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Comparative analysis of modern & traditional therapeutic approaches used to treat children who stutter, case of Tlemcen community.

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Dedications:

We dedicate this work to our beloved parents and grandparents, whose unwavering love, sacrifices, and prayers have been the foundation of our journey.

To our siblings, for their constant encouragement and patience throughout this process.

To our closest friends Youcef Brahimi and Ilyes Boumeddane for their support and help throughout this journey of learning.

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Abstract

This research examined the therapeutic strategies employed to handle stuttering among children in the community of Tlemcen, focusing on Qur'anic recitation as a culturally saturated intervention. The objective was to investigate the prevalence and effectiveness of traditional, and modern, as well as to investigate whether reciting the Quran could serve as an adjunctive therapeutic tool. A mixed-methods approach was employed, consisting of interviews with two Qur'anic teachers and four speech therapists, observation of five children undergoing therapy, and a questionnaire filled out by the local community. The findings showed that breathing exercises and syllable-timed speech, traditional methods, continue to be the most practiced as they are established, cheap, and well-known within the culture. Nevertheless, more recent methods such as neuro-linguistic programming and cognitive control training had longer-term fluency management potential if applied on a regular basis. Quranic recitation combined was an encouraging additional method with both phonological and affective benefits, particularly in religious households. Its use was, however, limited by parental resistance and widespread teachers' unawareness. The study arrived at the conclusion that a hybrid model, combining time-worn methods, newer cognitive models, and culturally acceptable practices like Qur'anic recitation, might provide a better and more comprehensive model for stuttering treatment. The study also demands greater interdisciplinary collaboration, better training of therapists, and public education to improve speech therapy interventions in resource-limited areas like Tlemcen.

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General Introduction

General introduction:

Stuttering is a complex speech disorder characterized by disruptions in the fluency of verbal communication, often manifested as repetitions, prolongations, and blocks. It typically begins in early childhood and can significantly affect a child's ability to communicate, academic performance, and psychological well-being. Although stuttering is a universal condition, its therapeutic management varies widely across regions.

In Algeria, Tlemcen, stuttering therapy among children is a combination of traditional techniques, recently emerging state-of-the-art techniques, and in some cases, practice of reciting the Qur'an. Traditionally, traditional speech therapy methods such as fluency shaping, control of breathing, and repetition methods have been the major approaches on the therapeutic platform due to their accessibility and convenience for practitioners.

Later years, however, have witnessed newer, more contemporary methods in line with neuro- and psycholinguistic frameworks begin to emerge. These include methods such as Neuro-Linguistic Programming (NLP), Delayed Auditory Feedback (DAF), and cognitive-linguistic games designed to create fluency through brain-led intervention. At the same time, Qur'anic recitation is being explored for its therapeutic benefits through its rhythm, breathing regulation, and calming effect, though it is not duly classified under clinical speech therapy.

This study aims to provide an empirical comparison of the different therapeutic techniques used for children who stutter within the Tlemcen context. Since several practices are present among the population, no literature to date has compared their relative efficacy. This study fills the gap by ascertaining the prevalence of these practices, their efficacy, and how other parameters like Qur'anic recitation could complement fluency gains in speech.

The study draws on the following questions of inquiry:

- Which treatments are most commonly used in Tlemcen for the treatment of childhood stuttering, and which have proven to be most effective?
- Is recitation of the Qur'an a viable treatment for reducing stuttering?

From these, the following hypotheses have been formulated:

- Traditional speech therapy treatment is more commonly used than the modern one in Tlemcen due to ignorance and lack of exposure, yet modern treatment is more effective in curing stuttering in children.
- Children who regularly recite the Qur'an demonstrate measurable improvement in fluency over time.

For the purposes of answering these questions, the study employs a mixed-methods comparative design that integrates qualitative and quantitative approaches. Interviews of Qur'anic teachers and speech therapists, therapy session observations, and a public questionnaire to examine general impressions regarding treatment of stuttering were used to collect data.

The dissertation is composed of two chapters. Chapter One presents a comprehensive review of the literature on definitions, etiology and classification of stuttering, historical and current therapy practice summary, and Qur'anic recitation as a potential therapeutic agent. Chapter Two presents the research methodology including description of the design, data collection instruments, participant selection criteria, and ethical concerns. The chapter also interlaces the results and analysis of the data into a meaningful narrative, giving an overall outlook to the findings of the study.

