

Critical Review: The Effects of Self-Imposed Time-Out from Speaking on Stuttering in Adolescents and Adults Who Stutter

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This critical review examines the effects of *self-imposed time-out from speaking* on fluency in adolescents and adults who stutter. Study designs include: single subject, randomized clinical trials, case study and single group tests. Overall, current research demonstrates an increase in fluency when using self-imposed time-out. Although limited, outcomes are positive and this treatment should be considered as an option or adjunct to traditional approaches used in clinical practice. Recommendations for future research are provided.

Introduction

Stuttering is characterized by an abnormally high frequency and/or duration of stoppages in the forward flow of speech, typically consisting of repetitions, prolongations or blocks in airflow (Guitar, 2006). In addition to these core behaviours, secondary behaviours are often used to escape or avoid stuttering, such as eye blinking or body jerks. The third component is the feelings and attitudes coinciding with these behaviours. Each person who stutters displays a unique pattern of behaviour ranging from mild to severe often interfering with a person's ability to function psychologically, occupationally and socially (Hewat et al., 2006). The exact cause of stuttering is unknown; however evidence suggests a genetic basis affecting the brain's organization of speech and language with many factors acting singly or in combination to precipitate the onset of stuttering in predisposed children (Guitar, 2006).

There are a variety of treatment options available for people who stutter, most commonly involving speech restructuring. Such treatment approaches can be cognitively demanding and involve extensive training with a Speech Language Pathologist. Although speech modification approaches can be successful, not all people who stutter are successful using them continuing to stutter into adolescence and adulthood. Another issue among treatment approaches is the maintenance of fluency outside of the clinic setting and over time. Stuttering often fluctuates in severity across a person's lifespan and even when therapy is successful initially, it is common for relapse to occur.

The time-out from speaking procedure is an operant conditioning approach where the person who stutters pauses after disfluent speech. The procedure can be administered by a clinician by pressing a button to illuminate a light indicating to cease speaking or self-imposed by the person who stutters allowing them to pause when they recognize they have been disfluent. Research shows the length of the pause has little effect

on the effectiveness of the procedure (James, 1983). The time-out approach is simple, requires minimal training, minimal cognitive demand and does not attempt to alter speech. Many researchers have hypothesized that using a self-imposed approach in comparison to a clinician-imposed approach will increase generalizability and reduce the chance of relapse of stuttering behaviours.

Objectives

The primary objective of this paper is to critically evaluate existing literature on self-imposed time-out to determine if this procedure increases fluency in adolescents and adults who stutter. The secondary objective is to provide evidence-based practice recommendations to clinicians regarding the use of the self-imposed time-out procedure. A third objective is to compare self-imposed time-out to clinician-imposed time-out to determine if self-imposed time-out is as effective as clinician-imposed and more easily generalized outside the clinical setting.

Methods

Search Strategy

Computerized databases including CINAHL, PsycINFO, Pubmed and Google Scholar were searched using the following search strategy:

((Stuttering) OR (stutter)) AND ((treatment) OR (time-out) OR ((self-imposed) AND (time-out))).

Databases were searched for relevant articles and background information. The reference lists of the articles were also searched for other relevant articles. The search was limited to articles written in English.

Selection Criteria

Studies selected for inclusion in this critical review paper were required to investigate the impact on fluency of self-imposed time-out in adolescents and adults who stutter. No limits were set on the demographics of research participants or outcome measures.

Data Collection

Results of the literature search yielded the following types of articles congruent with the aforementioned selection criteria: two single subject designs; a multiple baseline and case series; two randomized clinical trials mixed between and within groups; three case studies within one paper and a single group pre-posttest study.

Results

Two of six studies examined the effects of self-imposed time-out from speaking alone on fluency.

James (1981) used a single subject multiple baseline design to examine self-imposed time-out from speaking. This design is often used to examine how a behaviour changes in response to intervention (<http://www.hsr.methods.org>) providing a high level of evidence although lack of randomization and limited participants are downfalls. In James' (1981) study two experiments were conducted: self-imposed time-out from speaking and self-imposed time-out from speaking with a response-cost contingency where 5¢ was paid each time he failed to initiate. An ABB'A phase design was used: baseline, overt time-out (tone signals time-out), covert time-out and extinction over approximately five weeks. Fluency was measured in percentage of syllables stuttered (%SS) and percentage of interjections (%I), which were collapsed in treatment data as Pearson correlations found no significant difference. Recordings from five speaking situations were analyzed by the author and independent observer. Pearson product moment correlations showed inter-rater reliability of disfluency and the client's time-outs consistent with the researcher. When re-starting speaking after disfluency, the participant was given the option of where to re-start.

