Variables contributing to Relapses in Individuals with stuttering

Project Report

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INTRODUCTION

Stuttering is a puzzling disorder of fluency which has evaded researchers for decades in their attempts to find a cause and cure. Various theories and hypothesis have been put forth to explain its nature, onset and development but none so far can provide satisfactory answers to all the vagaries of the disorder.

Stuttering spontaneously recovers in some but persists in others to various extents in spite of intensive treatment programs lasting several months or years. Although persons with stuttering show improvement in their speech fluency soon after therapy, they regress back or exhibit relapses to various extents, sometimes almost to their pre-therapy baseline levels.

Relapse is commonly described as the recurrence or return of symptoms that were once cured or resolved. In medical research, relapse is defined as "the return of a disease weeks or months after its apparent cessation" (Miller & Keane, 1978). This term has frequently been sighted in several of the disorders, including fluency and related disorders. With respect to stuttering however, relapse needs to be understood and discussed in a different light. Due to the complexity and variability of the condition, a permanent cure or complete disappearance of stuttering rarely occurs. If one abides by the medical definition then, all persons treated with stuttering will be diagnosed to have relapse. Medically defined, relapse is also suggested as a condition of a dead end with little prognosis. However, in stuttering research, the person with stuttering (PWS) can again speak fluently. Relapse in stuttering can be understood as a condition wherein a PWS who has experienced fluency for a period of time feels that he/she is stuttering again consistently after a period of time. Formally defined by Craig (1998), relapse is "the recurrence of stuttering symptoms that were perceived as personally unacceptable after a time of improvement". Many PWS report being fluent after periods of relapse and experiencing relapses many times in a year.

Relapse has been commonly reported by several researchers, clinicians and clients. The relapse rates are however not uniform across adults and children with stuttering. Relapse rates of >50% and 70% have been recorded for adults with stuttering (AWS) (Boberg, 1981; Craig & Hancock, 1995; Craig, 1998) whereas rates of <10% have been reported for children with

stuttering (CWS) (Starkweather, 1995; Craig, Hancock, Chang, McCready, Shepley, McCaul, Costello, Harding, Kehran, Masel, & Reilly, 1996). These figures give a clear picture of the condition of relapse in adults and children with stuttering. It also gives reason to probe into the existence of such a disparity. CWS are found to recover earlier from the condition of stuttering than adults with stuttering. The neural plasticity of the brain, limited awareness into the condition or the lack of social stigma and negative feelings associated with the condition at a younger age are possible explanations.

Dwelling deep into the condition of relapse, the one thing that haunts researchers and explorers in the field is the reason of its occurrence. Through years of research it has been unveiled that there is no sole factor contributing to relapse. There is interplay of several forces and factors that in the end take the shape of relapse. For any successful treatment outcome and for fluency to be maintained for a period of time, it is of due importance that the several forces and factors lying beneath are completely understood. Only when such factors are identified and resolved can the condition of relapse be prevented.

Numerous variables or factors have been implicated by researchers in their quest for an answer. Neuro-physiological factors, including genetic basis, physiological underpinning of the disorder are few of the factors reported (Boberg, 1986). Some individuals with stuttering may have cortical and sub cortical systems that do not easily facilitate fluency. A genetic predisposition can augment the condition further. The severity of the problem, the duration of its existence and the variability of stuttering are other factors. Higher the stuttering severity levels, greater is the difficulty in achieving fluent speech and maintaining the same. Problems of dysfluency persisting from an earlier age are also more resistant to change, as the prior habits tend to set into the speech of an individual. The negative emotions and avoidance behaviors learned over the years tend to become habitual. Stuttering itself is a highly variable condition and this variability is at most times unpredictable by both the client and the clinician.

The whole process of bringing a change and maintaining it is a highly persistent and disciplined one. Setbacks and falls on part of the clinician and the client can also contribute to relapse. The clinician's knowledge, manner and approach of providing therapy and helping the PWS can substantially help in maintaining fluency. An open attitude of the clinician and the capability and readiness to bring about a change in the client's fluency and help him/her to

maintain the same by teaching self monitoring and correction strategies can significantly reduce the occurrence of relapse. It is ultimately the client or the PWS receiving the treatment who has to take the responsibility to maintain the achieved fluency. A failure to practice the technique and carry out the self correction and monitoring strategies can significantly hamper the maintenance of fluency. If the PWS loses motivation and commitment to carry out the activities or monitor his fluency, he is more than likely to relapse. The attitude about stuttering, its correction and the confidence in one's own capability are also significant. Negative and withdrawn attitudes with limited confidence to speak fluently are barriers to long term recovery. The environment in which the PWS is in also influences recovery and relapse in stuttering. If he/she is placed under high demands to speak fluently or is under stress to speak faster, the psychological pressure can lead to tension and apprehension which will increase the dysfluencies and reduce the confidence to speak fluently in the long run.

The occurrence of relapse is determined using several variables. Many researchers use an objective criterion. This includes measuring the overt disfluencies in speech. Estimation of the severity levels of stuttering using standardized test materials, calculation of % SS are few of the renowned methods in this. Using a pre-set criterion, PWS exhibiting stuttering levels greater than the specified levels are considered to have relapsed. Following the definition by Craig and Calver (1991), it can be understood that frequency of stuttering is not the sole determinant of stuttering and other predictive elements are the cognitive and attitudinal aspects of the client. The acceptability to self, the loss of confidence in their ability to speak fluently and increase in anxiety levels are significant in making the diagnosis of relapse. Standardized and objective means of assessing this is using personality tests and inventories. A comparison of the evaluated scores achieved previously can give substantial findings. Other informal means of assessing relapse are via questionnaires specifically designed to investigate the nature and factors implicated to result in relapse. However, due to the vast variability in the presentation of stuttering itself such methods cannot reliably establish or confirm the presence of relapse. The report of the client/ PWS is unavoidable information in diagnosing relapse.

Thus, it can be understood that relapse in stuttering is not uncommon. Therapy is not a simple or linear process and a cure and PWS are being put through dramatic changes during this process, which will automatically be challenging, difficult and inconsistent at times. A relapse to

the earlier feelings of helplessness and resentment with an increase in stuttering can occur and it is the duty of the clinicians in the field to inform the clients that these challenges are normal and can occur in the process. Also, to help them learn from this as to where has the lapse occurred and devise methods to control it in the future.

Determining with reasonable accuracy the proportion of children who persist in stuttering and those who indeed recover of their own accord and isolating factors that govern or influence persistency and remission are key objectives in the overall research effort concerning the nature of stuttering. These objectives have immense clinical, financial and ethical consequences. This issue, however, has been subject of considerable debate by several investigators (Martin & Linda mood, 1986; Young, 1975), These researchers, citing concerns about past research, have concluded that the level of spontaneous remission is considerably lower than 50% or even 40%. On the other hand, Yairi (1997) has argued that such low estimates overlook essential epidemiological factors that influence persistency and remission, particularly age, sex and time elapsed from onset of stuttering. For example, because recovery can take place at a very early age and within a short period after onset, an appreciable number of stuttering incidence and recovery cases go unreported (Yairi, Ambrose, & Cox, 1996). Similarly samples that consist primarily of school age population, make it impossible to capture most of the phenomenon of unaided recovery. Therefore for precise estimate of the true level of persistent and recovered stuttering longitudinal studies must be begin from close to the onset of the disorders.

Need of the study:

The current thrust toward evidence-based practice demands that the clinicians provide an objective rationale for the treatment approaches adopted. Documenting treatment outcomes is an area requiring more attention in stuttering treatment (Yaruss, 2004). Treatment outcome measures depend on many factors such as: "success" of the treatment (i.e., whether or not the client is able to achieve treatment goals), the efficacy of treatment (i.e., the length of time required for the client to achieve the goals) and the durability of the treatment effects (i.e., whether the client is able to maintain changes over time). Unlike in other speech problems this poses greater challenge in PWS because of its high inter and intra-individual variability (in severity and symptomatology), the ways listeners react those disfluencies, impact it has on speaker's lives, broad range of treatment approaches available (prolonged speech, reduced

speaking rate, easy onset, light articulatory contacts) and different reactions they exhibit toward these approaches.

Although there are studies employing rigorous investigative procedures of relapse in stuttering, studies in the Indian population are limited. Moreover, majority of the studies conducted in the western population have been done on specific variables in children or adults with stuttering. Studies pertaining to relapse and its factors in children and adults with stuttering are scarce and more so in the Indian context with its multi-lingual and cultural issues which are known contributors for the development of fluency. Only when factors leading to relapse are identified, can the condition of relapse be prevented or reduced. Thus it has significant clinical implications. For the cost effectiveness of therapy and the quality of life of PWS. The present study was therefore planned with the following objectives.

Objectives of the study:

This study aimed to investigate the variables contributing to relapse in individuals with stuttering.

The objectives were:

- To identify the proportion of children and adult PWS who exhibit relapses
- To identify the nature of such relapses such as whether it is complete or partial, and the probable duration after which relapse occurs
- To identify the factors contributing to relapses in the management of PWS

REVIEW OF LITERATURE

Stuttering is a puzzling disorder of fluency which has evaded researchers for decades in their attempts to find a cause and cure. Various theories and hypothesis have been put forth to explain its nature, onset and development but none so far can provide satisfactory answers to all the vagaries of the disorder.

For the speech to be fluent, coordination between such movements is necessary. Both spatial and timing coordination of movements contribute to fluency. A set of body parts, muscles and neural mechanism that participate is called a coordinative structure.

A critical review of research by Young (1999) concerning age of onset, prevalence, and recovery from stuttering indicates some inconsistencies among the findings; the reported recovery rates may be too high, although all data sources had limitations.

Relatively little is known about the fluency characteristics of normal children and their response to fluency disrupting stimuli. Almost nothing is known about the changes in fluency throughout the life cycle, particularly for older speakers (Manning, Dailey & Wallace, 1984; Manning & Shirkey, 1981). Furthermore few data have been accumulated about the fluency characteristics as a function of variables such as gender, race, culture and socio- economic level. Language and speech production is a complex task; it takes many years of experience to do it well; especially under conditions of stress.

Stuttering spontaneously recovers in some but persists in others to various extents in spite of intensive treatment programs lasting several months or years. Although persons with stuttering show improvement in their speech fluency soon after therapy, they regress back or exhibit relapses to various extents, sometimes almost to their pre-therapy baseline levels.

Relapse now being recognized as a very common event following treatment is not a result of one single factor. A multitude of factors contribute to relapse. Some of the factors are:

(1) slow decay due to similar stimuli encountered outside clinical set up which are not taken care of during therapy; (2) failure to practice; (3) genetic factors; (4) chronicity and severity of the problem; (5) neuro-physiological loading in terms of demands (internal and self-imposed) exceeding the capacities of the individual; (6) inadequate assumptions of

responsibilities by the client; (7) attitude change (8) lack of motivation and interest (9) inadequate or insufficient guidance and treatment with regard to establishment, transfer and maintenance; (10) achievement of false fluency; (11) self efficacy doubts; (12) poor self monitoring and self correction strategies; (13) dissatisfaction with the new methods of speaking introduced in therapy; (14) boredom; (15) Jost's law – when two responses of approximately equal strength compete, the older one will replace the newer one, over time; (16) catastrophes in one's health, family life or personal relationship could breakdown speech fluency; (17) penalty for fluency – i.e., if stuttering is used to gain attention (manipulate others, or as an excuse for failures) or as an escape behavior attaining fluency may not be helpful to the individual; (18) un-preparedness for any fluency break subsequent to therapy success; (19) continuous effort required to maintain fluency and (20) speaker's and listener's adjustment to the new speech behavior.

Factors contributing to relapse in children with stuttering (CWS):

Maintenance of the gains made during formal intervention is far more common with children (Bloodstein & Bernstein Ratner, 2008). Starkweather (1995) estimates that the relapse rate following successful treatment for young children is approximately 2%. Craig, et al, (1996) reported that out of 10 children aged 9 to 14 years, seven will have maintained reduced stuttering 1 year post treatment. 3 children would experience long term relapse.

Yairi and Ambrose (1992) conducted a pilot study on twenty seven pre-school aged children and had a follow up for a minimum of two years shortly after they began stuttering. Children continued to be followed for varying periods up to twelve years. Eighteen of the twenty seven subjects received a few speech treatment sessions during the initial period of the study whereas nine children did not receive direct treatment. Results indicated that for the two subgroups there was marked decrease over time in the mean frequency of stuttering. Much of the reduction in stuttering took place during the early stages of the disorder, especially near the end of the first year post onset.

Gottwald and Starkweather (1995) studied 45 children who received individualized intervention services such as direct therapy and parent counseling. All the children were speaking normally at the end of discharge. Follow up telephone calls to each of the families two

years following program completion revealed that fluency had been maintained according to parent report. Hancock et al (1998) conducted a two to six year follow up of 62 children, aged 11-18 years, who had received one of the three stuttering treatments (intensive smooth speech, parent-home smooth speech and intensive electromyographic feedback). They were assessed overtly during a clinic conversation with the clinician, while talking on the telephone to family or friend and talking at home. The authors found that most of the children had maintained the gains they had received one year post treatment. From the parent's perspectives, 13% believed that their child had relapsed to pre-therapy levels and 53% feel that their child's speech had deteriorated but not to pre treatment levels.

With regard to the pre-treatment variables contributing to relapse, Craig, et al (1996) conducted a controlled trial to investigate the effectiveness of treatment in children. A high level of pre-treatment % SS was significantly related to relapse risks after a one year follow up. Hancock, and Craig (1998) conducted a study to determine the factors that predicted stuttering frequency 1 year after treatment in 77 children and adolescents aged 9-14 years. The significant factors found to predict relapse were pre-treatment % SS and immediate post-treatment trait anxiety.

Manning (2010) suggests one method of reducing relapse in children is using a 'buddy system'. This is especially true with pre-adolescent or adolescent clients who tend to spend more time with their peers than family. The presence of someone who understands the dynamics of the situation can be highly useful.

Factors contributing to relapse in adults with stuttering (AWS): In adults with stuttering, the specific factors implicated by various researchers as contributing to relapse are listed below.

1) **Genetic factors:**

Genetic factors have been suggested as a variable contributing to relapse by few researchers. According to Cooper (1972) few individuals with stuttering are genetically predisposed to relapse. Clients with genetic loading who have a family history of stuttering may possess an underlying physiological or neuro-physiological condition (Boberg, 1986). However, Felsenfeld (1998) reported that although it is true that stuttering is familial and it may be true that

there is a familial tendency for recovery, sufficient empirical justification to use a family history profile to predict outcome for any given client is not possible."

2) **Pre-treatment variables**:

Pre treatment variables indicating the chronicity and severity of the problem have been strongly suggested in the literature to contribute for relapse. Pre-treatment severity has been listed as a major variable by various researchers in the field (Guitar, 1976; Craig, 1998). Hunick, Langevin, Kully, Graamans, Peters and Hulstijn (2006) reported that PWS who are based more severe prior to treatment show higher levels of regression one and two years later. The severity of stuttering was assessed based on many behavioral and cognitive factors. Higher rates of stuttering were associated with larger margin of behavioral progress, and also higher rates of relapse. Guitar (1976) rightly suggested the importance of considering several pre-treatment variables and not just one single factor in predicting relapse. He investigated the relationship between multiple pre-treatment factors and outcome using regression analysis in 20 PWS. The ability to predict relapse was much higher if a combination of pre-treatment factors (such as speech attitudes, personality factors and % SS) were used. Craig (1998) reported that those with more stuttering and slower speech rates were more likely to stutter at follow up. Landouceur, Caron and Caron (1989) conducted single case multiple baseline design research on 9 PWS (6 had less than 15% SS and 3 greater than 15%SS) and found high levels of pre-treatment % SS was a risk factor for relapse.

