4	3	3	4	3	3
3	3	2	2	2	3	3	2	2	4	3	3	2
4	2	2	2	2	2	2	2	2	3	2	3	1
5	4	3	3	2	4	3	4	2	5	4	3	4
6	2	2	4	2	3	3	4	3	3	3	3	2
7	3	3	3	2	3	3	3	3	3	2	3	1
8	3	3	4	3	4	2	3	2	3	4	2	1
9	2	2	2	2	2	2	2	2	3	3	2	2
10	3	3	3	3	3	3	3	3	3	3	3	3
Mean (SD)	2.8 (.63)	2.5 (.53)	2.8 (.79)	2.4 (.70)	3.1 (.74)	2.6 (.52)	3.0 (.82)	2.4 (.52)	3.3 (.68)	3.0 (.82)	2.7 (.48)	2.1 (.99)

Timepoints: A – Pre-Intensive; B – Post-Intensive; C – Pre-Maintenance; D – Post-Maintenance; 1 – Always; 2 – Frequently/Often; 3 – Sometimes; 4 – Rarely; 5 – Never.

Table 4. Overall Outcome Measures for Study Participants Across Timepoints

Participant	Critical Experiences for the Person Who Stutters (Siew et al., 2017) Across Timepoints											
	Perceptions of Speaking Ability**				Quality of Life Affected by Stuttering***				Stuttering's Interference on Social Situations***			
	A	B	C	D	A	B	C	D	A	B	C	D
1	3	2	2	2	4	2	2	2	3	2	3	2
2	4	3	3	2	4	3	3	3	1	1	1	1
3	4	2	2	2	5	1	3	2	4	2	3	3
4	4	2	2	1	2	1	1	1	3	2	2	2
5	4	2	2	1	4	3	3	2	4	3	3	2
6	2	2	3	2	2	1	2	2	1	2	1	2
7	2	2	3	2	4	3	4	2	4	4	3	3
8	5	2	3	3	2	1	3	1	2	1	3	1
9	3	2	2	2	4	4	2	1	4	1	2	1
10	2	2	3	2	2	2	1	1	1	1	2	2
Mean (SD)	3.3 (1.06)	2.1 (.32)	2.5 (.53)	1.9 (.57)	3.3 (1.16)	2.1 (1.10)	2.4 (.97)	1.7 (.68)	2.7 (.68)	1.9 (.99)	2.3 (.82)	1.9 (.74)

Timepoints: A – Pre-Intensive; B – Post-Intensive; C – Pre-Maintenance; D – Post-Maintenance.
**1 – Very Good; Very Positively; 2 – Good; Somewhat Positively; 3 – Not Good or Bad; Neutral; 4 – Bad; Somewhat Negatively; 5 – Very Bad; Very Negatively.
***1 – Not at all; 2 – A Little; 3 – Some; 4 – A Lot; 5 – Completely.

coxon signed-rank test revealed that participants experienced statistically significant changes in participants' perceptions of their speaking abilities (Z=-2.45, p=0.014) and in overall quality of life (Z=-2.07, p=0.038). Despite improvements in stuttering's interference on social situations, these changes were not significant.

Client satisfaction

Using the CSQ-8, participants averaged 30.4/32, indicating that they were highly satisfied with the tele-delivery of the maintenance phase of treatment. The primary complaint by participants was the issue of connectivity that at times disrupted the sessions. The only other comment, that led to a reduction in score of the CSQ-8, was regarding the desire of one

participant to maintain a group format with the tele-delivered session.

DISCUSSION

The primary finding of this study was that mean scores reported for speech related outcomes obtained in an intensive treatment program were maintained and further improved upon following a telepractice-delivered maintenance program. Gains maintained on outcome measures, following twelve tele-delivered sessions, were characterized by improvement in participant-reported overall impact of stuttering, speech-related outcomes, and critical experiences for PWS. Results of this project add to the evidence base, suggesting that telepractice can be utilized as an option for maintenance and continued growth of therapeutic gains away from the clinical setting.

