Stand-alone Internet speech restructuring treatment for adults who stutter

A pilot study
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This Phase I pilot study assessed the viability of a clinician-free Internet presentation of speech restructuring treatment for chronic stuttering. Two participants reduced their percentage of stuttered syllables by 59% and 61% respectively from pre-treatment to immediately following completion of the program. Additionally, self-reported stuttering severity and situation avoidance were also reduced. These results were attained with optimal clinical efficiency, without any clinician contact, after 6 weeks for one participant and 4 weeks for another. Participants did not incur costs such as clinic fees, travel, or time away from work for clinic attendance. We conclude that further development of this stand-alone Internet treatment and clinical trialling is warranted.

Stuttering is a developmental speech disorder that usually begins when children are 3 or 4 years old. It is common for those affected to not fulfil their educational and occupational potential (Klein & Hood, 2004). Stuttering is associated with considerable personal financial cost (Blumgart, Tran, & Craig, 2010), and poses obvious economic problems for society. Social anxiety is common among those who stutter with social phobia reported for up to 60% of clinical cohorts (Blumgart et al., 2010; Iverach et al., 2009a), with those cohorts also at risk for anxiety related mood and personality disorders (Iverach et al., 2009b).

Probability has been made with treatment methods for chronic stuttering, with reviews of replicated clinical trials favouring speech-restructuring procedures (Bothe, Davidow, Bramlett, Fracic, & Ingham, 2006; Onslow, Jones, O’Brien, Menzies, & Packman, 2008). Speech restructuring refers to the use of a new speech pattern to reduce or eliminate stuttering while aiming to sound as natural as possible (Onslow & Menzies, 2010).

Clinical trials have demonstrated the efficacy of the Camperdown Program, a speech restructuring treatment (O’Brien, Cream, Onslow, & Packman, 2001; O’Brien, Onslow, Cream, & Packman, 2003). This program utilises an exemplar to model Prolonged Speech (PS) (and no direct instruction in how to re-produce the speech pattern), as well as the removal of strict programmed schedules (O’Brien et al., 2001). The essential features of the Camperdown Program make it suitable to be adapted to models not requiring direct face-to-face contact between clinician and client. This was demonstrated in recent research investigating a telehealth version in which participants received treatment via the telephone (Carey et al., 2010; O’Brien, Packman, & Onslow, 2008). Telehealth delivery particularly benefits those clients isolated from speech pathology services for geographical reasons – in Australia, this is around one-third of clients (Wilson, Lincoln, & Onslow, 2002). Rural areas in Australia have low population density and large distances between urban settlements making adequate provision of health services difficult.

Even in metropolitan areas difficulties accessing stuttering treatment still exist because of the demands that traditional treatment programs place on clinics and clinicians. Lifestyle factors also present a barrier for metropolitan-based clients seeking treatment. In addition to clinic fees for treatment, direct and indirect costs are significant and often overlooked. These may include direct expenses such as transportation and indirect costs including time off work for clients and family members and childcare costs. Such costs may make treatment prohibitively expensive.

Despite a reduced demand for resources compared with traditional delivery models, there are still some limitations with telehealth delivered stuttering treatments. First, telehealth delivery requires specialist training and second, a considerable amount of clinician time is still required (Carey et al., 2010). Therefore, even though client travel time is reduced, some indirect costs including client time away from work remain.

Internet-based treatment may present a solution to these problems by overcoming clinical infrastructure, travel, and logistical issues for clinic administrators, clinicians, and clients. Several Internet-based treatments are now well established in other areas of health care, for example, the “MoodGYM” site (MoodGYM, n.d.) provides cognitive behaviour therapy (CBT) for depression. A recent randomised controlled trial found that this Internet program was a feasible and powerful intervention (Christensen, Griffiths, & Jorm, 2004). “Fearfighter” is another computer-based CBT program for the treatment of phobias and panic attacks (Marks et al., 2003). It has been shown to be efficacious for more than 700 patients (Hayward, MacGregor Peck, & Wilkes, 2007). While such programs...
have mostly shown similar outcomes to comparable in-clinic services (Kenwright, Liness, & Marks, 2001), it should be noted that long-term follow-up of participants in these trials has been absent and drops outs have been a considerable problem. Additionally, Internet-based treatments raise significant ethical issues such as how to assess the appropriateness of clients for this delivery method and whether clients are monitored for their response to treatment.