Visual inspection of the data showed reductions in stuttering in both conditions, reaching near zero in experiment 2 as well as correspondence between fluency changes and introducing and extinguishing intervention. Speaking rate was found not to be significant in the descriptive analysis. An increase in conducting the time-out procedure from 45.5% to 62.8% agreeance with the experimenter was found. Follow-up at 6 and 12 months post-treatment was carried out the same as the baseline phase. Visual inspection showed stuttering decreases maintained. Client and family reports throughout the experiment described marked improvements.

The participant in this study was well-described, providing information on age, gender, occupation, stuttering changes and prior treatment. The methodology and procedures were also described in detail allowing for replication. The experiment was conducted in a variety of environments within and

outside of the clinic. The measurements of fluency (%SS and %I) are common and relevant measures of fluency and statistical analyses used were appropriate.

Data were analyzed using visual inspection which lowers the strength of evidence as statistical analysis could have been conducted. Partial blinding of the independent observer was done, although experimenter and participant knew the purpose and expected outcomes which can bias the results. Collapsing of %SS and % I is questionable, these measurements are typically separated and statistical analysis at follow-up showed significant differences between them. Being the only study to include %I, and since people who do not stutter use interjections as well it should be separated if calculated. Although increased in the second experiment, the level of reliability between the experimenter and participant remained low. Allowing choice of where to re-start after disfluency may affect results as it may facilitate fluency. This single subject design provides level 1 evidence, however lack of statistical analysis of stuttering fluctuations makes the evidence suggestive. Overall, this study showed positive results from using the time-out from speaking.

Hewat, Onslow, Packman & O'Brian (2006) performed a single group pre-posttest clinical trial using the self-imposed time-out procedure. This design reduces variability between participants and is good for performance trends over time; however threats to the internal validity are common (<http://www.socialresearchmethods.net>). In Hewat et al.'s (2006) study 22 adolescents and adults who stutter participated in two stages over 6 months: Stage 1: instatement and generalization - procedure taught and used and Stage 2: maintenance - monthly meetings to analyze recordings. Primary outcomes were measured at 5 assessment occasions from 2 months pre-treatment to 6 months post and were stuttering frequency (% SS) and speech rate (syllables per minute (SPM)). Secondary outcomes are speech naturalness, type of stuttering and age. T-tests for inter-judge reliability for speech rate were significant and unreliable; intra-judge and inter-judge reliability for stuttering rate were not significant. Speech naturalness was rated by ten naive listeners comparing participants to control and a prolonged speech group. Participants were judged more unnatural than controls but more natural than prolonged speech comparisons. Pearson correlations showed a significant correlation between pre-treatment %SS and % change 1 week post treatment signifying greater benefit for severe stuttering. Three of 4 severe stuttering participants reduced stuttering by more than 60%. Visual inspection of age was not found to be a significant factor in outcomes. Visual inspection of data shows reductions of %SS for over half of participants and the mean reduction to be

53.6%; however great variability exists among the results. A participant inventory was returned by 77% of participants; those with prior prolonged speech treatment felt time-out was more effective and easier to use, all but one responder would recommend the program, most were using it “sometimes” 6 months later however many reported feeling “uncomfortable” using it in daily situations and found it “hard to use”.

Participants met criteria for age, confirmed stuttering, English-speaking and no recent treatment, however the group was quite heterogeneous in regards to age (14 – 52), sex (8 females, 22 males) and prior treatment (5 – 370 hours and various types). The outcome measures used (% SS and SPM) are common and relevant measures of fluency. The methodology accounts for a variety of variables including severity and age. Statistical analyses were conducted appropriately. Treatment took place in a variety of clinic and community settings. Speech naturalness was analyzed which is unique to this study and clinically important as some fluency treatments compromise naturalness in increasing fluency.

Details on self-administration of the time-out procedure should be included (i.e. duration of time-out) as well as consistency measures. Participant mortality was 26% during Stage 1 and an additional 4 participants in Stage 2, which is concerning as it may be due to dissatisfaction or lack of success. Only the independent observer was blinded, although it is difficult in such a study where stuttering is obviously the focus. Confounding the results is prior treatment participants have received with most receiving prior training and almost half was prolonged speech (James, 2007). Speaking rate measures were unreliable and since slow speaking rate can reduce disfluency we can not be sure increases in fluency are a direct result of intervention (James, 2007). Overall, this study is a level 2 providing suggestive evidence for time-out from speaking. It appears severe stuttering and having treatment in prolonged speech increases your benefit from time-out.