CHAPTER ONE

Chapter One: Literature Review

1.1 Introduction:

Stuttering is one the most difficult and controversial of speech disorders. Its intangible quality has also generated fascination and interest for centuries, from the ancient world to contemporary scientific disciplines. This chapter aims to provide a general introduction to stuttering by studying its numerous definitions and tracing the historical evolution of how it has been conceptualized and defined. Also, the different therapeutic methods and techniques used to address this speech disfluency and disorder.

1.2 Definitions and Historical Perspectives of Stuttering

1.2.1 Definition of Stuttering

The phenomenon of stuttering was first documented in ancient Egypt around (1550 BCE) in the Ebers Papyrus, which described it as a speech difficulty. Early Greek philosophers, such as Hippocrates and Aristotle, linked stuttering to an imbalance in the coordination between the tongue and language processing in the mind. Over time, stuttering has been defined in many different ways, often varying based on perspective and understanding. In the Middle Ages, it was frequently viewed as a curse, while the Renaissance era marked the shift toward more scientific explanations. Today, stuttering remains a complex phenomenon with diverse definitions, some of which focus on its causes, others describe the behavioural features seen in some individuals, and some even deny the existence of the condition altogether. Furthermore, there are definitions that aim to combine all previously mentioned aspects, showing how the understanding of stuttering has evolved and continues to be debated until this day.

The most widely accepted definition of stuttering describes it as a disruption in the fluency of verbal expression, which is characterized by involuntary, audible or silent repetitions or prolongations of short speech elements, such as sounds, syllables, or one-syllable words. These disruptions tend to occur frequently, are distinct in nature, and are not easily controlled by the speaker. In addition to these disruptions, stuttering is often accompanied by physical manifestations, including facial grimaces, tics, and head movements, as the body responds involuntarily to the speech difficulties.

While this widely accepted definition is based on observable speech disruptions, it is often described as listener-based, since it primarily focuses on the disruptions that are evident to an outside observer.

However, Perkins (1990) challenged this perspective in his now classic article "What is Stuttering?", arguing that listener-based definitions fail to adequately capture the true nature of stuttering. He proposed a speaker-centered definition, stating that stuttering is better defined as "the involuntary disruption of a continuing attempt to produce a spoken utterance." (1990, p. 376).

Perkins characterizes the stuttering nature as not residing in the acoustic interruptions or speech blocks themselves, but in the "loss of control" experienced by the speaker. It is not just the physical loss of control in trying to speak, but also the mental and emotional losses involved in it. It is not just the sounds or pauses the listener hears in speech, but the frustration and tension the speaker feels when they cannot communicate easily. Perkins' viewpoint was a major shift in how one has to think about stuttering: instead of just taking into account what other people can hear and see, he drew attention to what goes on inside the stutterer.

This shift paved the way for a more intimate and complex conceptualization of stuttering, acknowledging it as a physical and psychological struggle.

1.3. Linguistic Aspects of Stuttering

The prevailing literature has it that Stuttering is likely to be affected by the word order/Lexical placement. The findings have it that stuttering is Expected to occur at the beginning of a sentence or clause rather than the middle or end. The word class also plays a significant role in stuttering as Rachel et al (2010) demonstrated that the function words are more likely to be at the initial sentence position than content words.

Research indicates that the tendency of stuttering increases with word length (Griggs & Still, 1979; Hejna, 1955; Silverman, 1972; Soderberg, 1966, 1967). Stuttering is also likely to occur when the mean length of utterance is increased this latter refers to the

average/median number of morphemes in a speaker's own utterance Studies by Richels et al. (2010), Wagovich et al. (2009), report that stuttering is likely to happen when the speaker attempts to produce more complex syntactic structures. Stuttering could also occur when sentence structures are more grammatically complex. Logan (2003) suggests that this effect however decreases in adulthood. Furthermore, evidence suggests that the likelihood of stuttering tends to occur when the word is less familiar.