3) **Therapeutic factors:**

The type of training given, the manner and the duration for which it is provided are very substantial in determining the maintenance of the achieved fluency. Wampold (2001) in his study indicated that for successful outcome of treatment, clinician allegiance, competence and the client clinician alliance are two common factors. Manning (2006) also reported the most crucial factors in the success of treatment as the readiness of the speaker for change, the competency and experience of the clinician and the timing of when and how these two people intersect.

Kamhi (1982) has discussed about major two shortcomings in maintenance phase of therapy. The first one is that the PWS while undergoing therapy is made to believe that the underlying etiological factor of stuttering has been eradicated and he/she will no longer have any

disfluencies in speech production. However, it is widely known now that the factors have not been eradicated, it is just that the PWS has learned to reduce disfluencies in speech using several methods (e.g. by decreasing speech rate). The second shortcoming discussed is that maintenance stages in therapy do not take the very fact into consideration that probability for breakdown in the speech production processes varies among and within PWS. That is the propensities for speech disruptions are different not only in different PWS but also that the propensity for speech disruptions varies within a PWS too.

a) **Therapeutic approach used**: Different therapeutic approaches like fluency shaping approach and stuttering modification therapy and their maintenance has been experimented. Fluency shaping approaches are thought more as a form of physical therapy for the speech production system. Here fluency is enhanced by altering the manner in which the speaker uses his/her respiratory, phonatory and articulatory system. Stuttering modification therapy tackles the cognitive aspect also. In addition to altering the manner of usage of the systems, the cognitive and attitudinal response is altered as well. Researchers have found few treatment procedures to be more efficacious than others in maintaining fluency and reducing relapse rates.

It has been found that stuttering modification approaches, in spite of its difficulty and the longer time it takes to bring about fluency has generally been preferred by several clinicians. Yaruss, Quesal, Reeves, Molt, Kluetz, Caruso, McClure and Lewis (2002) conducted a survey study using questionnaire on 71 PWS who had attended therapy previously. The questionnaire consisted information about the speech treatment experiences and support group experiences and the satisfaction with them. They found a statistically higher probability of self reported relapse for members of a stuttering self help group who had received fluency shaping therapy than those who had tried stuttering modification or avoidance reduction therapy. Bloodstein (1995) suggested that relapse rates are more for treatment based majorly on behavioral approaches such as speaking fluently in a slow manner by prolonging syllables, as it would be unreasonable to expect the lifelong problem to be permanently eradicated in the short period.

Silverman (1981) reported that if the only changes emphasized during treatment are the client's speech rate and the related improvement in fluency, there may be

reasonably high occurrence of relapse. Craig (1986) reported the prevalence of relapse 1 year following treatment with smooth speech (Fluency shaping approach) to be 30%. However, Boberg and Kully (1994) conducted a 12 to 24 month follow up study on 17 adults and 25 adolescents who had undergone fluency shaping therapy. They found 69% of the subjects to have maintained a "satisfactory" level of post treatment fluency. Craig and Hancock (1995) found that about 70 percent of 152 participants who had received fluency shaping type therapy could be considered to have relapsed both by self report and objective measures. Only about 28 percent did not experience relapse. Therefore, fluency shaping approaches may not be very helpful in maintaining fluency in the long run.

Kully and Boberg (1991) followed up 8 CWS, who underwent a combined treatment programme of stuttering modification (pull outs and easy versus hard stuttering) and fluency shaping (slow speech) after a period of 8-18 months. The gains achieved during therapy were found to be maintained at follow up. Hancock, Craig, McCready, McCaul, Costello, Campbell and Gilmore (1998) followed up 46 children and adolescents for a period of 2-6 years using smooth speech and feedback with EMG. Only 13% were found to have relapsed to pre therapy levels, 53 % experienced partial relapse and no relapse was observed in 29% of the subjects. Treatment techniques were found to be effective.

Cognitive behavioural therapy is now a new arena of research and practice. Evesham and Fransella (1985) showed that relapse might be lowered by altering personal constructs using construct therapy. 47 adults who stuttered were randomly allotted into two groups; one group receiving fluency enhancing strategies (prolonged speech) and the other group was offered personal construct therapy. A criterion of less than 2% SS was used. By the end of treatment, both groups had significantly reduced stuttering. On revaluation after a period of 24 months, the personal construct group had lower rates of relapse. Craig et al (1987) presented a behavior therapy approach to treatment for stuttering based on outcomes data on 191 adult PWS treated over a period of six years. This cognitive-behavioral approach targeted on bringing in appropriate thought patterns and attitude in the process of successful therapeutic change. Following training, the clients were treated on an outpatient basis to encourage generalization of the skills

learned in the clinic to home and school environment. They were also taught concepts of self control and were given schedules of therapy practice to enhance long term survival. It was noticed that the programme had been effective with PWS and that relapse rate had come down substantially. Blood (1995) conducted single case experimental research for adults who stuttered. They offered computer assisted feedback for fluency training and then cognitive behavioral therapy aimed at reducing risks of relapse. The results at 12 months were positive, with all four subjects reducing their stuttering to below 3% SS. Daly, Simon and Burnett-Stolnack (1995) described cognitive and self instructional strategies to aid the maintenance of gains from treatments for adolescents who stutter.

Differences in improvement and maintenance of fluency across different severity levels of stuttering were noted by few researchers. Laudouceur et al (1989) in his study of nine 19-37 year old PWS having severity levels of mild, moderate and severe stuttering, used a multidimensional treatment mode encompassing awareness training, regulated breathing and cognitive restructuring. Behavior (percentage of syllables stuttered and rate of speech) and cognitive (self-efficacy perception, locus of control and Erickson scale of communication attitude) measures were taken using three multiple base line designs across subjects. Results showed that all mild and moderate PWS clinically improved at the end of the treatment and at the six months follow up, persons with severe stuttering did not achieve clinical improvement.

Rustin (1978) conducted a study using behavior modification technique in a group treatment for teenage clients (approaching 14 years of age) with stuttering. Initially, timed syllabic speech was used. There was a reduction in stuttering following treatment. However, a high failure rate was observed at the three month follow up. The technique was therefore changed to slowed speech. Relaxation, role drama, time out, video recording, and parental involvement were also done. All participants were self motivated and were assessed before, during and after the course on a personal questionnaire. The following components were suggested to be important among PWS to determine the success of the course:

(a) Changing the view of their defect so that they assume the major responsibility for progress.

(b) Organizing treatment so that the child can generalize newly acquired skills to other people in outside situations and

(c) Giving the child expertise in the appropriate use of fluency.

Blood (1995) described a relapse management program known as Power2 to treat adolescents who stutter. The author used the program by Shames and Florence's program (1980) and produced reductions in stuttering below 3% SS in 3 adolescent males who stuttered. During the maintenance phase, they were introduced to power2, a relapse management program that was approx 50 hours in duration. This management program targets on improving self management of speech behavior through cognitive behavioral strategies. After the program, a notable reduction in stuttering frequency was observed.

b) **Duration of therapy provided:** Therapy provided on a daily basis or intensive speech therapy is always preferred by several clients and clinicians. The regular nature of the therapy provides more chances of better improvement and maintenance of skills achieved. Silverman (1981) suggests relapse to be related to the client been discharged earlier than actually needed. It is reported that durations of approximately 1-3 months or 20 hours are needed for children and durations of one to several months/years or 140 hours for adults (Van Riper, 1973).

4) Clinician related factors:

For any therapeutic change to occur or for it to be maintained, a significant portion lies in the hands of the clinician providing the services to the client. The clinician's expertise, knowledge of multiple therapy approaches, ability to problem solve, ability to engage the client and establish therapeutic alliance are principal factors in determining this. Silverman (1981) reported one of the reasons of relapse as setting of very liberal thresholds for fluency breaks by the clinician. Viewing relapse as a setback of the clinician, Crichton-Smith (2002) pointed out that many therapeutic techniques and clinicians overly emphasize the production of fluency, thereby inadvertently promoting the concealment of stuttering possibly setting the stage for relapse.

5) Client related factors:

The most important aspect in any treatment is the PWS receiving the treatment. While in therapy sessions, the client gets constant guidelines and assistance from the clinician to remediate the condition. However, on discharge it is entirely the client's responsibility and commitment that matters in maintaining the acquired fluency. The following factors within a client have been suggested to contribute to relapse:

a) **Client's lack of motivation and unwillingness to change:** A number of authors have argued that the client's motivation and willingness to change have a critical impact on stuttering treatment outcome. In particular, the client's readiness for change as it relates to the therapy enrolment is an important factor in success; that is beginning therapy when one is most ready for change leads to a more positive outcome and maintenance of therapy goals (Blood, 1993; Manning, 2001; 2006).

b) **Failure to practice and carry out self monitoring and correction strategies:** Constant practice is required to maintain the improvement. Although natural ability plays a part in the development of expertise, empirical evidence indicates that training and preparation are necessary prerequisites for superior performance (Ericsson & Smith, 1991). The failure to practice is one of the main reasons that PWS experience relapse. As Andrews (1984) rightly noted "stuttering is a chronic disorder and many adults can only remain fluent by dint of constant effort". After noticing an improvement, clients tend to get over confident and don't feel the need to constantly practice the technique. The amount of effort and the tedious nature of management of stuttering lead many PWS to abort the task (Silverman, 1981).

Ingham (1982) used single case multiple baseline experimental research to study the effectiveness of self evaluation on the fluency maintenance of 2 young adults who stuttered. He showed that reductions in stuttering frequency occurred when self evaluation techniques (such as scoring and evaluating performance) were added to an intensive speech intervention. Gains were maintained up to 6 months follow up. Craig and Andrews (1985) suggested that employing self control skills were more than likely beneficial for reducing risks of relapse in the long term. The authors in a very interesting study offered retreatment

to six participants who had previously relapsed. This consisted of intensive smooth speech training over 5 days. Also, anti relapse strategies were taught in these five days which included self evaluation and self monitoring of stuttering, recording stuttering by counting disfluencies on a wrist counter and monitoring fluency levels every half hour in a daily diary. They were also trained to employ self reward for fluency and for achieving practice goals. They had to reach an accuracy criterion for self evaluation.

Perkins (1979) reported that of the different strategies to maintain fluency established in therapy (skill maintenance groups, counseling groups, self help groups, individual sessions, marathon sessions, refresher courses, family involvement, tape analysis, self help contracts, prosthetic devices and hypnotism), shaping and transfer procedures are universally effective. Craig (1988) suggests that for success to be observed, there should be practice of treatment activities and objectives that are achievable, using positive self reinforcements, practicing self monitoring skills, scheduling follow-up treatment and emphasizing self responsibility

Egan (2007) described the idea of 'entropy', the tendency of things to break down or fall apart. That is, the tendency to give up on a course of action that has been initiated. This can also be one of the several factors leading to relapse.

c) **Emotional crisis or disruptive life events:** Traumatic events or situations or changes in the daily life pattern have an effect on stuttering. Daly, Simon and Burnett-Stolnack (1995) indicate emotional crisis and disruptive life events to impact fluency. This is truer in case of adolescents as they seem to experience and react to negative events. Marital instability was positively related to relapse 12 months following treatment for drug addiction (Hartmann, Sullivan & Wold, 1991).

d) **Speakers and listener's adjustment to the new speech behaviour:** During stuttering intervention, the habitual manner of the client's speech is altered. A new and better pattern of speaking is created. However, researchers report that this change may bring discomfort to few PWS and contribute to relapse in them. (Boberg, 1981; Perkins, 1979). Boberg (1981) indicated the non habitual speaking mannerism to be a punishing experience for PWS. Perkins (1979) suggested that for some individuals who stutter, the problem of maintaining

fluency is largely one of identity. “When fluent, they feel like unwelcome strangers to themselves... they wish to feel like themselves and stuttering is part of that self image”. DiLollo, Neimeyer, and Manning (2002) conducted a research study examining the Personal Construct Theory in relation to individuals who recover and then relapse from stuttering. The findings of the study suggested that persons who recover from stuttering are likely to relapse because they fail to adjust to their “new” status as a fluent speaker.

e) **Embarrassment to use the technique:** Few PWS may find the technique taught to be obvious and very noticeable to others and hence refrain from using it outside clinical settings. This can lead to a relapse in stuttering in them. Craig and Calver (1991) in their study found that 40% of the PWS who experienced a relapse imputed it to embarrassment about the speech pattern that they had been taught such as prolongation.

f) **Loss of confidence in the technique:** A belief in the technique and the clinician are essential elements in rectification of a condition. When a person loses this, the tendency for the improvement to be maintained is also highly limited. Silverman (1981) reports one of the reasons for relapse as losing confidence in the treatment technique due to prior relapse experienced. The PWS would tend to think that this technique would also not help them in the long run, as the previous technique.

g) **Excuse/escape from responsibilities:** Some PWS use stuttering as an alibi for attaining personal gains. This could be at work place, home etc. Silverman (1981) reported this as a factor for relapse.

h) **Attitude towards stuttering:** DiLollo, Neimeyer & Manning (2002) said that the pervasive nature of relapse is an indicator that good therapy is about considerably more than changing the surface features of the problem. The client’s attitude and beliefs towards the condition too need to be targeted bringing in a more positive attitude and less anxiety in the client.

Guitar and Bass (1978) reported that for adults who stutter, post-treatment attitudes have been shown to be valuable predictors of fluency maintenance up to 1 year post therapy. Helps and Dalton (1979) suggest that stutterers with less favourable speech attitudes are less

likely to obtain long term benefit from a behaviour therapy employing rate control techniques. Investigators have demonstrated that clients who developed thinking that was self directed, realistic, or positive had better outcomes and longer term resistance to relapse than those who failed to make these cognitive changes (Craig & Andrews, 1985; Madison, Budd & Itskowitz, 1986). Several studies have repeatedly demarcated variables such as avoidance, external locus of control, production of learned compensatory behavior, negative attitudes about speech and high levels of trait anxiety to be associated with poorer long term gains from therapy as well as relapse (Blood, 1993; Craig, 1998; Guitar, 1976, 1998). Research has recently shown that increased anxiety levels have a strong influence on persistent stuttering (Mahr & Torosian, 1999). Plexico, Manning and DiLollo (2005) conducted a retrospective analysis of seven adults who stuttered and found that self acceptance and fear reduction are among the consistent themes they identified.