Because of the prominence of social anxiety among those who stutter, and hence the possibility of social avoidance, the Internet would have the additional advantage of allowing treatment to be accessed with anonymity (Tate & Zabinski, 2004). Clinical trials of the stand-alone “CBTpsych.com” site for social anxiety in adults who stutter have shown encouraging compliance rates and effect sizes (Holladottir, Menzies, Onslow, Packman, & O’Brian, 2011).

In consideration of the aforementioned potential benefits Internet-based treatment could offer, including increased access to treatment and a potential reduction in costs and resources, the aim of the current study was to develop and trial an Internet-based, clinician-free modified Camperdown Program. This pilot study was designed to assess the viability and safety of the program. A positive outcome for a preliminary trial would justify continued development of such a delivery model for adult stuttering treatment.

Method

Participants

Participants were two stuttering adults who had sought treatment at the La Trobe University Communication Clinic in Melbourne, Australia. Participant 1 was a male 22-year-old full-time university student who worked part-time as a hospital ward clerk. Participant 2 was a 30-year-old female with secondary school education who worked part-time as a masseuse. Neither participant had received speech restructuring treatment previously. Participant 1 had received stuttering treatment focusing on reading as a child while Participant 2 had completed tongue exercises, singing, reading, and rate control more than 10 years previously.

Procedure

The participants were invited to participate during an initial clinic assessment. After this session no personal contact was made with either participant. The participants received hard copies of the questionnaires outlined below during the initial assessment and returned these via mail prior to commencing treatment. Post-treatment questionnaires were sent to the participants and returned via mail after the completion of their speech measures.

Immediately after pre-treatment measures were taken, the participants were emailed a link to the treatment website and login details. Emergency contact details of a technical person involved in the construction of the website, but not familiar with the aims of the study, were provided at the beginning of the program in case of technical problems.

Primary outcome measure

The primary outcome measure was percentage of syllables stuttered (%SS). At each assessment point, during the week prior to starting the program, and immediately after completion of the final phase of the program, two randomly scheduled 10-minute telephone conversations were recorded for each participant. Research assistants who were unknown to the participants, made one “routine” call and one “challenging” call. Routine calls allowed the participant to discuss self-initiated topics. Challenging calls involved controversial topics and comprised a predetermined number of interruptions and disagreements. Participants were unaware of when the calls would be made and that challenges would be included. Calls were made to the participants’ mobile phones. Participants were permitted to decline a call, for example, if it interrupted work, but the subsequent call was not re-scheduled for a specific time.

All eight audio recordings (two recordings at each assessment for each participant) were de-identified and presented in random order to a speech pathologist specialising in stuttering treatment but independent of the study. As well as being blind to the identity of the participant, the speech pathologist was unaware of the assessment from which the sample was obtained. Measures of %SS were made using an EasyRater button-press counting and timing device. To establish intra-rater reliability, all recordings were re-presented to the observer on a second occasion in random order. To establish inter-rater reliability, all recordings were presented blind to another experienced rater not associated with the study and unaware of its purpose, who measured %SS with the same button-press counting and timing device. The second rater was also unaware of the identity of the participants and the assessments from which their samples came.

Secondary outcome measures

Severity ratings. Participants provided self-ratings of their stuttering severity in eight common speaking situations using a written questionnaire before and after treatment. These were talking with a family member, a familiar person, an authority figure, a group, a stranger, talking by telephone, when ordering food, and providing name and address details. The participants were asked to rate their “typical severity” for each situation using a scale of 1–9, where 1 = no stuttering, 2 = extremely mild stuttering, and 9 = extremely severe stuttering. Typical was defined as the score which would have been given for around 75% of speaking time in each situation.

Avoidance. Participants also reported their avoidance of these speaking situations, before and after treatment on the aforementioned questionnaire. Participants were asked to record their level of avoidance of these situations by circling either never, sometimes, or usually for each situation.