Four of six studies compared self-imposed time-out to clinician-administered time-out from speaking.

James (1983) studied the time-out procedure in a randomized control trial involving 33 adolescents and adults who stutter. A randomized control trial provides the highest level of evidence as it includes randomization and control over variables. Participants in James' (1983) study were randomly assigned a group: clinician-administered time-out of 10-second duration, clinician-administered time-out of durations chosen by client and client-initiated time-out of 10-second duration. Stuttering frequency (% SS) and speech rate

(SPM) were calculated pre and post experiment over approximately 2 months. An analysis of covariance of pre-experimental, baseline and experimental data showed significant increases in fluency and speech rate for all groups. No differences between groups were detected. Pearson product-moment correlations for inter-rater reliability of speech measures with independent observers were > 0.97 which is appropriate. No significant differences for treatment order were found using t-tests. Visual inspection showed one participant from clinician-administered and one from client-administered fixed time groups did not respond favourably to the procedure. Newman-Keuls post-hoc comparisons revealed the client-administered time-out group was less reliable in administering the time-out procedure than both experimenter-administered groups.

Participant selection and methodology were described in detail and allowed for replication of this study. Appropriate tests were used (i.e. t-tests for tests of difference, covariance and post-hoc measures) and variables accounted for (i.e. test order, speaking rate, reliability of measures). Speech measures used (% SS and SPM) are common and relevant measures of fluency. Full randomization of participants was conducted to account for any grouping trends.

Follow-up was not conducted to determine if increases in fluency were maintained which is of clinical significance if implementing this therapeutic procedure. Partial blinding of independent raters was used however full blinding would strengthen the study. As previously mentioned, blinding is difficult as participants are recruited based on fluency and the procedure is implemented at the point of disfluency. This study would benefit from a control group to ensure results are representative of decreases in fluency from intervention. Overall, this study is a level 1 and provides suggestive evidence that time-out is effective in reducing fluency within the experimental time frame.

Martin and Haroldson (1982) conducted a randomized clinical trial involving 30 adults who stutter randomly allocated to a group: clinician-administered time-out, self-administered time-out from speaking and a control group. Each participant had one 60-minute session containing an initial telephone, initial speaking, first and second time-out, final speaking and a final telephone period. Stuttering frequency (% of words stuttered), speaking rate (mean words per minute) and frequency of time-outs (compared to experimenter recordings) were measured. An independent observer also scored fluency and visual examination showed 87.5% correspondence with the examiner. An ANOVA and appropriate post-hoc analyses were used and found stuttering to decrease for the self-administered and clinician-administered

time-out groups during both time-out periods. A t-test indicated the amount of reduction between the two groups was not significantly different; although the self-administered time-out showed greater transfer to the telephone. Results indicated fast extinguishing of fluency in both groups however less extinction was shown in the self-administered group. Time-out frequency examined visually showed 79.3% and 76.6% agreement between the participant and experimenter.

This study has an adequate number of participants, randomization and a control group for comparison. Appropriate statistical analyses were completed (ANOVA, t-tests, post-hoc). Self-administration of time-out was analyzed to ensure the procedure was administered in a reliable way. The design of the study replicated the time-out procedure within the study to show fluctuations in fluency based on introducing and extinguishing the treatment.

Statistical analysis would have been more significant for determining the reliability of administering time-out. The measurement of fluency used (% words stuttered) is less typical; using words stuttered instead of syllables is less accurate as it is common to stutter on more than one syllable in a word. Partial blinding of the independent observer was conducted although full blinding would provide a higher level of evidence. One sixty minute session including all 6 measures is unrepresentative of clinical intervention. If intervention had been delivered over a longer span of time maintenance and transfer could be examined. Overall, this study is a level 1 of evidence and provides suggestive evidence for the short-term effects of time-out from speaking on fluency.

Boberg (1969) conducted a single subject case series involving 3 participants receiving both experimenter-administered and client-administered time-out and one participant receiving only client-administered. Sixteen sessions were completed, after each condition a period of extinction was used to compare the sustainability of fluency in experimenter versus client-administered time-out. A phone call was made after each phase to see if transfer occurred. Experimental order was controlled with reversing. Results using unknown analysis reported client-administered time-out was more resistant to extinction and generalized to the telephone in 2 participants.