OASES overall impact score

The broadest outcome measure used for the current project was the overall impact score of the OASES. Prior to the intensive program, participants averaged an overall impact score of 2.83, which falls in the upper end of a "moderate" (2.25-2.99) range. Following completion of the intensive program, participants averaged an overall impact of 2.17, a score which is categorized as "mild-to-moderate" overall impact. This study aimed to examine use of telepractice as a means to maintain such improvements. Upon completion of the 12-session, tele-delivered maintenance program, participants averaged an impact score of 1.95, demonstrating maintenance of gains obtained from the intensive program and continued growth via the tele-delivered maintenance program. Closer examination of individual data reveals that half of the participants (5/10) experienced a steady decline in overall impact at each timepoint, which is the ideal outcome. In such cases, the participant experienced gains throughout the intensive program, did not experience relapse in reported overall impact in the time following completion of the intensive program, and experienced further gains in the maintenance program. Broadly, improvements in the OASES' overall impact score are indicative of participants' increased knowledge of stuttering; a more positive perception of their speech; reactions to stuttering that are more conducive to effective and efficient communication; a decrease in difficulty of communication in various contexts; and an overall reduction of stuttering's interference on the individual's life. Therefore, gains in the OASES overall impact score are indicative of comprehensive improvements in the life of the PWS.

Self–reported speech related outcomes

As previously outlined, rather than measuring speech-related outcomes by clinician-perceived overt stuttering behaviors, we elected to use self-reported speech-related outcomes. From the current authors' perspective, given the inherent variability in fluency amongst PWS [66], offering a pre- and post-measure of percentage of stuttering would not be most indicative of therapeutic success. While the intensive and maintenance program did aim to increase participants' control over their speech, complete fluency was not a targeted outcome in this study and is not likely the goal for most treatments of PWS in this age range. As detailed in the description of the intensive program, the current treatment taught clients a new speech motor plan that utilized temporal and spatial adaptations. Even if listeners perceive this speech to be natural sounding, it is likely that any motoric adaptations of default speech patterns will cause the speaker to judge their speech to be different from that of PWNS. Additionally, participants were educated on experiences of stuttering such as anticipation of stuttering [69], and subperceptual stuttering [70] and that the presence of such equates to the continued presence of stuttering. However, for these and other experiences of stuttering that were once met with negative cognitive and behavioral reactions, PWS can learn more positive reactions and responses. Therefore, even when participants successfully adapt their speech motor plan, resulting in efficient and effective speech, it is likely that given their education from the intensive program, they may not classify these instances as speaking fluently, without stuttering (as asked in the OASES). In other words, although they successfully managed a moment of stuttering, they may have done so with a positive response or reaction to a moment of stuttering.

Participants were also taught that since there is no cure for stuttering, 100% fluency was not our goal and should not be the determinant for successful treatment. Specifically, participants were told that if 100% fluency was their expectation, they would be setting themselves up for failure in more than one way. First, the most obvious reason is that 100% fluency cannot be realized for a condition that currently has no cure. Second is the common observance that as some PWS experience an increase in fluency, they tend to disassociate from the condition [71]. Since 100% fluency will not likely be realized, some PWS may opt for avoidance behaviors over the possibil-

ity of others hearing or seeing moments of stuttering.While PWS who have received treatment may present with fewer overt behaviors of stuttering, they likely still experience such things as subperceptual stuttering [70] and anticipation of stuttering [69], which individually or combined may lead to debilitating avoidance behaviors. Therefore, clients were instructed that acceptance of stuttering [72] was a critical component of this treatment, and realizing gains in "owning the condition" would help alleviate communication apprehension [73,74], fear of negative evaluation [59,60], and would ultimately increase their communicative efficiency by reducing the fear of others perceiving stuttered speech or motoric adaptations used to control stuttered speech. In short, clients were taught that, ultimately, measurement of success was not necessarily fluent speech. Instead, success can be viewed by participation in communicative contexts that they previously would have avoided. An outcome that the current authors were particularly pleased to see were the gains in participants saying exactly what they wanted to say. These gains were gradual and consistent throughout the study's 4 timepoints, indicating continual psychosocial improvements via a tele-delivered approach.