1.3.1 Vocabulary Access and Lexical Retrieval

One Occasional and periodic hypothesis points out to the notion that stuttering may be associated with a difficulty in accessing a word (Gregory & Hill, 1999; Packman, Onslow, Coombes, & Goodwin, 2001; Wingate, 1988). Lexical retrieval difficulties are frequently related to cluttering and considered to be one of the main feature, however its acknowledgement as a stuttering characteristic is controversial

One of the problems in confirming or simply testing such hypotheses lies in the fact of Separating differences in delayed responses in people who stutter of whether being an actual issue in lexical access (Conture, 1990) or other psychological issues such as word fear or anxiety even. A research done by Packman et al. (2001) strived to interpret the notion who stutter had hurdles in producing both real words and nonwords, highlighting the reality that that the problem was not caused by the meaning of words but rather something else affecting speech production

1.3.2 Word Class Influence

As mentioned above word class is seen as critical to people who stutter therefore stuttering has also been approached from a word class point of view, specifically to the difference highlighted between stuttering on content words and function words. a study conducted by various scholars (Bernstein, 1981; Bloodstein & Gantwerk, 1967; Bloodstein & Grossman, 1981; Howell, Au Yeung, & Pilgrim, 1999; Richels et al., 2010; Wall, 1977) supports the observation that stuttering is likely to occur more commonly on function words in younger children. As function words are more likely smaller simpler structures as opposed to the content words (by which adults tend to

stutter the most) which carry more meaning. As children tend to develop they become more enhanced at utilizing function words within correct grammatical contexts as this phenomenon typically emerges around the age of eight. However, this still needs more empirical evidence as function words are likely to occur at the beginning of a sentence, likewise stuttering frequently happens at these sentence positions. In a study, Dworzynski and Howell (2004) highlighted the fact that instead of stuttering changing from function to content words a set group of 26 native German adult speaker showed increased stuttering in both word classes (regardless of what was mentioned before) compared to the 6-11 years old group

1.3.3 Development of Linguistic Skills

One significant literature findings point out to the fact that stuttering is likely to commence at a period of intense language developing (Arndt & Healey, 2001; Howell & Au Yeung, 2002; Kelman & Whyte, 2013; Kloth, Janssen, Kraaimaat & Brutten, 1995; Manning, 2009; Yairi, Paden, Ambrose, & Thorneburg, 1996; Yaruss, La Salle, & Conture, 1998). As children start rapidly acquiring new vocabulary, grammar and new sentence structures ,this period of intense development would be considered as a major cognitive overload obstructing the brain to internalize and process such load of information

It is also suggested that children would demonstrate a lower competence in expressive and receptive language (Anderson & Conture, 2000; Byrd & Cooper, 1989; Ntourou, Conture, & Lipsey, 2011; St. Louis & Hinzman, 1988) as this means they would find various difficulties in expressing themselves verbally and even understanding language, more immature language (Howell & Au Yeung, 1995; Wall, 1980), as it involves overgeneralization of rules for instance the third person “goes” is applied on all pronounce the past tense of the verb go is produced as “goed” and omission of certain morphemes

Children who stutter are also highlighted to have less sophisticated articulatory system (Melnick & Conture, 2003) as there could be potential difficulties with the actual physical production of sounds and have poorer grammar (Westby, 1974)

However, contradictory findings have emerged as scholars argued that children who begin to stutter demonstrate typical and normal language skills (Anderson & Conture, 2000; Miles & Ratner, 2001; Nippold, 2012) as they could also present advanced language skills at the time stuttering starts. Also one crucial finding is that the child having advanced language skills at the time of stuttering onset would be a risk factor as this suggests that the child's brain is in advance of their motor speech control leading to disfluencies

1.3.4 Phonological Aspects

The evidence that stuttering onset could be caused by language ability remains controversial however there is a great portion of evidence which suggests that phonological factors/difficulties play a more crucial role in developing stuttering.

1.3.4.1 Phonological Working Memory

Baddeley's (2003) reasoning behind the phonological working memory suggests that this latter incorporates a phonological store, as he describes as a temporary storage space on the speaker's mind where phonological information (spoken speech sounds) is held for a brief period of time, however such information is affected by gradual decay IE if it is not maintained it will fade away. Alongside the phonological working memory there is the what is called the process of silent rehearsal a process which resists the gradual decay and keeps the phonological information maintained on the working memory .A study conducted by Byrd et al (2012) tested 14 adults who stutter (AWS) and a comparable control participants in a non-word repetition tasks (mainly at 2 3 4 7 syllable) and a phoneme elision activity which required the participant to produce the non-word with one or more missing phoneme, They found that the AWS showed a n imprecise ratio at producing a lengthy non-word and had more attempts to reproduce the non-words in a correct way compared to their non-stuttering peers.