Few studies have also implicated a change in attitude towards speech, resulting from treatment, to correlate, weakly though, with relapse (Andrews & Craig, 1988; Guitar, 1976). Use of several psychological tests assessing attitude towards stuttering have been employed by researchers investigating the relapse and its relation to the attitude of the client. Guitar (1976) reported that those who were avoiding situations and those who reported high negative reactions to stuttering on the Iowa scale were most likely to relapse. The author also did not show significant relationships between either neuroticism and extroversion and long term outcome (both measured by the Eysenck Personality Inventory). Perkins (1973) conducted research on outcome (6 months after therapy) and its relationship to personality using measures such as the 16PF test (IPAT, 1972) and the Rorschach (Rorschach, 1921). No clinically significant relations were obtained. Guitar (1976) found a weak but statistically significant relationship between stuttering and abnormal pre-treatment speech attitudes measured by the shortened version of the Erickson scale (S24, Andrews and Cutler, 1974) and long term negative outcome. Craig, Franklin and Andrews (1984) as well as Craig and Andrews (1985) stress the importance of changing a speaker's Locus of control of behavior (LCB) scores toward more internal control during treatment to bring about long term treatment improvement. Andrews and Craig (1988) supported the relationship between normalizing the attitudes on the S-24 and long term treatment outcome. They also reported

two measures of attitude, combined with a measure of stuttering behavior, useful in predicting relapse after fluency shaping therapy.

Retrospective research was carried out by Craig and Hancock (1995). In this study, a survey was conducted on 152 persons attempting to maintain fluency skills following successful treatment of stuttering. Of the 152, 109 believed they had relapsed in the long term. Most of the 109 (92%) believed relapse was associated with moderate to severe levels of stress and the majority (60%) believed negative emotions were associated with relapse. It was interesting however, that 35% were experiencing normal to happy emotions before the relapse moment. Not surprisingly over half (54%) believed relapse was associated with feelings of helplessness.

Investigations into recovery from or successful management of stuttering, (Anderson & Felsenfeld, 2003; Crichton-Smith, 2002) indicate that participants attribute their success to a variety of factors including behavioral modifications of the way they are speaking (self assessment, fluency and stuttering modification techniques), motivation, environmental change and changes in attitude towards both the self and the problem). Andrews and Craig (1988) conducted a search for variables likely to predict individuals who are at a risk of relapse in two groups of successfully treated stutterers. The most powerful predictors were the attainment of three goals by the last day of treatment namely skill mastery as evidenced by no stuttering, normal attitudes to communication, and an internalization of the locus of control of the subjects who achieved these three goals. 97% maintained their improved speech in the long term. No subject who failed to achieve any of the three goals remained fluent, while those who achieved one or two goals had intermediate outcomes No single goal was necessary and none alone was sufficient to maintain improvement.

i) **Natural Variability of the system:** Kamhi (1982) points out that some people who stutter must expend considerably more effort than others to achieve and maintain fluency, due to the natural variability of their speech production systems. For some speakers such variability (including relapses) is more common and perhaps more severe.

j) **Environmental factors:** The environment in which the client lives also shapes the client's attitude and feelings towards maintaining the condition. As explained by De Nil (1999), environmental variables that impact communication indirectly influence central neurophysiological processing. The central processing would be different for each individual with stuttering due to the continuous filtering of environmental information. This explains why the reaction to stress or to a treatment program will vary considerably across individuals with stuttering. Boberg (1981) explained that in addition to the client finding the new manner of speaking to be non-habitual and punishing, the demands (both internal and external) too make maintaining the improvement difficult. After cessation of treatment, the PWS is somehow expected to display enormous fluency. This may not be very evident, being subtle most of the time. In this manner, the speaker is significantly under both external and internal stress/pressure of having to speak fluently. Demands from the environment to speak faster have been reported by several PWS. In a long term follow up of clients who had undergone smooth speech therapy, Craig and Calver (1991) found that the majority of those who had suffered a relapse related it to feeling under pressure to talk faster.

Boberg (1986) believed that in addition to the physiological basis of the disorder, other factors contributing to relapse are the influence of the post treatment environment and the lack of effective rewards operating in the lives of treated persons.

All these factors have to be taken care of in achieving better outcome and maintenance of fluency in PWS. Achieving good, natural sounding speech and motivating the individual and his parents the need for good practice, maintaining diary or daily log of goal-related activities and bringing out the necessary attitude change in the PWS and significant others in his environment is very crucial.

An Indian was also conducted to measure the outcome of treatment. Geetha, Jayaram and Sangeetha (2010) developed a treatment efficacy scale covering 12 different aspects of outcome. The scale was then administered on 57 PWS. Majority of the PWS showed improvement in their fluency (severity of their stuttering) although to various extents and improved ratings on all of the 12 parameters on the treatment efficacy scale. Improvement

was noticed in the clients' anxiety, avoidance, attitudes, confidence, speech naturalness and listeners' reactions during post therapy.

Measures of relapse in PWS:

Just as one factor cannot predict or result in relapse, there is no one measure also that can determine relapse. To diagnose relapse in a PWS, several parameters need to be taken into consideration. Guitar (1998) suggested that an ideal assessment of treatment outcomes should include aspects related to three primary components of stuttering—core behaviors (such as stuttering frequency and duration of stuttering moments), secondary behaviors (escape and avoidance behaviors), and affective aspects of stuttering (self-perceptions, attitudes, feelings, and anxiety levels). Finn and Gow (1989) believed that single assessment of stuttering upon which the relapse status was based as inappropriate. The variability of stuttering across contexts supports the need for multiple assessments, especially for relapse studies. In an ideal research design it would seem desirable to assess across two or three different locations and multiple assessment is certainly needed for single case or small group research.

Many investigators who have studied relapse in stuttering have used the presence of overt stuttering as the one and often the only measure of relapse. Some investigators have considered the percentage of syllables stuttered (% SS) and have used a relapse criterion of 2% SS (Craig, Franklin & Andrews, 1984; Craig & Hancock, 1984) or 4% SS (Boberg, 1981).

Boberg (1981) conducted a one year follow up research on 16 people treated for stuttering using speech modification techniques. Obtaining a score of less than 2% SS implicated satisfactory performance. Marginal performance was between 2 and 4% SS and unsatisfactory performance (relapse) was about 4% SS. Craig, Franklin & Andrews (1984) considered' all persons whose frequency of stuttering was over 2% SS to have relapsed. The % SS measures were taken from the authors' 10 month long term follow up by telephone conversations of persons treated with smooth speech. Based upon the clinical experience and knowledge of the authors, a 2% cut off was incorporated. In most instances, stuttering severity below this level is usually low and stuttering occurrences above this percentage are more likely to be disturbing and undesirable. However, taking this percentage of cut off also has its limitations. One encounters PWS who desire treatment, though their % SS is less than 2%. The vice versa is also observed,

wherein PWS having % SS greater than 2%, do not feel that they have stuttering and do not want to attend therapy for the same. Moreover, the 2% SS criteria does not inculcate the variability of stuttering across social contexts. Nor does it appropriately assess all aspects of severity such as speech rate or avoidance. Evesham and Fransella (1985) used 2% SS and less than 130 SPM as relapse criteria. Blood (1995) and Ladouceur, Caron and Caron (1989) used 3% SS to define treatment success.

Yaruss et al (2002) in their study also calculated relapse using questionnaire of nearly 50 items with multiple responses possible for each item. Analysis involved calculation of the percent of respondents who marked each item on the multiple response items, with results being presented descriptively in the text to facilitate interpretation of findings. Langevin et al (2006) suggested considering follow up fluency levels in terms of both pre-treatment and immediate post-treatment fluency levels (by adding 3% to follow up percentages to account for expected regression). This was to be used if the focus of change was to be measured in terms of the frequency of stuttering. Therefore, the definition by Craig and Calver (1991) is probably the most useful.

As previously reported, the frequency of stuttering is not the only one measure of relapse. Onslow and Ingham (1987) suggested speech naturalness as a measure. Fluent speech which is unnatural sounding will result in a poor treatment outcome in the long term and thus place the person at a higher risk of relapse. However, Craig, 1998 reported that to date there is no empirical evidence of an association between unnatural speech and relapse.

Changes in the attitude and cognitive aspects of the problem often in the form of negative self talk may take the lead in the progression of relapse. The clinician can determine relapse based on observable affective, behavioral and cognitive aspects of the problem. However, the presence and degree of relapse are best determined by the speaker. When speakers feel that they are no longer confident of managing their speech on their own or their decisions are increasingly based on the possibility of stuttering, relapse has reached a clinical level. Siegel (1999) stated that affective and cognitive factors have been acknowledged for several decades as factors that precipitate and maintain stuttering, particularly as they interact with behavioral factors.

Therefore, it can be understood from the literature review that in case of CWS, the relapse rates are lesser in comparison to AWS. Pre-treatment severity levels are a contributing factor to relapse, with higher severity levels of stuttering resulting in higher relapse rates. With respect to AWS, relapse rates of >50% have been reported. The reason for such high relapse rates manifold, with genetic factors, pre-treatment severity, therapeutic, client related factors etc.

METHOD

In order to study the relapse pattern in children and adults with stuttering the following method was adopted.

Participants: 30 children (8 females, 22 males) and 32 adults (31 males and 1 female) with stuttering participated in the study. Mean age of children in the study was 7.3 years and mean age of adults was 23.3 years. The participants were native speakers of Kannada, Malayalam and Hindi. The participants were selected from those who registered with a complaint of stuttering and had been diagnosed by SLPs as having stuttering and those who attended therapy for the same

Materials:

- A questionnaire developed to collect information from PWS for the purpose of the study
- Stuttering Severity Instrument (SSI- III, Riley, 1994)
- Pictures from the Fluency test (Sowmya, 1994)
- Sony CMOS Handy cam for video recording of speech samples

Procedure: The study was broadly carried out in 2 stages, with a pilot study being conducted initially, which was followed by the actual study, with suitable modifications to the pilot study. The phases of the study are listed below:

Phase 1- Contact details obtained: Contact details of persons with stuttering who had attended therapy at the All India Institute of Speech and Hearing, Mysore over a period of 4 years was obtained through the case file and registration information. The selection criteria for participants were that they should have taken therapy at least 6 months prior to the present study. They were contacted via telephone and follow up letters.

Phase 2- Development of questionnaire: A questionnaire was developed for the study to get information from the clients regarding the onset, nature, etiology, treatment taken, current status of the problem. The questionnaire consisted of three sections, with the first section targeting the recovery and relapse in stuttering, having questions on the rates of improvement and the maintenance of the same. The second section was on the problem related factors considering the age of onset, variability, etiology, family history, associated problems etc. The third section

investigated the therapy related factors such as age of therapy attended, total duration, lasting of treatment effectiveness etc. Six factor domains namely therapy related (TR), clinician related (CR), subject related (SR), environment related (ER), behavior and personality related (BR), and attitude related (AR) factors were chosen. Therapy related factors were insufficiencies in therapy given. Clinician related factors included shortcomings and inadequacy on part of the clinician. Subject related factors had a list of all the major factors that the subject failed to do. Environment related factors looked upon the effect of the environment upon the relapse of stuttering in PWS. The domain of behavior and personality comprised the general behavior and beliefs of the client towards his/her problem. Attitude related factors considered the attitude of the participant towards the problem and its rectification. Domain 1 and 2, which is therapy and clinician related factors had a total of 5 questions each. Domain 3, of subject related factors had a total of 11 questions. Domain 4, of environment related factors comprised 8 questions and domain 5, behavior and personality related factors had 7 questions. The last domain of attitude related factors had three questions under it. Each question had two responses, Yes and No. An additional column for the general remarks and opinions by the participant/caregiver was also provided. This would help to understand their problems better and improvise on the services provided.

Phase 3- Data collection: 25 CWS and 28 AWS were contacted via telephone for the pilot study. Of this, 5 adults (males = 5) and 4 children (male= 3, female = 1) reported for the follow up. All the participants/caregivers were willing to participate in the study and written consent was obtained. The questionnaire which was developed for the study was then administered on the 9 PWS. A video recording (using Sony CMOS handy cam) of the participant's spontaneous speech and reading were obtained. Based on the pilot study suitable modifications were made to the checklist and the questionnaire. The modified questionnaire also had three sections. However, the first section was now concerning the onset related information such as age of onset, nature, chronicity, awareness etc. The second section dealt with therapy related information, with questions pertaining to the age of commencement of therapy, duration, number, type of treatment experiences etc. The third section was related to the treatment outcome. The clients' report of the improvement subsequent to therapy and nature of relapse was included in this section. Out of the six factor domains in the pilot study, the domain of attitude related factors was combined with the behavior and personality related factors, resulting in a total of 5 factor domains in the actual study. Domain 1 which is subject related factors had a total

of 10 questions. Domain 2 and 3 which is therapy related and clinician related factors respectively, had 5 questions each. The fourth domain of environment related factors had 7 questions and the fifth domain, behavior and personality related factors comprised of 8 questions (please see appendix). Each question had two responses, Yes and No. Answering yes resulted in a score of 1 and No was given a score of 0. The questions were framed in such a way that score of 1 for a question implicated it was not a factor contributing to relapse. A score of 0, which indicates no, meant that those factors were contributing to relapse.

A total of 147 CWS and 152 AWS were contacted for the study. Telephone calls were made to 126 CWS and follow up letters sent to 21 CWS. Out of this, 26 CWS reported for re-evaluation. 121 AWS were contacted via telephone and 31 AWS via letters. 27 AWS reported for a follow up. 2 AWS who did not meet the criteria were excluded from the study. All the participants/caregivers who reported for follow up were willing to participate in the study and written consent was obtained from each of them. The questionnaire which was modified was then administered on the 51 PWS. A video recording (using Sony CMOS handy cam) of the participant's spontaneous speech and reading were obtained. The participants of the pilot study were also included in the actual study, resulting in a total of 30 children and 30 adults with stuttering.

Data analysis: The collected speech data was analyzed using SSI-3 (Riley, 1994). The present SSI scores were obtained for each participant. An indication of relapse was made by reports of the participants/caregivers, and also by making a comparison of the pre-therapy and the current SSI values. Based on this, the participants were classified into different relapse categories such as 'no relapse', 'partial relapse' and 'complete relapse'. To further investigate the variables contributing to relapse, the variables in the first and second sections of the questionnaire were compared across the relapse categories. Those variables which differed among the relapsed and the no relapsed categories were considered to contribute to relapse. Within the third section, the total score of the factors under the five domains were obtained. For analysis, each participant's response to all the questions was individually tabulated. The factors which obtained a lesser score were noted. Then, the total number of 'yes' responses obtained under each domain was calculated and a sum total was obtained. Statistical tests, Kruskal Wallis test and Mann Whitney was conducted to check for the significance of results.

RESULTS AND DISCUSSION

The present study aimed to investigate the nature of relapse in PWS and to identify the factors contributing to relapse. The results are discussed separately for children and adults with stuttering.