Upon completion of the maintenance program, seven of the ten participants reported that they "frequently/often" or "always" say exactly what they want, demonstrating clinically significant improvement from data taken prior to the intensive program, at which time all ten participants felt as if they "sometimes," "rarely," or "never" were able to do so. Covert behaviors of stuttering such as circumlocutions, word substitutions, and general avoidance of communicative situations often hinder PWS from fully participating in conversations [75]. These covert behaviors of stuttering are frequently overlooked clinically; however, they play a prominent role in the overall experience of stuttering for PWS [62]. A primary facet of the intensive and tele-delivered treatment was to reduce such communication barriers and encourage PWS to pursue their ideal of life to the fullest. Improvements in participants' ability to say exactly what they want indicates a reduction in covert characteristics of stuttering and likely an increase in communication confidence. It is notable that the greatest gains on this outcome measure were made during the tele-delivered portion of the study, though future studies are needed to clarify if this was a result of the delivery format or merely the result of therapeutic continuity. Nevertheless, individuals who feel as if they are able to say exactly what they want, when desired, will potentially engage in more communicative situations, likely contributing to a higher overall quality of life.

Critical experiences for the person who stutters

Siew et al. [67] recently identified three items of the OASES which encompass participants' overall experience as PWS and are pertinent to address in a treatment plan. As seen in Table 2, group means for each of these critical experiences for PWS improved during the tele-maintenance portion of the treatment. For perceptions of speaking ability, these results are indicative of participants feeling "good, somewhat positively," to "very good, very positively" about their speaking ability. Post-maintenance measure of stuttering's effect on quality of life are indicative of the participants' lives being affected "a little" to "not at all". While changes in stuttering's interference on social situations were not significantly different from pre- to post-maintenance, they may still be viewed as clinically successful, as end results indicate that stuttering interferes with participants' social situations "a little" to "not at all". A possible contributor to the continued success of these critical experiences for PWS is the inherent "away from the clinic" nature of telepractice. That is, by using a tele-delivery approach, participants are able to internalize the principles of the intervention program in more natural settings. This benefit of utilizing a tele-delivered approach to stuttering treatment has been previously reported, with a key factor being enhanced involvement of parents and siblings in the client's everyday setting [44]. Specifically, participants gained experiences of combining the two primary goals of the program, which are adapting behavioral responses to stuttering and decreasing avoidance behaviors in various communicative contexts. As an extension, participants were encouraged weekly during telepractice sessions to participate in challenging communicative situations as part of their daily routines. In initial maintenance sessions, clinicians guided participants through selection of individualized communicative tasks that were deemed as challenging. As sessions progressed, participants attempted tasks of increased complexity, gradually addressing communicative situations further outside of their comfort zones. Participants undertook challenges such as voluntary public speaking opportunities, increased class participation, reading aloud in class, initiation of conversation with a stranger, job interviews, phone calls, interacting with coworkers, and placing complex food orders at restaurants. These communicative challenges were intended to reduce stress and build participants' confidence in speaking situa-

tions that were self-identified as difficult. Jackson et al. [76] recently found that production of speech in PWS can be impacted by stress. Of interest is that all but two of their 41 participants had previously received some form of behavioral stuttering therapy with a focus on motoric alterations. Findings from their study, combined with their participant's therapy history, suggest that stressful situations impede the speaker's execution of motoric alterations, thereby limiting the speaker's ability to implement motoric adjustments that make stuttered speech more manageable. It is plausible that guiding and encouraging participants to confront these speaking situations in the presence of stress, during these tele-delivered sessions, helped to combat the state and social anxiety that is commonly present in PWS [77]. In this case, the result was enhanced confidence in saying exactly what they want to say, increased perception of their speaking ability, and an improved overall quality of life.