1.3.4.2 Phonological Encoding and Motor Coordination

Nmasivayan and van Lieshout (2008) Have conducted a study in which they identified differences between articulator stability between both adults who stutter and their fluent peers. The study showed that the adults who do not stutter (AWNS) with practice on the non-word activity became more accurate and consistent on the jaw and lip coordination (movements) to produce speech sounds likewise the adults who stutter (AWS) showed a less accurate coordination of the jaw and lips.

1.3.5 Bilingualism and Stuttering

Studies have put forward that as bilinguals may stutter in different phonetic positions in both of their languages there is also stability on stuttering location across syntactic structures. Howell and colleagues (2006) have approached stuttering loci from a different angle focusing on the function-content word class differentiation in English and Spanish. As mentioned before, adults tend to stress more on content words as this latter is considered to have stressed words where it involves more articulatory effort (Wingate, 1984). They have also proved that such word classes tend to be more motorically intriguing when measured by the index of phonetic complexity (Jakielski, 1998). While such data accounts for English which is considered to be a stress timed language it is very different in Spanish as similar levels of stress are placed on both the content and function words. In addition in the English language function words are more phonologically complex than content words, rather in Spanish there is a pretty much similar level of complexity

1.3.6 The Covert Repair Hypothesis

The covert repair hypothesis is a psycholinguistics theory which accounts for error production found in the non stuttering speakers. However through time it also started acknowledging and incorporating the speech of the stutterers from a phonological point of view. The Originators of this hypothesis Postma and Kolk's (1993) covert repair hypothesis (as cited in **David Ward**, 2010) believe that all linguistic output is governed by various self monitoring procedures. As speakers before they produce any verbal

expression, there is an internal monitoring mechanism that operates within the brain. The purpose of such a system is to check if the intended meaning the speaker wants to produce is correct and makes sense as it also establishes appropriate words giving its lexical value to the intended meaning.The Covert Repair Hypothesis (CRH) is a psycholinguistic model that explains the generation of errors in non-stuttering speakers. In the course of time, though, it has found application in stutterers' speech, but more so from the phonological point of view. Postma and Kolk (1993), the authors of this hypothesis, suggest that all linguistic output is controlled by internal self-monitoring mechanisms. Prior to the articulation of any uttered word, speakers employ an internal monitoring device within the brain. The function of this device is to scrutinize whether the message to be spoken is meaningful and true, as well as choosing proper lexical items for the transmission of the message.

Within the CRH, stuttering is accounted for by breakdowns in this internal monitoring system. More specifically, the hypothesis proposes that speech is disrupted by a pre-articulatory feedback loop at this planning stage—prior to actual speech production. When the internal monitor registers a phonological error at this level, the system breaks off the speech process to facilitate on-line repair. This break-off and repair process is held to be accountable for the disfluencies produced by people who stutter.

One highlighted assumption is that the errors stutterers are trying to fix is phonological as the phonological encoding is faulty this therefore leads to prolongations, blocks and repetitions hence stuttering. Vincent et al conducted a study which demonstrated that stuttering is not a static phenomenon but could manifest and function in different ways. They proposed that the different locations of phonological encoding breakdown lead to the identification of the type of stuttering, an instance provided would that once the breakdown occurs on a syllable final position on a Consonant vowel consonant (CVC) structure will create a repetition on the syllable onset thus a word like book will become /bU BU BU BU BUK/

1.4. Causes of Stuttering

Chapter One: Literature Review

When it comes to the causes of stuttering, there are still no clear answers. Many theories have been proposed by researchers, but nothing concrete has been established yet. The question 'Why do people stutter?' often invites the answer 'because,' but that response is usually preceded by 'maybe.' Maybe people stutter because they experience stress and become self-conscious. Or maybe it's because the brain's processing of speech doesn't coordinate smoothly with the articulatory system. These examples show that stuttering can have many causes (Va11 Ca111p, 2014, p. 112).

Let's consider a pupil who was asked by his teacher to read a passage starting with the word 'Bananas.' As soon as he began speaking, he pressed his lips together for two seconds to produce the **/b/** sound, then released his breath with excessive force to finish the word. Why did he stutter?

This could be due to **situational factors**, perhaps the pupil felt nervous because one of his classmates, whom he likes, was watching him, making him more self-conscious.

The stuttering might also have **constitutional causes**. Maybe the pupil was anxious because he wasn't familiar with the passage, or he might have been shy about standing up in front of the class.