Impact of stuttering. Impact was measured before and after treatment using the Overall Assessment of the Speaker’s Experience of Stuttering (OASES). This 100-item scale has previously been established as a valid and reliable method of establishing the overall impact of stuttering (Yaruss & Quesal, 2006). Multiple aspects of the condition are scored on a Likert scale and the total scale takes approximately 20 minutes to complete. The OASES contains four sections: (a) general information, (b) reactions to stuttering, (c) communication in daily situations, and (d) quality of life. An overall impact score is calculated based on scores from all subscales.

Reliability

Given the small number of recordings, analysis of agreement was considered more informative than correlation analysis. For intra-rater agreement, all ratings of the two observations (eight recordings) differed by less than 1.0 %SS. Regarding the inter-rater agreement, 75% of
ratings (6 recordings) differed by less than 1.0 %SS and 100% differed by less than 2.0 %SS.

The Internet program

The program adopts the primary methods of the Camperdown Program (O’Brian et al., 2008). These are (a) an operationalised video model for teaching the speech restructuring pattern, (b) no programmed instruction to instate natural-sounding stutter-free speech, (c) no formal transfer tasks to assist generalisation of stutter-free speech, and (d) a 9-point severity rating scale to replace %SS measures and a 9-point naturalness rating scale to evaluate speech quality. As this trial aimed to test only the feasibility of the program to reduce stuttering, participants did not complete the maintenance stage.

A linked administration website was developed as a database for storage of participant responses. Researchers were able to locate the time and date of a participant’s use of the program and determine their current stage of treatment. Additionally, responses to the program’s interactive questions were able to be stored and reviewed by the researchers. These questions related mainly to the participants’ understanding of treatment concepts.

The program consists of nine phases and begins by presenting background information and the requirements of the program. Participants require a recording device with sufficient memory to record 10 minutes of conversation. The participants are informed that phases of treatment will only become unlocked once they have completed the goals for the previous phase. However, they can always return to past phases if more practice at that level is required. At the start of every phase, participants are informed of the anticipated time required to complete the phase.

Phase 1
Participants identify five speaking situations representative of their daily life and assign and graph a typical and worst severity score for each. Typical is defined as around 75% of speaking time in the situation and worst as the most severe level that occurred. The participants are required to begin assigning a severity score to at least one of the five situations each day. The site provides audio examples of stuttered speech and corresponding severity scores (as judged by expert consensus) to guide participants with scoring.

Phase 2
Participants are provided with the Camperdown speech-restructuring model along with instructions to imitate the speech pattern without stuttering. They are required to read in unison with the model, record each attempt and then judge, during playback, whether the imitation closely approximated the model.

Phase 3
When participants are satisfied that they can imitate the model in unison with the recorded exemplar, they are required to practise reading it aloud without the recording. These attempts are recorded and reviewed for accuracy and fluency. The target is to achieve three consecutive attempts to criteria of speech naturalness 9 and stuttering severity 1. In other words, the goal is to produce highly unnatural sounding speech with no stuttering. If participants have difficulty imitating the target speech pattern or are unable to use it to stop stuttering, they are required to repeat the above sequence of tasks, recruiting help from a friend or family member, if needed, to explore differences between the model and their attempted imitations.

Phase 4
Participants make a series of 1–2 minute recordings of self-generated monologues at naturalness 9 and severity 1. As in the previous phase, participants are asked to evaluate and compare their recordings with the exemplar. Participants are required to complete three recordings of 1–2 minutes using their new speech pattern to remain stutter free.

Phase 5
Participants are required to complete three consecutive self-generated 3-minute monologues and then three consecutive 10-minute monologues at naturalness 9 and severity 1. Participants are asked to reflect on any changes to the daily severity ratings made for their nominated five representative speaking situations. In this phase, the site suggests that participants regularly practise using their new speech pattern by completing subsequent monologues at naturalness 9 and severity 1. It is suggested that participants enlist a “speech buddy” to help with practice or continue to self-evaluate using recordings.