While these findings are informative, they come with their limitations. First, the current study has a small sample size, limiting the generalizability of results. Second, the ages of the participants in the current sample range from child to young adulthood. Future work is needed in comparison within and across age ranges to determine if age contributes to responsiveness to intervention and/or the success or lack thereof in tele-delivery of the maintenance phase of stuttering therapy. Third, commencement and completion of tele-delivered maintenance phase varied for each of the participants. It is unclear how these factors may have influenced outcome measures. Fourth, it is possible that the outcome measures used in the current study have an inherently different threshold for change. Specifically, it is plausible that outcomes that measure covert behaviors of stuttering would necessitate more time for change to be realized than for overt behaviors of stuttering. As therapeutic interventions for PWS vary by clinician, future studies should also explore the effectiveness of telepractice as a medium of maintenance provision using other therapeutic approaches. Additionally, continued longitudinal data is needed to determine the long-term effectiveness of the current approach and those used in subsequent studies. One final thought that may inform future works. One participant (Table 2, participant 6) experienced a slight increase in overall impact from beginning the intensive program to completion of the maintenance program. A potential cause of this increased overall impact, upon completion of both programs, is increased awareness of the overall impact of stuttering on one's life. During informal conversations with participants, some commented that they had not been fully aware of the impact of stuttering on their life before this program. Researchers and clinicians may gain insight from comparing actual pretreatment data to retrospective pretreatment data.

CONCLUSION

In summary, gains made on mean scores of outcome measures during an intensive program for PWS were maintained and, in some cases, improved upon using a tele-delivered maintenance program. These findings are encouraging, as they support the use of telepractice as a service delivery model for PWS. As a result, clinicians have service delivery options for offering quality care to PWS. Future research is needed to examine tele-delivered formats to address maintenance issues among other stuttering treatment approaches. Additionally, future research should explore a variety of intrinsic and extrinsic variables that may facilitate or impede tele-delivery as a means to address maintenance of therapeutic gains among PWS.

DISCLOSURES

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Van Riper C. The nature of stuttering. Prentice Hall; 1982.
2. Briley PM, O'Brien K, Ellis C. Behavioral, emotional, and social well-being in children who stutter: Evidence from the National Health Interview Survey. Journal of Developmental and Physical Disabilities. 2019;31(1):39-53.
3. McAllister J. Behavioural, emotional and social development of children who stutter. Journal of Fluency Disorders. 2016;50:23-32.
4. Blomgren M. Behavioral treatments for children and adults who stutter: a review. Psychology Research and Behavior Management. 2013; 6:9.
5. Yaruss JS, Coleman CE, Quesal RW. Stuttering in school-age children: a comprehensive approach to treatment. Language, Speech, and Hearing Services in Schools. 2012.
6. Craig A. Relapse following treatment for stuttering: a critical review and correlative data. Journal of Fluency Disorders. 1998;23(1):1-30.
7. Tichenor SE, Yaruss JS. Recovery and relapse: perspectives from adults who stutter. Journal of Speech, Language, and Hearing Research. 2020;63(7):2162-2176.
8. Klassen TR. The challenge of regaining and maintaining fluency:

A socio-psychological view. Journal of Speech-Language Pathology and Audiology. 1995;19:97-102.
9. Perkins WH. From psychoanalysis to discoordination. In: Gregory HH, editor. Controversies about stuttering therapy. Baltimore, MD: University Park Press; 1979; p. 97-127.
10. Cooper E, Blood G, Sugarman M. Relapse or reemergence: coping with chronic stuttering. Journal of Fluency Disorders. 1997; 2(22):159.
11. Craig A, Feyer AM, Andrews G. An overview of a behavioural treatment for stuttering. Australian Psychologist. 1987;22(1):53-62.
12. The Experience of People Who Stutter. National Stuttering Association. 2009. [cited 2020 June 1]. Available from: https://westutter.org/what-is-stuttering/experience-people-stutter/.
13. Andrews G, Craig A. Prediction of outcome after treatment for stuttering. British Journal of Psychiatry. 1988;153:236-240.
14. Craig AR, Calver P. Following up on treated stutterers: Studies of perceptions of fluency and job status. Journal of Speech, Language, and Hearing Research. 1991;34(2):279-284.
15. Kamhi AG. The problem of relapse in stuttering: Some thoughts on what might cause it and how to deal with it. Journal of Fluency Disorders. 1982;7(4):459-467.
16. Irani F, Gabel R. Intensive stuttering therapy with telepractice follow-up: A case study. Perspectives on Fluency and Fluency Disorders. 2011;21(1):11-21.
17. O'Brian S, Packman A, Onslow M. Telehealth delivery of the Camperdown Program for adults who stutter: a phase I trial. Journal of Speech, Language, and Hearing Research. 2008.
18. Finn P. Addressing generalization and maintenance of stuttering treatment in the schools: a critical look. Journal of Communication Disorders. 2003;36(2):153-164.
19. Wilson L, Lincoln M, Onslow M. Availability, access, and quality of care: Inequities in rural speech pathology services for children and a model for redress. Advances in Speech Language Pathology. 2002;4(1):9-22.
20. World Health Organization. Increasing access to health workers in remote and rural areas through improved retention: global policy recommendations. World Health Organization; 2010.
21. About Rural Health. Centers for Disease Control and Prevention. 2017. [Cited on 2021 January 21]. Available from: https://www.cdc.gov/ruralhealth/about.html.
22. Bitsko RH, Holbrook JR, Robinson LR, Kaminski JW, Ghandour R, Smith C, et al. Health care, family, and community factors associated with mental, behavioral, and developmental disorders in early childhood—United States, 2011–2012. Morbidity and Mortality Weekly Report. 2016;65(9):221-226.
23. Rural North Carolina Counties Designated Health Professional Shortage Areas. North Carolina Health and Human Services. 2016. [Cited on 2021 January 21]. Available from: https://files.nc.gov/ncdhhs/2016_01_HPSA_Primary%2C%20Dental%2C%20Mental%20Map.jpg.
24. Poverty Statistics. North Carolina Poverty Research Fund. UNC School of Law. 2020. [Cited on 2021 January 21]. Available from: https://law.unc.edu/academics/centers-and-programs/n-c-poverty-research-fund/poverty-statistics/.
25. Lowman JJ, Kleinert HL. Adoption of telepractice for speech-language services: a statewide perspective. Rural Special Education Quarterly. 2017;36(2):92-100.
26. Crutchley S, Campbell M. Telespeech therapy pilot project: Stakeholder satisfaction. International Journal of Telerehabilitation. 2010;2(1):23.
27. Kelly D. Venturing into telehealth: applying interactive technologies to stuttering treatment. The ASHA Leader. 2002;7(11):1-5.
28. Daniels DE, Gabel RM, Hughes S. Recounting the K-12 school experiences of adults who stutter: a qualitative analysis. Journal of Fluency Disorders. 2012;37(2):71-82.
29. Briley PM. Issues in assessment of children who stutter: a survey of speech-language pathologists in the state of north carolina. Clinical Archives of Communication Disorders. 2018;3(2):95-103.
30. Brisk DJ, Healey EC, Hux KA. Clinicians' training and confidence associated with treating school-age children who stutter: a national survey. Language, Speech, and Hearing Services in Schools. 1997;28(2):164-176.
31. Kelly EM, Martin JS, Baker KE, Rivera NI, Bishop JE, Krizizke CB, et al. Academic and clinical preparation and practices of school speech-language pathologists with people who stutter. Language, Speech, and Hearing Services in Schools. 1997;28(3):195-212.
32. Santus N, Tellis G, Kong F, Santus N, Tellis G, Kong F. Are graduate students receiving adequate education and training in fluency disorders?. Clinical Archives of Communication Disorders. 2019; 4(3):236-251.
33. Tellis GM, Bressler L, Emerick K. An exploration of clinicians views about assessment and treatment of stuttering. Perspectives on Fluency and Fluency Disorders. 2008;18(1):16-23.
34. Telepractice. ASHA. 2021. [Cited on 2021 January 21]. Available from: https://www.asha.org/Practice-Portal/Professional-Issues/Telepractice/.
35. McGill M, Noureal N, Siegel J. Telepractice treatment of stuttering: a systematic review. Telemedicine and e-Health. 2019;25(5):359-368.
36. Onslow M, Menzies RG, Packman A. An operant intervention for early stuttering: the development of the Lidcombe program. Behavior Modification. 2001;25(1):116-139.
37. Onslow M, Webber M, Harrison E, Arnott S, Bridgman K, Carey B, et al. The Lidcombe program treatment guide. Lidcombe Program Trainers Consortium. http://lidcombeprogram. org/wp-content/uploads/2018/03/Lidcombe-Program-Treatment-Guide-December-2017-2. pdf. 2017 Dec.
38. Harrison E, Wilson L, Onslow M. Distance intervention for early stuttering with the Lidcombe Programme. Advances in Speech Language Pathology. 1999;1(1):31-36.
39. Lewis C, Packman A, Onslow M, Simpson JM, Jones M. A phase II trial of telehealth delivery of the lidcombe program of early stuttering intervention. American Journal of Speech-Language Pathology. 2008.
40. Wilson L, Onslow M, Lincoln M. Telehealth adaptation of the lidcombe program of early stuttering intervention. American Journal