Finally, since all what was mentioned before is considered as environmental factors, there could be **neurological factors**. Stuttering has been linked to differences in how the brain processes speech. Specifically, people who stutter often show more activity in the right hemisphere of the brain, which may cause confusion or difficulty in speech production since speech is usually controlled by the left hemisphere (ANN Packman, JOSEPH s. Attanasio, 2017, p04).

1.4.1 Psychological factors

Starting with only the psychological factors leading to stuttering we have first WENDELL Johnson in his famous book *The Onset of Stuttering* (1959), stated that "Stuttering begins not in the child's mouth but in the parent's ear. It is essentially a problem of diagnosis, not of speech." (Johnson, W. (1959). *The Onset of Stuttering:*

Research Findings and Implications. University of Minnesota Press, p. 45.) He believed that stuttering is not caused because of a neurological problem, that it is not something that children are born with, rather it is caused by how parents or caregivers react to their children's speech mistakes, which will make the child more anxious and self-conscious about their speech. This stress or anxiety can make the stuttering worse overtime.

Another theory that is related to psychology and stuttering was introduced by Joseph Sheehan (1918–1983). He viewed stuttering as an "approach - avoidance" conflict within the speaker and the stutterer. "Approach" which refers to the desire of speaking fluently and comfortably as a normal person and speaker, and "avoidance" which refers to the fear and the anxiety that the stutterer gets before speaking. It is a set of assumptions that the speaker makes and imagines before speaking. This creates a mental and emotional conflict, where the speaker wants to speak but fears of making mistakes and stuttering in the process.

Sheehan argued that when a person wants to speak but simultaneously afraid of making mistakes, his brain will send mixed signals to the speech muscles which will create an abnormal movement causing speech to become blocked.

If the stutterer finds himself in a situation where they have to speak fluently without making any mistakes, the fear of them making mistakes will increase and the mixed signals will keep on getting to the speech muscles making the rate of stuttering raise more and more.

Sheehan with his "approach - avoidance" theory highlighted the avoidance behaviour that stutterers use to lessen the stuttering in their speech and came up with many therapeutic methods to help these people overcome this behaviour.

Similarly, Oliver Bloodstein (1920–2010) also approached stuttering from a psychological point of view as he introduced the Anticipatory Struggle Hypothesis. This theory refers that stuttering develops due to a child's expectations of the difficulty of the act of speaking. These anticipations usually come from the challenges that children face during their early speech, the pressure to speak fluently, or the pressure they get from

their parents or caregivers. Bloodstein (1995) said that when a child anticipates the mistakes he is going to make while speaking before even speaking, he will eventually get stressed and anxious which will lead to the phenomenon of stuttering in the long term.

Bloodstein (1995) and Sheehan (1970) both introduced psychological and environmental factors that lead to stuttering. They both talked about the contribution of the emotions of fear and anxiety to stuttering; Bloodstein (1995) focusing on the development of fear within the stutterer over time, and Sheehan paying more attention to the conflict that happens during the time of speaking and the fear of stuttering and the conflict between the two.

1.4.3 Neurological factors

While those previously mentioned theories set the foundation for further exploration of the psychological and environmental origin of stuttering, they were far from adequate to completely explain the ease of the phenomenon of stuttering. A clear void existed in research on the neurology of causes of stuttering, and it is for this reason that most researchers started examining such factors so that they could find out more about why people stutter.

There were many theories that focused on the neurological factors leading to stuttering and all of them are supported with solid evidence that is based on experiments and analysis and many years of work. Starting with Gerald Maguire (2000) and his colleagues, it was believed that the neurotransmitter “dopamine” is related to the phenomena of stuttering. This neurotransmitter has a direct effect on the basal ganglia which refers to a group of interconnected structures located deep within the brain.

These structures play a big role in controlling and coordinating various functions. The basal ganglia control voluntary movements such as walking, running, grabbing something, or even speaking, these are movements that we consciously make the decision to make. They also help the movements that a human decides to make

coordinated and smooth, this includes actions like writing, typing, or any other action that requires focus and precision.

When it comes to speaking, the basal ganglia ensures that speech is smooth and coordinated. They focus on coordinating the movements of the lips, tongue, and voice, ensuring that speech flows without interruptions. However, if the basal ganglia are not working properly, or there is some sort of abnormal activity, this motor control will be disturbed and it will cause motor disorders such as stuttering.