I. Children with stuttering:

1) **Nature of disfluency in CWS:** Table 1 provides the nature of disfluencies in CWS in the study. This includes the age of onset, nature of onset, etiology, awareness, concern about the problem, and the variability in stuttering across different situations, languages and persons.

   a) **Age of onset of stuttering**: It can be seen from the table that 13 CWS (43.3%) reported onset of stuttering below 3 years of age and 13 children (43.3%) between 3.1-5 years. Only 4 CWS (13.3%) had onsets of stuttering greater than 5 years of age. The result is in support of the findings by Darley, 1955; Johnson and associates; 1959 who reported that the onset of stuttering in majority of the children ranged between the ages of two and five years.

   b) **Nature of onset:** The nature of onset was classified into two groups-sudden and gradual. Onset of stuttering within a period of 1 week was classified as sudden onsets and onsets greater than this as gradual onsets. This classification was taken as per the study by Yairi and Ambrose (1992). It was found that majority of children had gradual onset of stuttering, which was reported in 23 (76.7%) of the CWS, while 7 CWS (23.3%) had sudden onset of stuttering. This is in agreement with Van Riper (1982) that the onset of stuttering is usually gradual in nature.

   c) **Etiology:** The etiology of stuttering was classified into 4 groups- hereditary, psychological, unknown and others. Those CWS who had relatives who stuttered were classified under the category of hereditary. Psychological etiologies included onset of stuttering after incidents of fear, tension etc. Van Riper (1982) reported that on the onset of stuttering following a traumatic emotional event. Those CWS in

whom no significant etiology was reported came under the classification of unknown and the category of 'others' included etiologies which did not fall into the three categories of etiology. For example, onsets of stuttering after fever, seizures, fall, eating chocolates etc were included in the category of others. Results showed that 9 CWS each (60%) reported hereditary and psychological factors. 9 CWS (30%) did not report of any other significant factor for stuttering. Yairi and Ambrose (1999) reported that 67% of CWS had relatives who stutter. However, in the current study, only 30% of the CWS had a family history of stuttering.

Table 1: Nature of disfluency in CWS

Sub	Age of onset	Nature of onset	Etiology	Awareness	Concern	Variability		
						Situations	Language	Person
P1	< 3	Gradual	Others	Aware	Somewhat	Somewhat	No	No
P2	3.1-5	Gradual	Psychological	Aware	Not	Somewhat	No	Somewhat
P3	< 3	Gradual	Others	Unaware	Not	Highly	No	No
P4	3.1-5	Gradual	Unknown	Aware	Not	Highly	No	No
P5	< 3	Gradual	Psychological	Unaware	Not	Somewhat	No	No
P6	< 3	Gradual	Unknown	Unaware	Not	Highly	No	No
P7	< 3	Gradual	Unknown	Unaware	Not	Highly	No	No
P8	< 3	Gradual	Hereditary	Aware	Somewhat	Somewhat	Somewhat	Somewhat
P9	5.1-12	Gradual	Unknown	Aware	Somewhat	Highly	No	Highly
P10	< 3	Gradual	Unknown	Aware	Highly	Highly	Highly	Highly
P11	< 3	Gradual	Others	Unaware	Not	Somewhat	No	Somewhat
P12	5.1-12	Gradual	Hereditary	Aware	Somewhat	Highly	No	Somewhat
P13	3.1-5	Gradual	Others	Aware	Highly	Somewhat	No	Somewhat
P14	5.1-12	Gradual	Unknown	Aware	Not	Highly	No	No
P15	3.1-5	Gradual	Hereditary	Aware	Not	Highly	No	No
P16	3.1-5	Sudden	Others	Aware	Not	Highly	No	No
P17	< 3	Gradual	Hereditary	Aware	Somewhat	Highly	Somewhat	Highly
P18	< 3	Sudden	Others	Aware	Not	Somewhat	Somewhat	Somewhat
P19	5.1-12	Sudden	Unknown	Aware	Highly	Highly	No	Highly
P20	3.1-5	Sudden	Hereditary	Unaware	Not	Highly	No	No
P21	< 3	Gradual	Hereditary	Unaware	Not	Somewhat	Somewhat	Somewhat
P22	3.1-5	Gradual	Others	Aware	Not	Highly	No	No
P23	3.1-5	Gradual	Others	Aware	Not	Somewhat	No	Somewhat
P24	3.1-5	Gradual	Unknown	Aware	Highly	Somewhat	No	Somewhat
P25	3.1-5	Gradual	Hereditary	Aware	Somewhat	Highly	No	No
P26	< 3	Sudden	Hereditary	Aware	Not	Somewhat	Somewhat	Somewhat
P27	< 3	Gradual	Others	Aware	Not	Highly	No	No
P28	3.1-5	Gradual	Psychological	Aware	Not	Highly	No	No
P29	3.1-5	Gradual	Unknown	Aware	Highly	Somewhat	No	No
P30	3.1-5	Gradual	Hereditary	Aware	Not	Highly	No	No

d. **Awareness:** The awareness of stuttering in CWS was classified into two groups-aware and not aware. Most of the CWS (76.7%) were aware that they had stuttering. Only 23.3% of the CWS were not aware of their problem.

e) **Concern about stuttering:** CWS were classified into three groups based upon their concern about stuttering- not concerned, somewhat and highly concerned. 19 CWS (63.3%) were not concerned about their problem, 6 CWS (20%) were somewhat concerned and 5 CWS (16.7%) were highly concerned about their problem.

f) **Variability of stuttering:** The variability of stuttering is described across situations, language and persons. Situational variability included the variability of stuttering across different situations such as excitement, anger etc. Language variability was variability of stuttering with respect to different languages the person spoke. Variability across persons was variability in stuttering across different persons such as teachers, strangers, friends etc. It was found that the highest variability was in different situations and the least variability was across languages. All children displayed variability across situations with 18 CWS (60%) displaying high variability and 12 CWS (40%) with somewhat variable stuttering. Considering variability across persons, 16 CWS (53.3%) did not report any variability. 10 CWS (33.3%) reported stuttering to be somewhat variable and 4 CWS (13.3%) reported it to be highly variable. No variability was reported across languages by 24 CWS (80%), 5 PWS (16.7%) reported somewhat variability and 1 CWS (3.3%) reported high variability.

2) **Details of therapy attended:** Table 2 gives the details of therapy attended by PWS in the study. Details of age of commencement of therapy, duration, type and number of treatment experiences, duration since stoppage of therapy, presently attending therapy and other treatments are included.

a) **Age of therapy provided:** Majority of the CWS had started attending therapy at the ages of 3.1-5 years (43.3%) and 5.1-12 years (40%). Very few CWS had attended therapy below 3 years of age (16.7%).

b) **Total duration of therapy attended:** 11 CWS (36.7%) had attended therapy for durations of 1-2 months. Durations of greater than 2 months by 2 CWS (6.7%). 5 CWS each had attended therapy for 1 week (16.7%) and 2 weeks (16.7%).

c) **Recent duration of therapy attended:** 14 PWS (46.7%) had attended the most recent therapy for 2 weeks. 7 CWS each had attended recent durations of therapy for 3-4 weeks (23.3%) and 1-2 months (23.3%).

Table 2: Details of therapy attended by CWS

Sub	Age of therapy provided	Duration		No. of treatment experience	Duration since stoppage
		Total	**Recent**		
P1	3.1-5	1-2 months	> 1 month	1	> 1 year
P2	3.1-5	3-4 weeks	1-2 weeks	> 5	6-12 months
P3	3.1-5	2 weeks	1-2 weeks	1	6-12 months
P4	3.1-5	1-2 months	> 1 month	1	6-12 months
P5	< 3	1-2 months	> 1 month	1	6-12 months
P6	< 3	3-4 weeks	2-4 weeks	1	6-12 months
P7	< 3	1-2 months	> 1 month	1	6-12 months
P8	5.1-12	3-4 weeks	1 week	3-5	6-12 months
P9	5.1-12	1-2 months	1-2 weeks	2-3	3-6 months
P10	5.1-12	1 week	1 week	1	6-12 months
P11	3.1-5	1-2 months	> 1 month	1	6-12 months
P12	5.1-12	1 week	1 week	1	6-12 months
P13	5.1-12	1-2 months	2-4 weeks	2-3	> 1 year
P14	5.1-12	1-2 months	> 1 month	1	3-6 months
P15	5.1-12	> 2 months	> 1 month	2-3	6-12 months
P16	3.1-5	1-2 months	1-2 weeks	3-5	> 1 year
P17	5.1-12	3-4 weeks	1-2 weeks	2-3	> 1 year
P18	< 3	3-4 weeks	2-4 weeks	2-3	> 1 year
P19	5.1-12	3-4 weeks	2-4 weeks	2-3	6-12 months
P20	3.1-5	2 weeks	1-2 weeks	1	6-12 months
P21	5.1-12	2 weeks	1-2 weeks	1	6-12 months
P22	5.1-12	3-4 weeks	2-4 weeks	1	6-12 months
P23	3.1-5	2 weeks	1-2 weeks	1	3-6 months
P24	3.1-5	> 2 months	2-4 weeks	3-5	6-12 months
P25	3.1-5	2 weeks	1-2 weeks	1	3-6 months
P26	< 3	1-2 months	> 1 month	1	> 1 year
P27	3.1-5	1 week	1 week	1	> 1 year
P28	3.1-5	1-2 months	2-4 weeks	2-3	6-12 months
P29	5.1-12	1 week	1 week	1	6-12 months
P30	3.1-5	1 week	1 week	1	6-12 months

d) **Number of treatment experiences:** It can be observed from the table that majority of the CWS (63.3%) had only a single treatment experience. This was followed by 2-3 treatment experiences that were reported by 7 CWS (23.3%). Only 1 CWS had greater than 5 therapy experiences (3.3%).

e) **Type of therapy:** Analogies were the most commonly taught techniques to teach slow rate and prolongation in majority of CWS. This was followed by slow speech, modified airflow technique. Response cost, prolongation and gentle onset of speech were taught to only 3 CWS.

f) **Duration since stoppage of therapy:** Most participants (83.3%) had stopped therapy since for periods greater than 6 months, with 19 CWS (63.3%) for 6-12 months and 6 CWS (20%) greater than a year. Out of the 30 participants, 25 participants (83.3%) of the participants were not currently attending therapy and had not taken any other treatments for stuttering. 5 CWS (16.7%) are currently attending therapy. Also, 5 CWS had opted for alternate treatment options.

3. **Participant reports of improvement and relapse:** Children and their caregivers reported on the improvement post therapy. The improvement rates and reports of relapse are given in table 3.

1) Rate of improvement:

a) Improvement rates: Improvement rates of 50-75% were most reported by 9 caregivers and children (30%). This was followed by rates of 75-100% by 8 caregivers (26.6%), 4 caregivers (13.3%) each reported rates of < 25% and 25-50%. No improvement was documented by 3 caregivers (10%). 2 caregivers (6.6%) reported 100% improvement.

b) Relapse: It can be observed from table 3 that caregivers of 7 (30%) participants (P1-P7) reported that their child did not experience a relapse in stuttering. 8 caregivers and

children (26.6%) reported that they had relapsed partially and 13 (43.3%) reported complete relapse to pre-therapy condition.

Table 3: Participant report of improvement post therapy and relapse

Subjects	Improvement rates	Relapse
P1	75-100%	No relapse
P2	25-50%	No relapse
P3	75-100%	No relapse
P4	75-100%	No relapse
P5	25-50%	No relapse
P6	50-75%	No relapse
P7	75-100%	No relapse
P8	50-75%	Partial relapse
P9	50-75%	Partial relapse
P10	50-75%	Partial relapse
P11	75-100%	Partial relapse
P12	< 25%	Complete relapse
P13	50-75%	Partial relapse
P14	50-75%	Partial relapse
P15	75-100%	Partial relapse
P16	75-100%	Complete relapse
P17	75-100%	Partial relapse
P18	< 25%	Complete relapse
P19	25-50%	Complete relapse
P20	50-75%	Partial relapse
P21	50-75%	Complete relapse
P22	< 25%	Complete relapse
P23	50-75%	Complete relapse
P24	No improvement	Complete relapse
P25	100%	Complete relapse
P26	No improvement	Complete relapse
P27	25-50%	Complete relapse
P28	No improvement	Complete relapse
P29	< 25%	Complete relapse
P30	100%	Complete relapse

c) **SSI scores (pre and present):** The Pre-therapy and present SSI scores, percentile and stuttering severity levels are given in table 4. It can be observed from table 4 that participants P1-P7 obtained scores of very mild and lesser on the SSI-3. Participants

P8-P15 displayed lesser severity levels presently than the pre therapy. Participants P16-P30 had similar severity levels both pre and post therapy with one participant (P30) obtaining greater severity levels of stuttering presently.

Table 4: SSI scores (pre and present), percentile and stuttering severity levels in CWS

Subjects	Pre therapy			Current		
	SSI score	Percentile	Severity	SSI score	Percentile	Severity
P1	16.0	24-40	Mild	10.0	5-11	Very mild
P2	22.0	41-60	Moderate	6.0	1-4	Very mild
P3	14.0	24-40	Mild	6.0	1-4	Very mild
P4	12.0	12-23	Mild	6.0	1-4	Very mild
P5	18.0	41-60	Moderate	0.0	0	? normal
P6	16.0	24-40	Mild	6.0	1-4	Very mild
P7	16.0	24-40	Mild	9.0	5-11	Very mild
P8	24.0	61-77	Moderate	18.0	24-40	Mild
P9	29	78-88	Severe	25.0	61-77	Moderate
P10	30.0	78-88	Severe	18.0	24-40	Mild
P11	25.0	61-67	Moderate	16.0	24-20	Mild
P12	32.0	89-95	Severe	24.0	61-77	Moderate
P13	23.0	41-60	Moderate	17.0	24-40	Mild
P14	27.0	61-77	Moderate	17.0	24-40	Mild
P15	23.0	41-60	Moderate	15.0	24-40	Mild
P16	15.0	12-23	Mild	15.0	12-23	Mild
P17	33.0	89-95	Severe	30.0	78-88	Severe
P18	23.0	41-60	Moderate	24.0	61-77	Moderate
P19	21.0	41-60	Moderate	22.0	41-60	Moderate
P20	14.0	24-40	Mild	11.0	12-23	Mild
P21	31.0	78-88	Severe	30.0	78-88	Severe
P22	21.0	41-60	Moderate	25.0	61-77	Moderate
P23	24.0	61-67	Moderate	22.0	41-60	Moderate
P24	31.0	78-88	Severe	29.0	78-88	Severe
P25	24.0	61-67	Moderate	22.0	41-60	Moderate
P26	20.0	24-40	Mild	18.0	24-40	Mild
P27	14.0	24-40	Mild	16.0	24-40	Mild
P28	18.0	41-60	Moderate	25.0	61-77	Moderate
P29	14.0	12-23	Mild	12.0	12-23	Mild
P30	11	12-23	Mild	21.0	41-60	Moderate

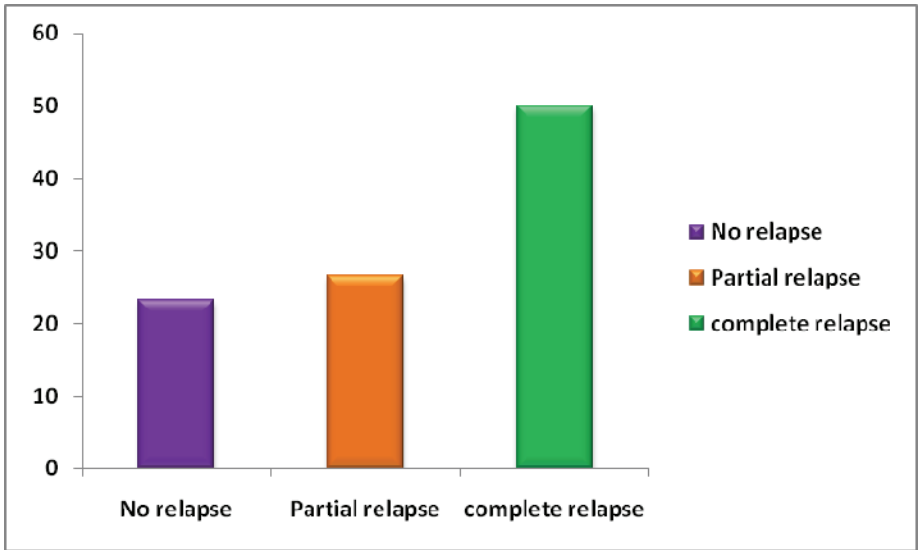
4 A. Determining relapse: A decision of relapse was made using child and caregiver reports and by comparing pre and present SSI scores. On the basis of this, the nature of relapse was classified into three categories, namely complete relapse to pre therapy levels, partial relapse and

no relapse. A fourth category of 'no improvement' was also included. This comprised CWS who did not report improvement after attending fluency therapy. The results obtained are described under each group.