of Speech-Language Pathology. 2004.
41. O'Brian S, Smith K, Onslow M. Webcam delivery of the Lidcombe Program for early stuttering: a phase I clinical trial. Journal of Speech, Language, and Hearing Research. 2014;57(3):825-830.
42. Bridgman K, Onslow M, O'Brian S, Jones M, Block S. Lidcombe program webcam treatment for early stuttering: a randomized controlled trial. Journal of Speech, Language, and Hearing Research. 2016;59(5):932-939.
43. Sicotte C, Lehoux P, Fortier-Blanc J, Leblanc Y. Feasibility and outcome evaluation of a telemedicine application in speech–language pathology. Journal of Telemedicine and Telecare. 2003;9(5):253-258.
44. Valentine DT. Stuttering intervention in three service delivery models (direct, hybrid, and telepractice): two case studies. International Journal of Telerehabilitation. 2014;6(2):51.
45. Carey B, O'Brian S, Lowe R, Onslow M. Webcam delivery of the Camperdown Program for adolescents who stutter: a Phase II trial. Language, Speech, and Hearing Services in Schools. 2014; 45(4):314-24.
46. Eslami Jahromi M, Ahmadian L, Bahaadinbeigy K. The effect of tele-speech therapy on treatment of stuttering. Disability and Rehabilitation: Assistive Technology. 2020 :1-6.
47. O'Brian S, Carey B, Lowe R, Onslow M, Packman A, Cream A. The Camperdown Program stuttering treatment guide. Australian Stuttering Research Centre. https://www.uts.edu.au/research-and-teaching/our-research/australian-stuttering-researchcentre/asrc-resources/resources. 2018 May.
48. Carey B, O'Brian S, Onslow M, Block S, Jones M, Packman A. Randomized controlled non-inferiority trial of a telehealth treatment for chronic stuttering: the Camperdown Program. International journal of language & communication disorders. 2010;45(1):108-120.
49. Irani F, Gabel R, Daniels D, Hughes S. The long term effectiveness of intensive stuttering therapy: a mixed methods study. Journal of Fluency Disorders. 2012;37(3):164-278.
50. Haynes E, Langevin M. Telepractice at the Institute for Stuttering Treatment and Research (ISTAR). InPaper presented at the 13th International Stuttering Awareness Day online conference for ISAD on-line forum; 2010.
51. Kully D. Telehealth in speech pathology: applications to the treatment of stuttering. Journal of Telemedicine and Telecare. 2000;6 (2_suppl): 39-41.
52. Langevin M, Kully D. The comprehensive stuttering program and its evidence base. The Science and Practice of Stuttering Treatment. 2012:115-129.
53. Ratcliffe M, Burd C, Holder K, Fields A. Defining rural at the US census bureau. American Community Survey and Geography brief. 2016;1(8).
54. Packman A, Code C, Onslow M. On the cause of stuttering: integrating theory with brain and behavioral research. Journal of Neurolinguistics. 2007;20(5):353-362.
55. Diedrichsen J, Kornysheva K. Motor skill learning between selection and execution. Trends in Cognitive Sciences. 2015;19(4):227-233.
56. Andrews G, Howie PM, Dozsa M, Guitar BE. Stuttering: speech pattern characteristics under fluency-inducing conditions. Journal of Speech, Language, and Hearing Research. 1982;25(2):208-216.
57. Ingham RJ. Current status of stuttering and behavior modification—II: principal issues and practices in stuttering therapy. Journal of Fluency Disorders. 1993;18(1):57-79.
58. Marcotte AK. Evidence, goals, and outcomes in stuttering treatment: Applications with an adolescent who stutters. Language, Speech, and Hearing Services in Schools, 2018;49(1):23-32.