Gerald Maguire (2000) dived deep into this matter and he noticed through many brain scans and clinical trials that the basal ganglia will have more abnormal activity if there is too much dopamine activity in it.

He said that "The overactivity of dopamine in the basal ganglia disrupts the neural circuits responsible for fluent speech, leading to the characteristic blocks and repetitions seen in stuttering." (Maguire, G. A., Riley, G. D., & Franklin, D. L. (2000). The pharmacological treatment of stuttering. *CNS Drugs*, 14(4), 261-273, p. 265.) This mainly explains that the neurotransmitter "dopamine" has a direct impact on the basal ganglia which has a direct impact on the speaking mechanisms. Gerald's research (Maguire, G. A., Riley, G. D., & Franklin, D. L. (2000). The pharmacological treatment of stuttering. *CNS Drugs*, 14(4), 261-273, p. 265.) opened doors to many therapeutic methods and it was revolutionary although it only focused on the neurological aspect of stuttering.

Recent research and advances in the genetic and neurobiology studies (e.g., **Kang et al., 2010; Drayna, 2011**) have shown that certain genes play a role in how the human brain develops and how it processes, especially the areas in charge of speech and language processing. These genes influence the wiring of brain circuits that manage speech motor control and auditory feedback. (**Kang et al., 2010; Drayna, 2011**) When mutations occur in these genes resulting in an abnormal activity leading to language disorders such as stuttering. Similarly, Dennis Drayna, (2011) believed that some of these genes are responsible for the stuttering phenomenon. He believes that stuttering

has a genetic origin and has nothing to do with emotions or environmental factors, strictly genetics and family history. To prove his theory, his study was mainly about specific mutations in certain genes that may lead to stuttering.

The genes Drayna focused on the most in his research are: GNPTAB, GNPTG, and NAGPA. He believed that mutations in these genes will probably lead to stuttering eventually. The GNPTAB gene provides instructions for making two parts (alpha and beta subunits) of an enzyme called GlcNAc-1-phosphotransferase, which plays a key role in lysosomal enzyme targeting.

This enzyme helps tag enzymes so they are properly delivered to lysosomes, which are like tiny recycling centers inside our cells. These lysosomes break down and reuse materials the cell no longer needs. Mutations in this gene may lead to inefficient tagging and transport of enzymes in brain cells, which can disrupt motor control functions related to speech (Kang et al. (2010), New England Journal of Medicine.).

The GNPTG gene that encodes the gamma subunit which is the third part of the same GlcNAc-1-phosphotransferase enzyme complex. It works together with GNPTAB to direct enzymes to lysosomes. Like GNPTAB, mutations in GNPTG impair lysosomal enzyme processing. When neurons in areas that control speech are affected, it can contribute to stuttering. (Kang et al. (2010), New England Journal of Medicine).

The NAGPA gene is like the finisher in the cell, it makes sure the enzyme gets to the right place (the lysosomes) by completing the tagging process that was started by the other two genes (Kang et al. (2010), New England Journal of Medicine).

To prove that his theory was valid, he studies genes' mutation with families whose history with stuttering is continuous. He started with a sample of 123 people who stutter but not because of trauma or any environmental cause. He found that 5% (6 people out of 123) had mutations in these 3 genes. However small the percentage might seem it is still an important finding as they didn't find any mutation in a group of 270 people who did not stutter. These findings suggest that stuttering might directly be linked to these genetic mutations.

To expand the study even more, another experiment and analysis was conducted with 270 people who stuttered from different countries (Pakistan, the U.S., and the U.K). The results were that 6% (16 persons) had the same mutations, and the highest percentage of mutation was in Pakistan due to marriages between relatives, which increases the inheritance of genetic problems.

This research and theory introduced a new perspective to the causes of stuttering, Drayna suggests that stuttering has a direct relation with gene mutations. However, his research showed that having mutations does not necessarily mean that a person will stutter as other factors come into play.

On another neurobiological theory introduced by a prominent speech-language pathologist and neuroscientist known for his groundbreaking research on the neurological basis of stuttering, Luc De Nil, (2001) who studied how the brain of people who stutter works and functions, using scans and **functional Magnetic Resonance Imaging** (fMRI), which is a scanning technique and a technology that helps measure the brain activity by its blood flow. When a part of your brain is more active, it uses more oxygen, and fMRI can pick up on that change.