Phase 6
The site introduces participants to the concept of improving speech naturalness using the speech pattern, and how to measure changes with the naturalness scale. Example recordings of stutter-free speech produced at different naturalness levels from 1 to 9 (as judged by expert consensus) are presented. Participants complete a quiz to identify the naturalness of speech examples at different levels.

Phase 7
The site provides a video tutorial which explains (a) the Camperdown Program procedure for instating natural-sounding stutter-free speech using speech cycles (practice, trial and evaluation), and (b) the performance-contingent protocol for progression through the cycles (see O’Brian, Cream, Onslow, & Packman, 2001). Participants are required to produce at least six consecutive cycles with severity 1–2 and naturalness 1–3 practising alone, as well as at least six cycles talking with a friend or family member. Links are provided to assist participants with a range of clinical problems typically encountered such as sounding less natural than intended or conversely stuttering when trying to improve naturalness. In the event of repeated failure to attain program criteria, the site provides possible reasons for this and strategies for solving the problem during the next cycle attempt.

Phase 8
During this phase participants are required to make speech recordings and self-reports of their severity and naturalness in representative, everyday situations. Participants use the five speaking situations nominated during Phase 1, ranking them in order from easiest to hardest based on their average daily severity scores since starting treatment. Participants are encouraged to make a series of 10-minute conversations with a goal of maintaining a naturalness of 1–3 and a severity of 1–2. Participants start with their easiest situation and progress to more difficult situations as they meet progression criteria.

Phase 9
This maintenance phase has been built into the Internet site using the standard Camperdown Program format. However, participants did not complete this phase because this trial was intended only to establish the viability and possibility of a treatment effect using the program. Nonetheless, the
importance of maintenance cannot be understated and future users will be encouraged to make regular recordings of their speech in everyday speaking situations and evaluate them for naturalness and severity. Users will be able to record results from these attempts on the Internet site and graph their progress. Additionally, the site will provide prompts to encourage problem solving should they not achieve a naturalness of 1–3 and severity of 1–2 in each recording.

Results

Clinical progress

Participant 1 completed the program in just over 6 weeks, logging in 26 times. Participant 2 completed the program in 4 weeks and logged in 35 times. The specific number of treatment hours could not be accurately determined because it was unclear how much time during each login the participants spent doing the treatment. For example, the participants may have logged in and left the computer unattended. Neither participant contacted the researchers for technical support.

Per cent syllables stuttered

Figure 1 presents %SS scores for each beyond clinic telephone call pre-treatment and post-treatment. Marked improvements were noted for both participants in each of the assessment calls after treatment. Participant 1 recorded a 61% reduction in stuttering frequency for the routine call and a 57% reduction for the challenging call. Participant 2 recorded a 79% reduction in stuttering frequency for the routine call and a 42% reduction for the challenging call.

Severity ratings

The mean self-reported typical stuttering severity in the eight situations for Participant 1 (Figure 2) pre-treatment was 7.0 (range 3–9) and post-treatment was 5.1 (range 1–7). For Participant 2 (Figure 3) the mean severity rating was 6.0 (range 6–6) before treatment and 1.4 (range 1–2) after treatment. Participant 1 reported an improvement in seven of the eight situations. Interestingly, the only speaking situation with no improvement was the telephone (where the speech measure was obtained). Further, Participant 1 reported only small improvements when speaking to a stranger. Participant 2 reported a large improvement for each of the speaking situations, with typically no stuttering (severity 1) in five of the eight situations and very mild stuttering (severity 2) in the other three situations (group, stranger, authority).
Avoidance

After treatment, Participant 1 reported never avoiding three situations that he previously avoided sometimes or usually (family, familiar person, group). Two further situations (ordering food and providing name and address) reduced from usually avoided to sometimes avoided. The remaining three situations were unchanged. Participant 2 reported that after treatment she never avoided three situations she previously avoided sometimes (phone, ordering food, and providing name and address). Additionally, after treatment the “group” situation was avoided sometimes after previously avoiding it usually. The remaining four situations were unchanged; however, two (family and familiar people) were previously never avoided and two (stranger and authority) were sometimes avoided.