a) **No relapse:** The category of no relapse included those CWS who reported to have maintained the improvement and whose present overall SSI scores was below 10 having less than 5 percentile in SSI-3 (Riley, 1994). This criterion was taken following the study by Coulter, Anderson and Conture (2009), wherein the authors classified participants as children with no stuttering (CWNS) if they obtained a total overall score of 10 or below (severity rating within very mild) on the SSI-3. In the current study, participants P1-P7 can be classified to have no relapse, as they reported to have maintained the improvement and also obtained the required score on SSI-3. The mean age of children in this category was 4.7 years. The pre-severity levels of stuttering were mild in 4 CWS (57.1%) and moderate in 3 CWS (42.8%). Immediate to therapy, improvements were reported by all the CWS. 4 CWS (57.1%) had 75-100% improvement, 2 CWS (28.5%) had 25-50% improvement and 1 child (14.2%) had 50-75% improvement as per the parent reports.

b) **Partial relapse:** The category of partial relapse included those CWS who felt that they had improved significantly but are now experiencing relapse though not to the pre-therapy severity levels. The criterion for classifying as partial relapse was that the current SSI scores should be less than the pre-therapy SSI scores. Also, the current scores on the SSI-3 should be greater than the 5^{th} percentile. In accordance to the caregiver reports and SSI values, in the present study, participants P8-P15 were found to have partially relapsed. One caregiver reported that the child had completely relapsed. However, on comparing the SSI scores, only a partial relapse was observed. Mean age of children in this category was 9.3 years. The pre-severity levels of stuttering were found to be moderate in 5 CWS (62.5%) and severe in 3 CWS (37.5%). Majority of the participants (62.5%) had 50-75% improvement immediately after therapy. 2 CWS (25%) had 75-100% improvement and 1 child had less than 25% improvement.

c) **Complete relapse:** CWS were classified as being completely relapsed to pre-therapy condition if the caregivers/child felt that they have completely relapsed and if the present SSI scores were the same as the pre-therapy SSI scores. In the present study, caregivers of 14 CWS reported that the children had completely relapsed to the pre-therapy condition. When comparing the SSI scores also, 13 CWS were found to obtain the required score to be classified into the category of complete relapse. One caregiver reported that the child had only partially relapsed, but on procuring the SSI scores, similar severity levels as pre-therapy was observed. Hence, that child can also be classified under the category of complete relapse. The mean age of the participants was 7.7 years. The pre-severity levels of stuttering was found to be mild in 6 CWS (40%), moderate in 6 CWS (40%) and severe in 3 CWS (20%). With respect to the improvement immediate to therapy, 3 CWS (20%) reported improvements of 25-50%, 3 (20%) of 50-75%, 2 CWS each had 75-100% (13.3%) and 100% improvement (13.3%). However, 3 CWS (20%) reported no improvement after therapy and 2 CWS (13.3%) said that though improvement was present, it was less than 25%.



Graph 1: Relapse categories across CWS

Therefore, in case of CWS, 7 children (23.3%) were found not to have relapsed, 8 children (26.6%) had partial relapse and 15 children (50%) completely relapsed to the pre-therapy condition. The results are depicted in graph 1. Greater number of children in

the present study had relapsed than maintained the condition. The findings are not in accordance with the study of Hancock, Chang, McCready, Shepley, McCaul, Costello, Harding, Kehran, Masel, and Reilly, (1996), that fewer children will experience a relapse in stuttering. This disparity could be understood by studying the contributing factors in relapse, which is discussed in the next section.

4 B. Variables contributing to relapse in CWS: With respect to the above discussed variables, a comparison can be made across the different categories of relapse. The results are presented below:

i) **Nature of disfluency across relapse categories:** Table 5 shows the nature of disfluency including the mean age, prior severity, age, nature of onset and etiological factors across the different categories of relapse.

Table 5: Nature of disfluency across relapse categories in CWS (in %)

Category	Mean age (years)	Prior Severity (%)			Age of onset (years)			Nature of onset		Etiology			
		Mild	Mod	Severe	< 3	3.1-5	5.1-12	Sudden	Gradual	H	P	O	U
No relapse	4.7	57.1	42.8	0	71.4	28.5	0	0	100	0	28.5	28.5	42.8
Partial relapse	9.3	0	62.5	37.5	37.5	25	37.5	1	100	37.5	0	25	37.5
Complete relapse	7.7	40	40	20	33	60	6.6	33.3	66.6	40	6.6	33.3	20

(H-hereditary, P-psychological, O-Others, U-Unknown)

It can be seen from the table that the participants in the 'no relapse' category were younger in age than the other participants. All the children in the category had prior severity levels of stuttering which was mild and moderate. No child had severe stuttering. Pre-treatment severity was thus a contributing factor. The study supports findings of Craig, Hancock, Chang, McCready, Shepley, McCaul, et al (1996); Hancock, Craig (1998) in terms of pre-treatment severity.

The age of onset was below 5 years in all the children among the 'no relapse' category. Gradual onset of stuttering was reported in case of all the participants in the group. They also did not report any family history of stuttering. The participants in the category of

partial and complete relapse were older in age and had onsets of stuttering greater than 5 years. The findings support that of Seider, Gladstein and Kidd (1983), that there is a decreasing probability of recovery with age. Sudden onsets were also reported by participants in the complete relapse category. Unlike the participants in the no relapse group, participants in the relapsed group had implicated hereditary factors in stuttering. These results are in accordance with the findings of Cooper (1972), that there can be a genetic predisposition to relapse.

ii) **Awareness, concern, variability of stuttering, associated problems across relapse categories:** The awareness of the problem, the concern about it, variability and the associated problems with stuttering are other variables which were investigated across the relapse categories. The results obtained are presented in table 6.

Table 6: % CWS with Awareness, Concern, Variability, Associated problems across relapse categories

Category	Awareness	Concern			Variability			Associated problems
	Present	NC	SC	HC	Situations	Language	Person	
No relapse	42.8	85.7	14.2	0	100	0	14.2	14.2
Partial relapse	87.5	37.5	37.5	25	100	25	75	25
Complete relapse	86.6	66.6	13.3	20	100	26.6	46.6	20

[NC: not concerned, SC-somewhat concerned, HC-highly concerned]

It can be seen from the table that participants in the category of partial and complete relapse were most aware of their condition and were more concerned about it. In terms of variability of stuttering across situations, no difference was observed across the category of no relapse and relapse. Language variability was present in the relapse categories. This is because the participants in the category of no relapse knew only one language. Variability of stuttering with different persons was also more reported by participants in the relapse groups.

Participants in the relapse category also had more associated problem than participants in the no relapse category. This is in agreement with reports by Conture et al. (1993) and

Bernstein Ratner (1995) who described the clinical observation that children who stutter and exhibit coexisting phonological problems sometimes make little or no progress in therapy, or take longer to show improvements in speech fluency over the course of treatment.

iii) Therapy details across relapse categories: The age of commencement of therapy, the total duration, type of therapy, number of treatment experiences and the duration since stoppage of therapy can be other contributing variables. These variables and their details in different relapse categories are given in table 7.

Table 7: Therapy details across relapse categories in CWS (in %)

Category	Age of therapy (in years)			Total duration (in months)			No of Treatment exper.			Duration since stoppage (in months)		
	< 3	3.1-5	5.1-12	<1	1-2	>2	1	2-5	>5	3-6	6-12	>12
No relapse	42.8	57.1	0	42.8	57.1	0	85.7	0	14.2	0	85.7	14.2
Partial relapse	0	0	100	37.5	50	12.5	50	50	0	25	62.5	12.5
Complete relapse	13.3	53.3	33.3	73.3	20	6.6	60	40	0	13.3	53.3	33.3

It can be seen from the table that the age of commencement of therapy was higher for participants in the relapse group. In accordance with Yairi, Ambrose, Paden and Throneburg (1996), it is very important that children start receiving therapy at earlier ages. When there is more time between stuttering onset and school age, the child will experience more social repercussions. Considering the duration of therapy attended, more participants in the completely relapsed group had attended therapy for durations of less than a month than the no relapse group. The findings supports the view of Silverman (1981) that sufficient duration of therapy is necessary to reduce relapse. The participants in the relapse group had greater treatment experiences than the participants in the no relapse group. It was observed that the participants in the no relapse group were exposed to eclectic speech therapy approaches.

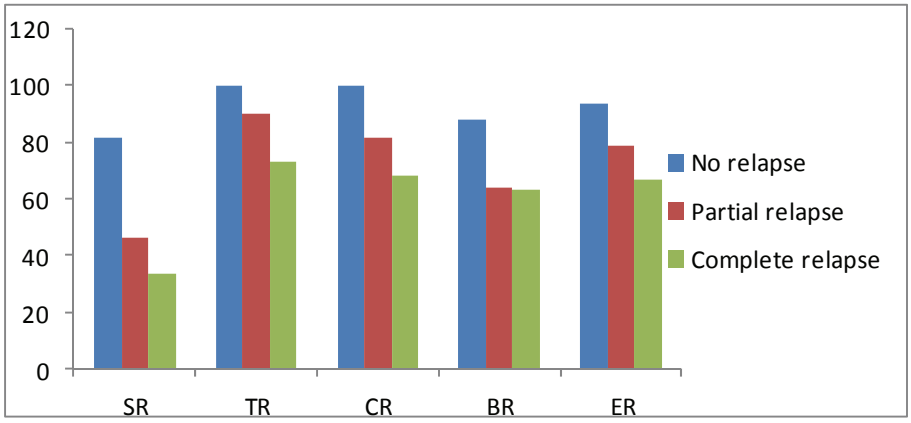
iv) **Rates of improvement across relapse categories:** The caregiver/child improvement rates immediate to therapy are important factors in determining the reason for relapse. The data is given in table 8.

Table 8: Rates of improvement across relapse categories in CWS (in %)

Category	No improvement	< 25%	25-50%	50-75%	75-100%	100%
No relapse	0	0	28.5	14.2	57.1	0
Partial relapse	0	12.5	0	62.5	25	0
Complete relapse	20	20	13.3	20	13.3	13.3

Table 8 shows that few participants in the complete relapse category reported no significant improvement immediate to therapy. Rates of less than 25% improvement were also more reported by participants in this category. This could be one of the variables contributing to their relapse pattern

v) **Major factor domains:** The major factors contributing to relapse based on the rating by CWS on different parameters were grouped under 5 factor domains which include subject related (SR), therapy related (TR), clinician related (CR), environment related (ER) and behavior and personality related (BR). Graph 2 depicts the scores under the different domains for the three categories of relapse.



[SR-Subject related, TR-Therapy related, CR-Clinician related, BR-Behavior and personality related, ER-Environment related factors]

Graph 2: Factors and relapse groups in CWS

It can be observed from the graph that the category of no relapse had obtained the highest scores across all the factor domains. Highest scores were obtained in the domain of therapy and clinician related factors. This implies that the participants were satisfied with the therapy and the manner in which it was provided. This was followed by environment related; behavior and personality related and finally subject related factors. The participants were motivated to carry out the techniques, and were not stressed to speak faster. The caregivers of the children were interested and motivated to carry out the techniques and monitor the child's fluency. These factors are therefore very essential in maintaining achieved fluency.

The partial relapse group obtained higher scores than the complete relapse group on all the factor domains. Highest scores were observed in the domain of therapy related factors. Clinician related factors obtained the second highest scores. This means that the caregivers were largely satisfied with the therapy given. However, few participants were dissatisfied with the therapy technique and the guidance, manner of therapy provided by the clinician. Environment and behavior and personality related factors were placed next. The caregivers/children were found to be less motivated to carry out the strategies explained. The domain of subject related factors received poorest scores. This clearly depicts the lack of practice of the technique and the strategies to maintain fluency. This could be due to the dissatisfaction with the therapy and the clinician. They were not confident on the technique and its effectiveness.

The complete relapse group procured the least scores in all the domains compared to the other categories of relapse. Lowest scores in this category were also in the domain of subject related factors. Better scores were observed in the domains of therapy related and clinician related factors. This was followed by behavior, personality and environment related factors. The caregivers/children in this category were not satisfied with the therapy technique, counseling and duration of therapy provided. They attributed the relapse to shortcomings and inadequacy on part of the clinician and therapy. Hence, they lost the interest to carry out the technique and motivate the child to speak more fluently.

To examine if there is any statistical difference, Kruskal Wallis test was done. The results are shown in table 9. It can be observed that there is significant difference across the different categories of relapse in the domains of subject related, therapy related, behavior and personality and environment related factors.

Table 9: Kruskal wallis test results for different factor domains in CWS

Domains	SR	TR	CR	BR	ER
Chi-square (χ2)	19.513	7.026	4.912	15.651	14.346
Asymp. Sig.	.000	.030	.086	.000	.001

Further, to know the pairs that were statistically significant, Mann Whitney test was done.

1) **Between the groups of no relapse and partial relapse:** The results obtained are shown in table 10. It can be seen from the table that significant difference was obtained for the factor domains of subject related, behaviour personality related and environment related factors. No significant difference was obtained for the therapy related and clinician related factors.

Table 10: Mann Whitney test results across no relapse and partial relapse in CWS

Domains	SR	TR	CR	BR	ER
/Z/	-3.318	-1.740	-1.740	-3.112	-2.739
Asymp. Sig. (2-tailed)	.001	.082	.082	.002	.006

2) **Between the groups of no relapse and complete relapse:** The results are depicted in table 11, which shows that statistically significant difference was obtained for all the factor domains across the two categories of relapse.

Table 11: Mann Whitney test for comparison across no relapse and complete relapse in CWS

Domains	SR	TR	CR	BR	ER
/Z/	-3.770	-2.501	-2.093	-3.672	-3.370
Asymp. Sig. (2-tailed)	.000	.012	.036	.000	.001

3) **Between the categories of partial relapse and complete relapse:** Table 12 gives the test results. Statistically significant difference is only present for the domain of subject related factors across the two categories of relapse.