Complete critical analysis could not be completed as only the abstract of the paper was available. The study appears to be well-designed although it is unclear whether statistical analysis was used to draw conclusions from the data and the period of time the experiment occurred over which could affect the impact of the results. A single subject case series is a level 1

evidence, however it is difficult to determine if the evidence is suggestive or otherwise based on the lack of methodological information.

Costello (1975) examined three case studies involving adolescent and adult males who stutter and were treated using a baseline-treatment-reversal method of the time-out procedure. Case studies are typically used for rare disorders and do not provide a high level of evidence because they do not control or manipulate data. In Costello's (1975) study the first two cases involved clinician-administered time-out and the third case used both clinician-administered and self-administered time-out. Fluency was measured in terms of % of words stuttered and disfluencies per minute, speaking rate was monitored throughout.

Results were analyzed using visual inspection and description statistics. The third case comparing clinician-administered time-out to client-administered suggested that clinician-administered time-out was more effective; however results were inconclusive because client-administered was only probed in two sessions. Although the results suggested clinician-administered was more effective, self-recording of stutters showed consistently less stuttering suggesting the client's awareness of each stutter seemed beneficial. There were large discrepancies between the clinician's and client's identification of disfluencies (30% agreement).

The three cases were described in detail including age, stuttering severity, history and prior therapy. The study is clinically relevant showing reduction in stuttering using clinician-administered time-out in real clinical scenarios. The measures of fluency used are less typical; % words for previously mentioned reasons and disfluencies per minute is altered by speaking rate and type of stuttering (i.e. one block may span for a minute). Overall this study provides equivocal evidence for self-imposed time-out, although evidence is demonstrated for clinician-administered time-out. The study would have been strengthened by statistical analysis and conducting more sessions and training in using self-imposed time-out.

Recommendations

Current research is promising but remains limited in the evidence provided. Based on the above analysis, the following recommendations are made to improve the evidence for future studies in this area.

Increase subject control and reduce confounding variables by selecting or grouping participants based on prior treatment received (amount and type) and severity of stuttering. Further investigate the consistency of self-

administering of time-out and its effect on fluency to determine if it is a significant factor. Conduct long term studies to evaluate the transfer and maintenance of fluency and long term effects of this treatment. Conduct current randomized clinical trials involving blinding where possible and a large number of participants to increase the strength of evidence for self-imposed time-out.

Discussion

In all the studies examined on the time-out from speaking procedure, all showed some increases in fluency when using self-imposed time-out. Research on the effects of self-imposed time-out from speaking is lacking in the quantity of studies conducted, especially in recent years, and also involving long term outcomes and maintenance of fluency over time. These are important factors when determining the strength of evidence available and the clinical implications of the evidence. It would be of clinical significance for researchers to embark on comparing the time-out procedure to other stuttering treatment procedures used currently in practice (i.e. speech modification or prolonged speech) in terms of reductions in stuttering.

With regards to the third objective of this paper, the evidence suggests that self-imposed time-out is as effective, if not more, at reducing stuttering in adolescents and adults who stutter compared to clinician-imposed. This is important because it creates a higher chance of transfer and maintenance of the skill over time because the client can quickly and easily administer their own treatment. This decreases the risk of relapse which is a prominent problem in fluency disorders.

Administration of the self-imposed time-out is a reoccurring issue in the research. The client must be able to correctly identify disfluency in order to administer the procedure in the same manner as a clinician would. However, research has shown that clients are not as effective at administering this procedure yet the decreases in stuttering are not significantly different from clinician's administration. If stuttering is reduced and what the client considers disfluency is eliminated than it seems clinical and client satisfaction is achieved.

Clinical Implications

The current research is promising and provides suggestive evidence that clinicians should consider implementing the time-out procedure in their clinical practice. It would be beneficial for clinicians to use individual outcome measures as the research is sparse

and to determine if this procedure is effective in reducing disfluencies consistently over time. This area needs more attention based on the positive outlook of the studies conducted. Results of most recent evidence from Hewat et al. (2006) suggest there is significant success but also a fair degree of variability. It may be of special interest to people who continue to stutter into adolescence and adulthood when traditional treatment has not been successful. Some have suggested that time-out be used along with other interventions.

Currently in the field there are dominant perspectives and intervention programs in stuttering treatment resulting in minimal searching and accepting of new treatment options. This is a procedure that will not cause harm by attempting, is easy to train and can be used independently by clients therefore introducing this therapeutic technique to clients looking for an alternative or adjunctive option could be very beneficial.

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