Impact of stuttering

After treatment, both participants improved their scores in each of the four sections assessing the impact of stuttering as well as the “overall” OASES scale. Participant 1’s “overall” impact was reduced from a severe level (77) to a moderately severe level (82), and Participant 2 from a moderate level (58) to a mild-moderate level (34). Participant 1 recorded the largest impact reduction post-treatment in the “communication in daily situations” section (from 74 severe to 54 moderate) while Participant 2 recorded the largest reductions in “quality of life” (57 moderate to 25 mild) and “reactions to stuttering” (75 severe to 38 mild-moderate).

Discussion

This pilot study assessed the viability of a stand-alone Internet speech restructuring program for the reduction of stuttering with two participants. It is the first published investigation of Internet-delivered treatment for adults who stutter. Positive outcomes suggest the program is manageable and has the potential to reduce stuttering without any clinician input.

Stuttering reduction was confirmed with both objective and self-report data. The two participants reduced their stuttering by an average of 59% and 61% respectively from pre-treatment to post-treatment. Despite the obvious advantages this program provides, the stuttering reductions are not as substantial as previously reported Camperdown Program variants in a similar phase of research. For example, the 10 participants who completed O’Brian et al.’s (2008) pilot study using telehealth delivery reduced their stuttering by an average of 82%. However, it should be noted that there was considerable individual variation, with 3 of the 10 participants reducing their stuttering by less than 80%. Additionally, O’Brian et al.’s (2003) clinician-delivered Camperdown Program yielded a mean 95% reduction immediately after treatment.

Participant reports of typical severity during everyday speaking situations in this trial were consistent with the objective data. Similarly, both participants reported considerable reduction in avoidance of specific speaking situations post-treatment. This is an important finding in light of the social anxiety that is typical for many stuttering adults (Iverach et al., 2009a). Furthermore, the treatment improved quality of life measures for both participants, albeit to a small degree. Therefore, while both participants were still stuttering mildly after treatment, it appears the program yielded further positive effects beyond reducing surface stuttering behaviours.

Clinical implications

These results were attained with optimal clinical efficiency, without any clinician contact. Participants had the convenience and flexibility of accessing a treatment without visiting a clinic, thereby eliminating costs associated with clinic fees, travel, and time away from work. The program also allowed the participants to complete the program at their own pace. One participant required 6 weeks to complete the treatment and another required 4 weeks. This suggests that the Internet-based treatment was sufficient to motivate these participants. Further research could establish the number of hours required to complete treatment.

Clearly this clinician-free delivery will not be suitable for all clients and it is not the intention of this development to aim for this. Some clients will prefer and/or need the continued input of a clinician; however, it may also be that clients can use a combination of Internet delivery and clinician input. A more refined version of the program also will be useful for generalist clinicians who may have limited experience or limited skills treating adults who stutter. For these clinicians, the program also may act as a guide for treatment.

Limitations and future research

The limitations of this pilot study are clear but should be acknowledged. The paper presents the results of just two participants and provides only descriptive analysis of their results. Generalisations beyond these two participants cannot be made. Additionally, this study does not report long-term follow-up data. However, given it is essentially a proof of concept study the primary aim was to establish the feasibility of the program. The findings suggest that further development of this Internet-based program may make treatment available to many adult stuttering clients who have access to the Internet but who, for geographic and other reasons, are isolated from treatment services.

Future research could also address issues beyond the scope of this preliminary study. For example, larger scale trials may be able to identify particular client characteristics that predict success. Additionally, ethical issues should be considered such as responsibility for clients who don’t respond to treatment, deciding how clients access the treatment (i.e. open access or only via a speech pathologist) and whether safeguards are needed to ensure that only adults access the program.

During the course of this trial we discovered many potential improvements to the program, and plan further development and refinement. Some of these improvements include improved website design for better client interactivity and increased database monitoring of client use of the program. Judging by the process of development and refinement of a stand-alone site for cognitive behaviour therapy for stuttering clients (Hegadöttir et al., 2011), such pursuits may be productive. In principle, there is no reason why continued development and clinical trialling of this treatment method should not produce outcomes comparable to the in-clinic or telehealth delivered Camperdown Program.

References


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