Table 12: Mann Whitney test for comparison across partial relapse and complete relapse in CWS

Domains	SR	TR	CR	BR	ER
/Z/	-2.463	-1.244	-.895	-1.156	-1.775
Asymp. Sig. (2-tailed)	.014	.213	.371	.248	.076

II. ADULTS WITH STUTTERING:

1. **Nature of disfluency in AWS:** The nature of disfluencies in terms of the age of onset, nature of onset, etiology, awareness, concern about the problem, and the variability in stuttering across different situations, languages and persons are presented in table 13.

a) **Age of onset of stuttering:** The age of onset of stuttering in majority of the AWS was before 12 years of age, with 10 AWS (33.3%) below 3 years, 8 AWS (26.6%) between the 3.1-5 years and 6 AWS (20%) in the ages of 5.1-12 years of age. 4 AWS (13.3%) had onsets between 12.1-17 years of age, and one participant each had onsets between 17.1-30 (3.3%) and 30.1-50 years (3.3%). This supports the findings of Johnson and associates (1959) that onset of stuttering is majorly between 2 and 5 years of age.

b) **Nature of onset:** Majority of the participants (80%) reported gradual onsets of stuttering. However, sudden onsets were also reported by few AWS (20%).

c) **Etiology:** Hereditary factors were found to be the most commonly reported etiological factor. 11 AWS (36.6%) had relatives with stuttering. 10 AWS did not report any significant etiological factor. 6 AWS (20%) had psychological factors relating to the onset of stuttering and 2 AWS (6.6%) reported ‘other’ factors.

d) Concern: 93% of the participants were concerned about their problem, with 17 AWS (56.6%) being highly concerned and 11 AWS (36.6%) somewhat concerned about the problem.

Table 13: Nature of disfluency in AWS

Subjects	Age of onset	Nature of onset	Etiology	Concern	Variability		
					Situations	Language	Person
P1	30.1-50	Sudden	Psychological	Highly	Somewhat	No	No
P2	17.1-30	Gradual	Psychological	Highly	Highly	Highly	Highly
P3	12.1-17	Sudden	Hereditary	Highly	Highly	no	Highly
P4	5.1-12	Gradual	Unknown	Somewhat	No	no	Somewhat
P5	< 3	Gradual	Hereditary	Somewhat	Highly	no	Highly
P6	5.1-12	Gradual	Hereditary	Somewhat	Highly	no	No
P7	< 3	Gradual	Hereditary	Somewhat	Highly	Somewhat	Highly
P8	12.1-17	Gradual	Psychological	Highly	Somewhat	no	Somewhat
P9	< 3	Gradual	Hereditary	Highly	Highly	Highly	Highly
P10	3.1-5	Gradual	Psychological	Highly	Highly	No	Highly
P11	< 3	Gradual	Unknown	Somewhat	Highly	No	Highly
P12	3.1-5	Gradual	Hereditary	Somewhat	Somewhat	No	Somewhat
P13	5.1-12	Gradual	Unknown	Highly	No	Somewhat	Highly
P14	3.1-5	Gradual	Unknown	Highly	Highly	Somewhat	Highly
P15	< 3	Gradual	Hereditary	Somewhat	Highly	somewhat	Highly
P16	3.1-5	Sudden	Hereditary	highly	Highly	Highly	Highly
P17	12.1-17	Gradual	Others	Highly	Somewhat	Somewhat	Somewhat
P18	<3	Sudden	Hereditary	Highly	Highly	no	Highly
P19	3.1-5	Sudden	Psychological	Somewhat	Highly	Somewhat	Somewhat
P20	< 3	Sudden	Hereditary	Somewhat	Highly	Highly	Highly
P21	< 3	Gradual	Unknown	Highly	Highly	Highly	Highly
P22	5.1-12	Gradual	Unknown	Somewhat	Highly	No	Highly
P23	3.1-5	Gradual	Unknown	Not	somewhat	somewhat	No
P24	3.1-5	Gradual	Unknown	Not	No	somewhat	No
P25	5.1-12	Gradual	Hereditary	Highly	Highly	Highly	Highly
P26	< 3	Sudden	Hereditary	Highly	Highly	somewhat	Highly
P27	5.1-12	Gradual	Psychological	Highly	Highly	somewhat	Highly
P28	3.1-5	Gradual	Unknown	Highly	Highly	somewhat	Highly
P29	< 3	Gradual	Unknown	Somewhat	Highly	no	Highly
P30	12.1-17	Sudden	Others	Highly	Highly	Highly	Highly

e) Variability: Variability in stuttering was noticed across situations, language and persons. With regard to the situational variability, 22 AWS (73.3%) reported high variability, 6 AWS (20%) reported somewhat variability and 2 AWS (6.6%) had no variability.

Variability with respect language was not present in 14 AWS (46.6%), was somewhat present in 9 PWS (30%) and very much variable in 7 AWS (23.3%). Variability of stuttering across persons was reported to be high by 21 AWS (70%), somewhat variable in 5 AWS (16.6%) and not variable in 4 AWS (13.3%).

2. Details of therapy attended: The details of therapy attended such as age of commencement of therapy, duration, type and number of treatment experiences, duration since stoppage of therapy, presently attending therapy and other treatments are provided in table 14.

a) **Age of therapy attended:** Majority of the AWS had started attending therapy at the ages of 17.1-30 years (56.6%). 7 AWS (23.3%) attended therapy between the ages of 12.1-17 years. 4 AWS (13.3%) attended therapy between the age of 5.1-12 years. 1 AWS each attended therapy between the age of 3.1-5 years (3.3%) and > 50 years (3.3%).

b) **Total duration of therapy attended:** 11 AWS (36.6 %) had attended therapy for durations of 1-2 months. Durations of greater than 2 months were only reported by 5 PWS (16.6%). 5 AWS had attended therapy for 1 week (16.6%) and 8 adults (26.6%) for 2 weeks.

c) **Recent duration of therapy attended:** 13 AWS (43.3%) had attended their most recent therapy for 1-2 weeks. 7 AWS each had attended recent durations of therapy for periods of 1 week (23.3%) and greater than a month (23.3%). 2 AWS had attended therapy lately for 2-4 weeks (6.6%).

d) **Number of treatment experiences:** It can be observed from the table that majority of the AWS (56.6%) had only a single treatment experience. This was followed by 2-3 treatment sessions that were reported by 10 AWS (33.3). 1 AWS had 3-5 treatment experiences (3.3%). 2 AWS had greater than 5 therapy experiences (6.6%).

e) **Type of therapy:** Most often combinations of techniques were used in therapy. The modified airflow technique was most commonly used. 25 AWS (83.3%) were taught this technique. The next most commonly taught technique was Prolongation and finger thumb analogy for 23 AWS (76.6%). Techniques of slow speech, gentle onset, and use of devices such as metronome were also reported by few participants.

Table 14: Details of therapy attended by AWS

Subjects	Age of therapy provided	Duration		No. of treatment experiences	Duration since stoppage
		Total	Recent		
P1	>50	1-2 months	>1 month	1	3-6 months
P2	17.1-30	1 week	1 week	1	6-12 months
P3	17.1-30	1-2 months	>1 month	2-3	6-12 months
P4	17.1-30	2 weeks	1-2 weeks	>5	3-6 months
P5	17.1-30	2 weeks	1-2 weeks	1	3-6 months
P6	17.1-30	2 weeks	1-2 weeks	1	6-12 months
P7	5.1-12	1-2 months	>1 month	1	>1 year
P8	17.1-30	2 weeks	1-2 weeks	2-3	>1 year
P9	17.1-30	2 weeks	1-2 weeks	1	3-6 months
P10	17.1-30	3-4 weeks	1-2 weeks	2-3	>1 year
P11	5.1-12	> 2months	1-2 weeks	> 5	>1 year
P12	12.1-17	> 2 months	>1 month	1	3-6 months
P13	17.1-30	1-2 months	1 week	2-3	6-12 months
P14	17.1-30	1-2 months	1-2 weeks	2-3	6-12 months
P15	3.1-5	1-2 months	>1 month	2-3	>1 year
P16	17.1-30	1-2 months	>1 month	1	6-12 months
P17	12.1-17	> 2 months	2-4 weeks	3-5	>1 year
P18	12.1-17	1 week	1 week	1	>1 year
P19	5.1-12	> 2 months	1-2 weeks	2-3	>1 year
P20	17.1-30	1-2 months	>1 month	1	>1 year
P21	5.1-12	> 2 months	1 week	>5	3-6 months
P22	17.1-30	1-2 months	1 week	2-3	>1 year
P23	17.1-30	1 week	1 week	1	>1 year
P24	17.1-30	1-2 months	1 week	1	6-12 months
P25	12.1-17	2 weeks	1-2 weeks	1	6-12 months
P26	12.1-17	1 week	1-2 weeks	1	>1 year
P27	17.1-30	2 weeks	2-4 weeks	2-3	>1 year
P28	17.1-30	1 week	1-2 weeks	2-3	6-12 months
P29	12.1-17	2 weeks	1-2 weeks	1	>1 year
P30	12.1-17	1-2 months	>1 month	1	>1 year

f. Duration since stoppage of therapy: 15 participants (50%) had stopped therapy for periods greater than a year. 6 AWS (20%) had stopped therapy since 3-6 months and 9 AWS (30%) between 6-12 months. 8 AWS (26.2%) were currently attending therapy and 4 AWS (13%) had opted for alternate treatment options such as ayurvedic medications and yoga.

3. Participant reports of improvement and relapse: Participants reported on the improvement immediate to therapy. The improvement rates and reports of relapse are given in table 15.

a) **Improvement rates:** Improvement rates of 50-75% were most reported, by 9 AWS (30%). This was followed by rates of 75-100% by 8 participants (26.6%) 4 participants (13.3%) each reported rates of < 25% and 25-50%. No improvement was documented by 3 AWS (10%). 2 participants (6.6%) reported 100% improvement.

Table 15: Participant reports of improvement and relapse in AWS

Subjects	Improvement rates	Relapse
P1	75-100%	No relapse
P2	25-50%	No relapse
P3	75-100%	No relapse
P4	75-100%	No relapse
P5	25-50%	No relapse
P6	50-75%	No relapse
P7	75-100%	No relapse
P8	50-75%	No relapse
P9	50-75%	Partial relapse
P10	50-75%	Partial relapse
P11	75-100%	Partial relapse
P12	< 25%	Complete relapse
P13	50-75%	Partial relapse
P14	50-75%	Partial relapse
P15	75-100%	Partial relapse
P16	75-100%	Partial relapse
P17	75-100%	Partial relapse
P18	< 25%	Partial relapse
P19	25-50%	Partial relapse
P20	50-75%	Partial relapse
P21	50-75%	Complete relapse
P22	< 25%	Complete relapse
P23	50-75%	Complete relapse
P24	No improvement	Complete relapse
P25	100%	Complete relapse
P26	No improvement	Complete relapse
P27	25-50%	Complete relapse
P28	No improvement	Complete relapse
P29	< 25%	Complete relapse
P30	100%	Complete relapse

2.

b. Relapse: It can be observed from table 3 that 8 participants (P1-P7) reported that they did not experience a relapse in stuttering. 11 AWS each reported partial relapse (36.6%) and complete relapse (36.6%).

4. SSI scores (pre and present): The Pre-therapy and current SSI scores, percentile and stuttering severity levels are given in table 16.

Table 16: Pre-therapy and current SSI scores, percentile and stuttering severity levels in AWS

Subjects	Pre therapy			Current		
	SSI score	Percentile	Severity	SSI score	Percentile	Severity
P1	32	78-88	Severe	8	0	? Normal
P2	15	5-11	Very mild	8	0	? Normal
P3	30	61-67	Moderate	12	1-4	Very mild
P4	29	61-67	Moderate	10	1-4	Very mild
P5	27	41-60	Moderate	10	1-4	Very mild
P6	21	24-40	Mild	10	1-4	Very mild
P7	18	12-23	Mild	10	1-4	Very mild
P8	25	41-60	Moderate	12	1-4	Very mild
P9	34	78-88	Severe	17	5-11	Very mild
P10	23	24-40	Mild	13	5-11	Very mild
P11	24	24-40	Mild	15	5-11	Very mild
P12	22	24-40	Mild	16	5-11	Very mild
P13	26	41-60	Moderate	17	5-11	Very mild
P14	33	78-88	Severe	19	12-23	Mild
P15	28	61-67	Moderate	15	24-40	Mild
P16	27	41-60	Moderate	19	12-23	Mild
P17	25	41-60	Moderate	19	12-23	Mild
P18	32	78-88	Severe	28	61-67	Moderate
P19	33	78-88	Severe	30	61-67	Moderate
P20	28	61-67	Moderate	18	12-23	Mild
P21	22	24-40	Mild	22	24-40	Mild
P22	45	96-99	Very severe	42	96-99	Very severe
P23	23	24-40	Mild	18	12-23	Mild
P24	17	5-11	Very mild	23	24-40	Mild
P25	39	96-99	Very severe	42	96-99	Very severe
P26	23	24-40	Mild	25	41-60	Moderate
P27	14	5-11	Very mild	18	12-23	Mild
P28	34	78-88	Severe	32	78-88	Severe
P29	31	61-67	Moderate	29	61-67	Moderate
P30	22	24-40	Mild	19	12-23	Mild

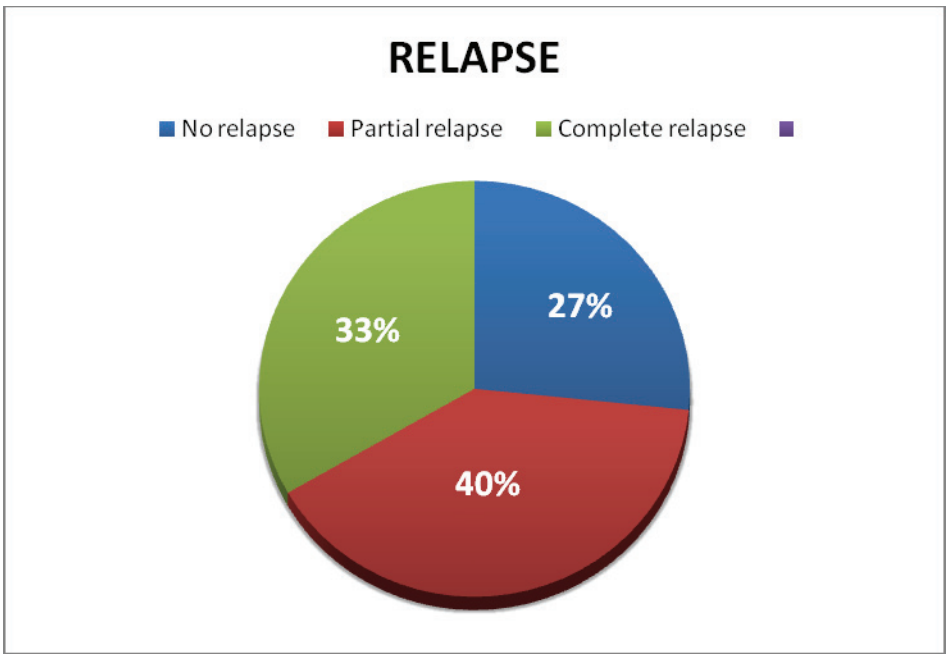
It can be observed from table 16 that participants P1-P13 obtained scores of very mild and lesser on the SSI-3 (1994). Participants P14 –P30 had severity levels greater than 'very mild' stuttering. Participants P21-P30 had similar severity levels both pre and post therapy with two participants (P26, P27) obtaining greater severity levels presently.