59. Iverach L, Rapee RM. Social anxiety disorder and stuttering: current status and future directions. Journal of Fluency Disorders. 2014;40:69-82.
60. Iverach L, Rapee RM, Wong QJ, Lowe R. Maintenance of social anxiety in stuttering: a cognitive-behavioral model. American Journal of Speech-Language Pathology. 2017;26(2):540-556.
61. Caughter S, Dunsmuir S. An exploration of the mechanisms of change following an integrated group intervention for stuttering, as perceived by school-aged children who stutter (CWS). Journal of Fluency Disorders. 2017;51:8-23.
62. Yaruss JS, Quesal RW. Overall Assessment of the speaker's experience of stuttering (OASES): documenting multiple outcomes in stuttering treatment. Journal of Fluency Disorders. 2006;31(2):90-115.
63. Yaruss JS, Quesal RW. Overall Assessment of the speaker's experience of stuttering (OASES-A). Assessment Instrument. Stuttering Therapy Resources. 2016.
64. Ingham JC, Riley G. Guidelines for documentation of treatment efficacy for young children who stutter. Journal of Speech, Language, and Hearing Research. 1998;41(4):753-770.
65. Onslow M, Costa L, Rue S. Direct early intervention with stuttering: some preliminary data. Journal of Speech and Hearing Disorders. 1990;55(3):405-416.
66. Constantino CD, Leslie P, Quesal RW, Yaruss JS. A preliminary investigation of daily variability of stuttering in adults. Journal of Communication Disorders. 2016;60:39-50.
67. Siew CS, Pelczarski KM, Yaruss JS, Vitevitch MS. Using the OASES-A to illustrate how network analysis can be applied to understand the experience of stuttering. Journal of Communication Disorders. 2017;65:1-9.
68. Attkisson CC, Greenfield TK. The UCSF client satisfaction scales: I. The Client Satisfaction Questionnaire-8.
69. Jackson ES, Yaruss JS, Quesal RW, Terranova V, Whalen DH. Responses of adults who stutter to the anticipation of stuttering. Journal of Fluency Disorders. 2015;45:38-51.
70. Freeman FJ. Laryngeal muscle activity of stutterers. In: Curlee RF, Perkins WH editors. Nature and treatment of stuttering: new directions. San Diego, CA: College Hill Press; 1984. p. 104-116.
71. Murphy B, Quesal R, Gulker H. Covert stuttering. SIG 4 Perspectives on Fluency and Fluency Disorders. 2007;17(2):4–9.
72. Beilby JM, Byrnes ML, Yaruss JS. Acceptance and commitment therapy for adults who stutter: psychosocial adjustment and speech fluency. Journal of Fluency Disorders. 2012;37(4):289-299.
73. Mulcahy K, Hennessey N, Beilby J, Byrnes M. Social anxiety and

the severity and typography of stuttering in adolescents. Journal of Fluency Disorders. 2008;33(4):306-319.
74. Erickson S, Block S. The social and communication impact of stuttering on adolescents and their families. Journal of Fluency Disorders. 2013;38(4):311-324.
75. Guitar B. Stuttering: An integrated approach to its nature and treatment. Lippincott Williams & Wilkins; 2013.
76. Jackson ES, Tiede M, Beal D, Whalen DH. The impact of social–cognitive stress on speech variability, determinism, and stability in adults who do and do not stutter. Journal of Speech, Language, and Hearing Research. 2016;59(6):1295-1314.
77. Craig A, Tran Y. Trait and social anxiety in adults with chronic stuttering: conclusions following meta-analysis. Journal of Fluency Disorders. 2014;40:35-43.