I) **Determining relapse:** A decision of relapse was made using participant reports and by comparing pre and present SSI scores. On the basis of this, the nature of relapse was classified into three categories, namely no relapse, partial relapse and complete relapse to pre therapy levels.

a) **No relapse:** The category of no relapse included those AWS who reported to have maintained the improvement and whose present overall SSI scores was below 12 having less than 5 percentile in SSI-3 (Riley, 1994). In the current study, participants P1-P8 can be classified to have no relapse, as they reported to have maintained the improvement and also obtained the required score on SSI-3. Immediately after therapy, improvements of >25% were reported by most participants. 2 AWS each had prior improvements of 25-50% and 50-75% and 4 AWS had 75-100% improvement.

b) **Partial relapse:** The category of partial relapse included those AWS who felt that they had improved significantly but are now experiencing relapse though not to the pre-therapy severity levels. The criterion for classifying as partial relapse was that the current SSI scores should be less than the pre-therapy SSI scores. Also, the current scores on the SSI-3 should be greater than the 5^{th} percentile. Following this criteria, 12 AWS (P9-P20) can be classified to have partial relapse. Immediately on post therapy, improvement rates of less than 25% were reported by 2 AWS, 25-50% by one participant, 50-75% by 5 AWS and 75-100% by 4 AWS.

c) **Complete relapse:** AWS were classified as being completely relapsed to pre-therapy condition if they themselves felt that they have completely relapsed and if the present SSI scores were the same as the pre-therapy SSI scores. In accordance to this, 10 AWS (P21-P30) have completely relapsed to the pre-therapy condition.



Graph 3: Relapse categories in AWS

Comparing the relapse rates within AWS in the present study, it was found that more number of participants have relapsed than maintained the condition. Out of the 30 AWS, 8 adults (26.6%) have maintained the condition, 12 adults (40%) have partially relapsed and 10 adults (33.3%) have completely relapsed. Graph 3 depicts the relapse rates.

Variables contributing to relapse in AWS: With respect to the above discussed variables, a comparison can be made across the different categories of relapse. The results are presented below.

1. Nature of disfluency across relapse categories: Table 17 shows the nature of disfluency including the prior severity levels of stuttering and the age of onset of stuttering. Table 18 depicts the nature of onset and the etiological factors across the 3 categories of relapse.

Table 17: Prior severity and age of onset of stuttering across relapse categories in AWS

Category	Prior Severity (%)					Age of onset in years (%)					
	V. Mild	Mild	Mod	Sev	V.sev	< 3	3.1-5	5.1-12	12.1-17	17.1-30	30.1-50
No relapse	12.5	25	50	12.5	0	25	0	25	25	12.5	12.5
Partial relapse	0	25	41.6	33.3	0	41.6	41.6	8.3	8.3	0	0
Complete relapse	20	40	10	10	20	30	30	30	10	0	0

From table 5, it can be seen that the category of no relapse had lesser severity levels of stuttering prior to therapy than the other two relapse categories. This study shows that this could be a variable contributing to relapse, in accordance with literature findings (Guitar, 1976; Craig, 1998; Hunick et al, 2006). With respect to the age of onset of stuttering, it can be observed that the relapse categories had age of onset of stuttering earlier than the no relapse categories.

Table 18: Nature of onset and etiology across relapse categories in AWS

Category	Nature of onset		Etiology			
	Sudden	Gradual	H	P	O	U
No relapse	25	75	50	37.5	0	12.5
Partial relapse	33.3	66.6	50	16.6	8.3	25
Complete relapse	30	70	20	10	10	60

Table 18 shows that there is not much of a difference in the nature of onset across the relapse categories. Hereditary factors also were not found to be a contributing factor to relapse in AWS as 50% of the participants who maintained the improvement had family history of stuttering. No significant findings can be drawn as many participants did not report of any significant etiological factor. The study supports the statement by Felsenfeld (1998) that though this hereditary etiology may be a predictive factor for relapse, empirical justification is not possible.

2. Concern, variability of stuttering, associated problems across relapse categories: The concern, variability of stuttering with differing situations, language and persons, and the associated problems across different relapse categories are discussed in table 19

Table 19: Concern, stuttering variability, associated problems across relapse categories in AWS

Category	Concern			Variability			Associated problems
	NC	SC	HC	Situations	Language	Person	
No relapse	0	50	50	87.5	25	75	0
Partial relapse	0	41.6	58.3	91.6	66.6	100	16.6
Complete relapse	20	20	60	60	80	80	20

From table 19, it can be seen that the participants in the category of 'no' and 'partial' relapse were concerned about their problem. However, 20% of participants in the completely relapsed category were not concerned about their problem. This could be one of the variables contributing to relapse. Only when one is concerned and tries to device means to maintain fluency, does relapse reduce. Across the relapse categories, variability in stuttering was present for different situations, language and persons. The category of no relapse reported highest variability of stuttering in different situations. The category of partial relapse had highest variability across persons and the complete relapse category found stuttering to be most variable in different languages and with different persons. There were no associated problems along with stuttering for participants who did not relapse in stuttering. The participants who relapsed were however found to have associated problems such as lisping and mild articulatory errors. An association can hence be drawn between relapse and associated problems.

3. Therapy details across relapse categories: Table 20 lists the details of therapy taken such as age of commencement of therapy, and the total duration of therapy taken. Table 21 shows the number of treatment experiences and the duration since stoppage of therapy across the relapse categories.

Table 20: Percentage of AWS against age of therapy and total duration across relapse groups

Category	Age of therapy					Total duration (months)		
	3.1-5	5.1-12	12.1-17	17.1-30	> 50	<1	1-2	>2
No relapse	0	12.5	0	75	12.5	62.5	37.5	0
Partial relapse	8.3	16.6	25	50	0	25	41.6	33.3
Complete relapse	0	10	40	50	0	60	30	10

Majority of the participants had started attending therapy between the ages of 12.1-17 years. 1 participant in the category of no relapse had started attending therapy after the age of 50 years. From the table, it can be understood that the age of commencement of therapy was not a variable contributing to relapse.

Table 21: % of AWS against number of treatment experiences and duration since stoppage

Category	No of Treatment experiences			Duration since stoppage (in months)		
	1	2-5	>5	3-6	6-12	>12

No relapse	62.5	25	12.5	37.5	37.5	25
Partial relapse	41.6	50	8.3	16.6	25	58.3
Complete relapse	60	30	10	10	30	60

Majority of the participants in the category of no relapse had only single treatment experience. Participants in the relapse categories had more treatment experiences. Thus, in the current study, this was not found to be a variable contributing to relapse in AWS. Within the category of relapse, the durations since stoppage of therapy were larger than that for no relapse category. This implies that follow up periods of greater than a year can be more helpful in predicting relapse in stuttering.

4. Rates of improvement across relapse categories: The improvement rates immediate to therapy as reported by participants in the different categories of relapse are in table 22.

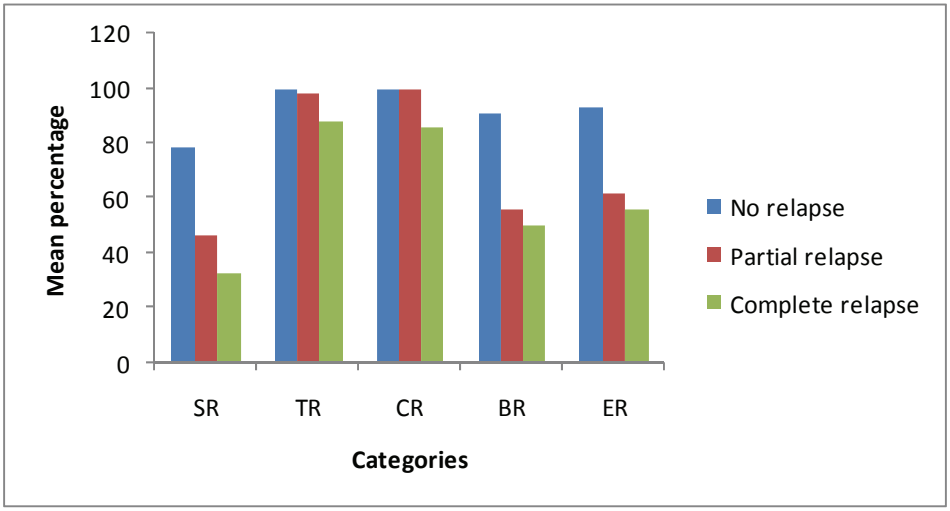
Table 22: Rates of improvement across relapse categories in AWS

Category	No improvement	< 25%	25-50%	50-75%	75-100%	100%
No relapse	0	0	25	25	50	0
Partial relapse	0	16.6	8.3	41.6	33.3	0
Complete relapse	30	20	10	20	0	20

It can be observed from the table that all the participants who did not relapse in stuttering had > 25% improvement post therapy. 16.6% and 50% of the participants in the partial and complete relapse category respectively had reported improvement rates <25%. This can be one factor for the participants experiencing relapse.

5. Major factor domains: The major factors contributing to relapse based on the rating by AWS on different parameters were grouped under 5 major factor domains which include subject related (SR), therapy related (TR), clinician related (CR), environment related (ER) and behaviour and personality related (BR). Graph 2 depicts the scores under the different domains for the three categories of relapse. Each domain comprised of several questions. Answering yes for a question resulted in a score of 1 and No was given a score of 0. The questions were framed in such a way that score of 1 for a question implicated it was not a factor contributing to relapse. A score of 0, which indicates no, meant that those factors were contributing to relapse. The total

number of yes responses were then obtained. This was divided by the total number of questions and a mean percentage score was calculated.



Graph 4: Factors and relapse groups in AWS

As can be observed from graph 4, the category of no relapse obtained the highest scores in all the factor domains. This suggests the importance of all the factor domains in maintaining achieved fluency. Highest scores were documented in the domains of therapy related and clinician related factors. All the participants were very satisfied with the therapy technique, counseling and instruction provided. This was followed by environment related and behavior, personality related factors. Most of the participants maintained a calm composure while speaking and were more confident and positive about the problem and their ability to monitor the same. They had also practiced the technique and were able to speak fluently without stressing themselves. The findings of the current study yield similar results as the findings of Plexico, Manning and DiLollo (2005); Craig and Andrews, (1985); Madison, Budd and Itskowitz, (1986).

Participants in the category of partial relapse had better scores on all factor domains in comparison to the participants in the complete relapse group, and had lesser scores on all factor domains (with the exception of clinician related factors) when compared with the participants in the no relapse group. This category obtained good scores on domains of clinician and therapy related factors, suggesting that these factors were not the contributing factors to relapse for majority of the participants in this category. Least scores were obtained in the domain of subject

related factors. Failure to practice the technique, self monitoring strategies and the discomfort of using the technique outside the clinical settings are few of the common factors implicated. These participants reported losing motivation and interest to do so. The findings are in agreement with literature regarding the motivation, interest and the need for regular practice to maintain achieved fluency (Blood, 1993; Manning, 2001; 2006). They also were not comfortable to use the technique outside clinical settings. Stress at the work place and interruptions by others when the client spoke were other factors reported to contribute to relapse.

The category of complete relapse obtained the least scores on all the factor domains. This further suggests the importance of the five factor domains in contributing to relapse. Those participants who relapsed completely to the pre therapy condition were found to obtain poor scores on subject related factors and behavior and personality related factors. Failure to practice, use self monitoring strategies are the subject related factors suggested. The participants reported the technique to be effortful and difficult to practice and therefore lost their motivation and interest. Considering the behavior and personality related factors, a feeling of inferiority, resentment and disappointment about the condition of stuttering were found to be contributing factors. Participants were also found to possess a negative attitude towards stuttering and its therapy. These findings are also in total support of the research findings observed by Craig, 1998; Silverman, 1981, Blood, 1993; Yaruss et al, 2002 and Manning, 2001; 2006. Such factors are reported to be very crucial in determining relapse in stuttering. The participants also had lesser scores in the domain of clinician and therapy related factors. Specific factors implicated by majority of the participants were that the technique taught was inadequate, with the clinician not giving sufficient instruction and guidance during the sessions. The participants thus reported not to practice the technique or take enough responsibility to reduce stuttering. Yaruss et al (2002) also reported that 9% of the participants in their study reported dissatisfaction about the therapist.

To examine if there is any statistical difference, Kruskal Wallis test was done. The results are shown in table 23. It can be seen from table 23 that statistical significance was obtained across the relapse categories in the domains of subject related, behavior and personality related and environment related factors.

Table 23: Kruskal Wallis test results for different factor domains in AWS

Domains	SR	TR	CR	BR	ER
Chi-square	21.110	6.032	6.429	18.302	17.563
Asymp. Sig.	.000	.049	.040	.000	.000

Further, to know the pairs that were statistically significant, Mann Whitney test was done. Pair wise comparison using Mann-Whitney test: this was done to make a comparison across the three categories of relapse.

a. **Between the categories of no relapse and partial relapse:** The results obtained are shown in table 24.

Table 24: Mann Whitney test results across 'no' and 'partial' relapse in AWS

Domains	SR	TR	CR	BR	ER
Z	-3.785	-.816	.000	-3.851	-3.633
Asymp. Sig. (2-tailed)	.000	.414	1.000	.000	.000

The domains of subject related, behavior and personality related and environment related factors were found to be statistically significant across the relapse categories. The domains of therapy related and clinician related factors were not statistically significant.

b. **Between the categories of partial relapse and complete relapse:** Table 25 gives the test results. Across the three categories of relapse, significant difference was only obtained for the domains of subject related and clinician related factors. No significant difference was observed for the other three factor domains.

Table 25: Mann Whitney test results across 'partial' and 'complete' relapse in AWS

Domains	SR	TR	CR	BR	ER
Z	-2.603	-1.760	-1.990	-.651	-.741
Asymp. Sig. (2-tailed)	.009	.078	.047	.515	.459

c. **Between the categories of no relapse and complete relapse:** The results are depicted in table 26. Statistical significance was obtained for all factor domains, with the exception of clinician related factors, across the three relapse categories.

Table 26: Mann Whitney test results across 'no' and 'complete' relapse in AWS

Domains	SR	TR	CR	BR	ER
Z	-3.597	-1.960	-1.643	-3.558	-3.640
Asymp. Sig. (2-tailed)	.000	.049	.100	.000	.000

In the current study, it was observed that CWS had similar relapse rates as AWS. Majority of the participants experienced a relapse in stuttering. In case of CWS, the variables majorly found to contribute to relapse were the pre-treatment severity, age of onset of stuttering, age of commencement of therapy, hereditary factors and associated problems. For younger children, other contributing factors were a lack of motivation, and failure of proper instruction and practice by the caregivers. With respect to AWS in the study, pre-treatment severity and associated problems were contributing factor. In addition, failure to practice the techniques and monitor oneself, along with loss of motivation and negative attitude towards the problem and its correction were major factors.

SUMMARY AND CONCLUSION

The present study aimed to identify the nature of relapse in children and adults with stuttering and to investigate the specific factors contributing to relapse. Beginning with a pilot study on 5 adults and 4 children with stuttering, the actual study proceeded on with suitable modifications as per the responses obtained on the pilot study. Including the pilot study, a total of 172 children and 180 AWS who had attended therapy at the All India Institute of Speech and Hearing, over a period of 4 years were contacted via telephone and follow up letters. The criteria for inclusion in the study was that the participants should have attended therapy at least 6 months prior to the data collection for the present study and should have taken treatment for a minimum of 1 week. 30 children and 32 adults reported for a follow up, of which 2 adults were excluded from the study, as they did not fulfill the required criteria.

A questionnaire was developed for the study, separately for children and adults with stuttering. The questionnaire comprised questions targeting relapse and the factors contributing to the same. Questions pertaining to the onset, nature, etiology, treatment details were included in the first and second section and the third section was in a Yes/ No format, investigating the treatment outcome with particular reference to specific factors contributing to relapse. These specific factors were put under five domains, namely clinician related (CR), therapy related (TR), subject related (SR), behavior and personality related (BR), and environment related (ER) factors. The participants' report of the improvement and relapse was also considered in this section. The domain of clinician related factors had questions which focused on the satisfaction with the clinician's approach and manner of providing therapy. Therapy related factors were insufficiencies in therapy given. The domain of subject related factors had questions which enquired upon the practice of technique, maintenance of motivation and other questions on part of the subject. Behavior and personality related factor domain considered the attitude and beliefs about the problem and its rectification. Environment related factors were a domain in which the effect of environment upon relapse in stuttering was checked. In case of younger children the questionnaire information was obtained through parents.

The results in the current study revealed that majority of the participants experienced a relapse in stuttering. This was true in case of both children and adults with stuttering. Out of 30

CWS, 23 children were found to have relapsed in stuttering, with 8 children having partially and 15 children completely relapsed. Among the 30 AWS in the study, 22 had relapsed, with 12 adults experiencing partial and 10 adults, a complete relapse to pre therapy condition.

A detailed investigation into the factors contributing to such widespread relapse rates revealed that for both children and adults with stuttering, subject related factors were most observed to result in relapse. Failures and lapses on part of the subject/participant in terms of practicing the technique, the self monitoring strategies and maintaining the motivation and interest were mainly responsible for the relapse. This was followed by behavior and personality related factors. Within this, tension and anxiety in speaking situations, negative attitude about the problem and loss of confidence and interest in managing the problem were found to be strong contributing factors. The third major factor domain was found to be environment related factors. Lack of motivation from the environment and pressure to speak faster was majorly reported. In case of CWS, the caregivers were found to be less motivated and did not believe in the treatment and the practice of the same. Hence, the children were not motivated or directed to speak slower or use the techniques. The domain of clinician and therapy related factors obtained higher scores. However, few adults and caregivers did implicate the relapse to lack of proper instruction and training on part of the clinician and limited effectiveness of technique itself. Insufficient therapy durations were also reported by few persons with stuttering. Relapse categories and the factor domains were statistically analyzed. All the domains were found to be statistically significant.

Probing into the relation of relapse to the chronological age, age of onset, nature, etiological factors, associated problems, pre-treatment severity, revealed that pre-treatment severity and associated problems to be possible factors contributing to relapse in both children and adults with stuttering. Participants who did not relapse had lesser pre therapy severity levels of stuttering than the participants who experienced partial and complete relapse. The participants who relapsed had more associated problems with stuttering than the participants who maintained the achieved fluency.

With respect to children with stuttering, the children who maintained the improvement belonged to a younger age group than the children who relapsed in stuttering. They had also begun attending therapy at a younger age. The children who relapsed in stuttering had a strong

family history of stuttering, while none of the children who maintained the improvement had such a history. However, hereditary factors were not found to be contributing to relapse in AWS.

Since majority of CWS did not report for follow up, conclusions regarding the recovery patterns cannot be generalized. It could be that many those PWS who did not follow up had recovered which made them or their parents not to respond for further follow up.

It can therefore be concluded that in case of CWS, the contributing factors to relapse were pre-treatment severity, hereditary factors, age of onset, age of commencement of therapy and associated problems. For AWS in the study, pre-treatment severity and the presence of other associated problems were found to be contributing factors to relapse. Among the specific factors contributing to relapse, all the factor domains were very essential in determining relapse. The study highlights the importance of incorporating attitude and behavior modification and emotional support into the treatment regimen of PWS, and addressing their feelings and concerns with due respect and consideration. Also, it is important to devise better means of training during the maintenance phase of therapy, so that the relapse rates reduce. In case of CWS, better treatment methodology and techniques incorporating evidence based methods and greater participation from the child and caregivers should be brought in. Counseling the immediate members in the client's environment will also be helpful in achieving this goal.

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APPENDIX I

ALL INDIA INSTITUTE OF SPEECH AND HEARING

VARIABLES CONTRIBUTING TO RELAPSES IN INDIVIDUALS WITH STUTTERING

QUESTIONNAIRE (CHILDREN)

Name: **Case No:** **Date:**

Age/ sex: **Tel no:** **e-mail:**

Address:

Education: **Occupation:**

I) Onset related Information:

P1) Age of onset of stuttering:

1) < 3 yrs 2) 3;1-5 yrs 3) 5;1-12 yrs

P2) Nature of onset: Sudden/ Gradual

P3) Status of the condition: Static/ Increasing/ Decreasing/ Fluctuating

P4) Chronicity: 1) Acute (< 1 month) 2) > 6 months (specify)

P5) Awareness of problem: 1) Not aware 2) Aware

P6) Concern about problem: 1) Not concerned 2) Somewhat concerned 3) Highly concerned

P7) Stuttering variability: 1) No 2) Somewhat variable 3) Highly variable

a) Situations
b) Language
c) Person

P8) Cause of stuttering:

1) Hereditary 2) Organic 3) Psychological 4) Unknown 5) Others (specify)

P9) Associated problems, if any (specify):

II) Therapy related information:

T1) Age at which therapy was provided:

1) < 3 yrs 2) 3;1-5 yrs 3) 5;1-12 yrs

T2) Number of times therapy taken:

1) 1 2) 2-3 3) 3-5 4) > 5

T3) Type of speech therapy provided:

1) Lilly pad/barrel bridge/ finger thumb/blown up balloon.
2) Prolongation of sounds
3) Airflow / modified airflow
4) Gentle onset of speech
5) Use of devices
6) Response cost
6) Combination of treatment (specify)
7) Counselling

T4) Total duration of speech therapy sessions:

1) 1 week 2) 2 weeks 3) 3-4 weeks 4) 1-2 months 5) > 2 months

T5) Duration of most recent speech therapy:

1) < 1 week 2) 1-2 weeks 3) 2-4 weeks 4) > 1 month

T6) Presently attending speech therapy classes? Yes / No

T7) Duration since stoppage of therapy:

1) < 2 weeks 2) 2-4 wks 3) 1-3 mths 4) 3-6 mths 5) 6-12 mths 6) > 1 year

T8) Any other kinds of treatment tried for stuttering? Yes/ No (specify)

III) Treatment outcome:

1) How would you rate your improvement in fluency soon after completion of therapy?

1)No improvement 2) < 25 % 3) 25-50% 4) 50-75% 5) 75-100% 6) 100%

2) How is the improvement noted, if any maintained?

1) Stuttering has relapsed to pre therapy levels.
2) Improved partially and maintained it.
3) Improved partially and relapsed, though not to pre-therapy levels.
4) Improved completely and maintained it.

Sl. No	Particulars	NO	YES	NA
1.	***Subject related factors:***			
S1	Were you regular to the therapy sessions?			
S2	Did you practice the technique?			
S3	Were you comfortable using the technique outside clinical settings?			
S4	Were you prepared for any fluency breakdown after success in therapy?			
S5	Were you able to practice the technique without much effort?			
S6	Did you show enough responsibility to maintain acquired fluency?			
S7	Did you use the self monitoring and self correction strategies?			
S8	Did you maintain motivation and interest?			
S9	Were you able to speak fluently without stressing yourself?			
S10	Do you perform your duties without using stuttering as an excuse/escape behavior?			
2.	***Therapy related factors***			
T1	Was the time allotted for therapy sufficient?			
T2	Was the technique taught adequate?			
T3	Did therapy address your feelings, concerns along with your stuttering?			
T4	Was the language used in the session familiar?			
T5	Was the counseling/ guidance adequate?			

3.	***Clinician related factors***			
C1	Did the therapist seek information in making decisions?			
C2	Did the therapist teach self monitoring and self correction strategies?			
C3	Was sufficient instruction given regarding maintenance of fluency?			
C4	Was sufficient instruction given regarding generalization of fluency?			
C5	Did the clinician explain the technique adequately?			
4.	***Environment related factors***			
E1	Are you allowed to speak slowly without being pressurized?			
E2	Are you allowed to complete what you want to say without interruptions?			
E3	Do listeners patiently listen when you speak?			
E4	Are you encouraged or motivated to use the technique?			
E5	Are you comfortable in communicating with others?			
E6	Are you happy with your school/friends?			
E7	Has your life remained the same (without significant/influencing events) since cessation of therapy?			
5.	***Behavior and Personality related factors***			
B1	Do you feel calm and relaxed while speaking?			
B2	Do you initiate conversations than being alone?			
B3	Do you feel confident of your ability to communicate?			
B4	Do you like to talk often and socialize?			
B5	Are you comfortable to discuss your fears and concerns openly?			
B6	Do you feel that you are as capable as others without stuttering?			
B7	Do you feel that you can change your stuttering?			
B8	Do you feel that your stuttering does not interfere in your achievements?			

General remarks by the client/Caregiver (specify):

Informant
(with name and date)

Examiner's remarks:

Examiner
(with name and date)

APPENDIX II

ALL INDIA INSTITUTE OF SPEECH AND HEARING

VARIABLES CONTRIBUTING TO RELAPSES IN INDIVIDUALS WITH STUTTERING

QUESTIONNAIRE (ADULTS)

Name: **Case No:** **Date:**

Age/ sex: **Tel no:** **e-mail:**

Address:

Education:

Occupation:

Marital status:

I. Onset related Information:

P1) Age of onset of stuttering:

2) < 3 yrs 2) 3;1-5 3) 5;1-12 4) 12;1-17 5) 17; 1-30 6) 30; 1-50 7) >50

P2) Nature of onset: Sudden/ Gradual

P3) Status of the condition: Static/ Increasing/ Decreasing/ Fluctuating

P4) Chronicity:

1) Acute (< 1 month since onset) 2) 1-3 months 3) 3-6 months 4) > 6 months 5) Not known

P5) Awareness of problem: 1) Not aware 2) Aware

P6) Concern about problem: 1) Not concerned 2) Somewhat concerned 3) Highly concerned

P7) Stuttering variability: 1) No 2) Somewhat variable 3) Highly variable

a) Situations

b) Language

c) Person

P8) Cause of stuttering:

1) Hereditary 2) Organic 3) Psychological 4) Unknown 5) Others (specify)

P9) Associated problems, if any (specify):

II. Therapy related information:

T1) Age at which therapy was provided:

2) < 3 yrs 2) 3;1-5 3) 5;1-12 4) 12;1-17 5) 17; 1-30 6) 30; 1-50 7) >50

T2) Number of times therapy attended:

1) 1 2) 2-3 3) 3-5 4) > 5

T3) Type of speech therapy provided (tick the appropriate ones):

1) Analogies (specify) 2) Prolongation 3) Airflow/ modified airflow

4) Gentle onset of speech 5) Use of devices 7) Counselling

6) Combination of treatment (specify)

T4) Total duration of speech therapy sessions:

2) 1 week 2) 2 weeks 3) 3-4 weeks 4) 1-2 months 5) > 2 months

T5) Duration of most recent speech therapy:

1) < 1 week 2) 1-2 weeks 3) 2-4 weeks 4) > 1 month

T6) Presently attending speech therapy classes? Yes / No

T7) Duration since stoppage of therapy:

2) < 2 weeks 2) 2-4 wks 3) 1-3 mths 4) 3-6 mths 5) 6-12 mths 6) > 1 year

T8) Any other kinds of treatment tried for stuttering? Yes/ No (specify)

III. Treatment outcome:

IV. How would you rate your improvement in fluency soon after completion of therapy?

0) No improvement 1) < 25 % 2) 25-50% 3) 50-75% 4) 75-100% 5) 100%

V. How is the improvement noted, if any?

5) Stuttering has relapsed to pre therapy levels.
6) I have improved partially and maintained it.
7) I have improved partially and relapsed, though not to pre-therapy levels.
8) I have improved completely and maintained it.

Sl. No	Particulars	NO	YES
1.	Subject related factors:		
S1	Were you regular to the therapy sessions?		
S2	Did you practice the technique?		
S3	Were you comfortable using the technique outside clinical settings?		
S4	Were you prepared for any fluency breakdown after success in therapy?		
S5	Were you able to practice the technique without much effort?		
S6	Did you show enough responsibility to maintain acquired fluency?		
S7	Did you use the self monitoring and self correction strategies?		
S8	Did you maintain motivation and interest?		
S9	Were you able to speak fluently without stressing yourself?		
S10	Do you perform your duties without using stuttering as an excuse/escape behavior?		

2.	***Therapy related factors***		
T1	Was the time allotted for therapy sufficient?		
T2	Was the technique taught adequate?		
T3	Did therapy address your feelings, concerns along with your stuttering?		
T4	Was the language used in the session familiar?		
T5	Was the counseling/ guidance adequate?		
3.	***Clinician related factors***		
C1	Did the therapist seek information in making decisions?		
C2	Did the therapist teach self monitoring and self correction strategies?		
C3	Was sufficient instruction given regarding maintenance of fluency?		
C4	Was sufficient instruction given regarding generalization of fluency?		
C5	Did the clinician explain the technique adequately?		
4.	***Environment related factors***		
E1	Are you allowed to speak slowly without being pressurized?		
E2	Are you allowed to complete what you want to say without interruptions?		
E3	Do listeners patiently listen when you speak?		
E4	Are you encouraged or motivated to use the technique?		
E5	Are you comfortable in communicating with others?		
E6	Are you happy with your school/friends?		
E7	Has your life remained the same (without significant/influencing events) since cessation of therapy?		
5.	***Behavior and Personality related factors***		
B1	Do you feel calm and relaxed while speaking?		
B2	Do you initiate conversations than being alone?		
B3	Do you feel confident of your ability to communicate?		
B4	Do you like to talk often and socialize?		
B5	Are you comfortable to discuss your fears and concerns openly?		
B6	Do you feel that you are as capable as others without stuttering?		
B7	Do you feel that you can change your stuttering?		
B8	Do you feel that your stuttering does not interfere in your achievements?		

General remarks by the client/Caregiver (specify):

Informant
(with name and date)

Examiner's remarks:

Examiner
(with name and date)

SH/ARF 3.65-YVG/2010-11 14.10.2011

Submitted to the Director

Sub: Submission of ARF (No. 3.65/2010-11) Project Report
Ref: SH/Coordn/ARF/3.65/2009-11

With reference to the above, we are herewith submitting the Project Report (ARF/No. 3.65/2010-11) titled "Variables contributing to Relapses in Individuals with stuttering". We take this opportunity to thank the Director for sanctioning the project and all the support.

In this context we are also pleased to inform you that the paper based on part of this project work was presented by the principal investigator of the project in the 9th Oxford Dysfluency Conference held at Oxford, UK during the first week of September 2011. The title of the paper was "Relapse following therapy in adult persons with stuttering", which was received well by the delegates of the conference. Also, abstract titled "Relapse pattern in children with stuttering" has been submitted for the forthcoming ISHA conference.

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