Luc (2001) had an experiment with two categories of people. 16 who stutter and 16 who do not stutter. The method was to give them the same speech tasks and do fMIR scans during these scans to measure the brain activity and the changes of each category. Luc found that people who stutter showed more activity when it comes to the right hemisphere, particularly in the **right inferior frontal gyrus** and **right motor areas**. On the other hand, normal speakers showed more activity in the left hemisphere which is normally the one responsible and involved in speech. (**De Nil, L. F., Kroll, R. M., Lafaille, S. J., & Houle, S. (2001).** Hemispheric activation patterns for language production in stuttering and nonstuttering adults. *Journal of Neurolinguistics*, 14(2–4), 173–195.)

There was no clear reason provided on why there is hyperactivity in the right hemisphere more than the left one which is involved in speech, but researchers

suggested that the brain shows more activity in the right hemisphere with people who stutter to make up for damages in the left one. They suggest that it could be a compensatory response when during speech the left hemisphere doesn't work well. The brain recruits the right one to compensate for the left one and control speech. This theory states that stuttering can be caused by the brain and how it functions and organizes the motor functions and hemispheres.

1.5. Types of stuttering

It is widely agreed that stuttering is a very complex phenomenon. From definitions and causes to types, stuttering is both diverse and dynamic, and researchers have come to propose different perspectives on the nature, causes, and typology of this unique speech disorder.

Researchers and practitioners introduced a number of types of stuttering, and each has presented different reasons leading to that type of stuttering. Some are psychological and others neurological. Knowing the type of stuttering the child or the person is suffering from will be of great help in the treatment process, and for this reason, speech therapists are interested in types and knowing what type of stuttering the person has.

1.5.1 developmental stuttering

As of 2025, there are approximately 80 million people who stutter worldwide, representing about 1% of the global population (Stuttering Foundation. (2025).). Out of this number, an estimated 30 million are children between the ages of 2 and 5 who experience stuttering during the critical period for speech and language development. This type of stuttering is known as developmental stuttering. It was first introduced by Oliver Bloodstein who published this work in *Journal of Speech and Hearing Disorders*, 1960. This study by Oliver Bloodstein analyzes how stuttering develops and changes within children between the ages of 2 to 16 years old. The study included 418 children (336 boys and 82 girls) who were examined at the Brooklyn College Speech and Hearing Center between 1950 and 1956 (Bloodstein, 1960).

The researcher found that developmental stuttering typically begins in the ages of 2 to 5, highlighted by repetitions of sounds, words or syllables. These early repetitions are usually effortless and deliberate. When a child is repeating these sounds (I-I-I….. Or and-and-and….) the repetition is calm and natural, as if the child is hesitating. Also, these repetitions often occur with function words which are simple and short words that help build up the structure of the sentence, such as "I" , "HE" or "AND", rather than complex, long words such as nouns, verbs and adjectives, for example a child might say "I-I-I-I want a toy" and not " I want -want- want a toy" By this age children show no awareness or embarrassment about their speech disruptions.

As children grow older (around age 6+) the symptoms of stuttering become more complexe, including longer prolongations and hard contacts or blocks, which is when a child struggles to let the word out, often with physical force. During this age children also begin to develop a set of behaviours such as eye blinking, facial expressions, and fist clenching, specifically with more severe cases. Oliver Bloodstein also mentioned the "fluent period" and how they are common in young children, but it soon disappears or becomes less common by that age.

By around age 8 or 9, many children begin to anticipate stuttering moments, leading to behaviors like word substitution, speech avoidance, or postponement, often accompanied by emotional reactions such as frustration or shame. Some children show subliminal awareness of their stuttering even at a very young age. The study emphasizes that stuttering follows a developmental course, beginning from simple disfluencies and progressing towards emotional behaviors.

The findings of the study emphasize the importance of early intervention in order to enable stuttering not to become chronic and emotionally painful.

1.5.2 Neurogenetic stuttering

Another type of stuttering was discussed in the article "A Theory of Neuropsycholinguistic Function in Stuttering" by William H. Perkins, Reymond D. Kent , and Richard F. Curlee, (1993) who tackled Neurogenetic stuttering. This type

occurs when there is damage caused to the brain, usually because of strokes, traumatic brain injury, brain tumour, or other neurological problem, that disrupts the mechanisms responsible for controlling speech movements. This type, unlike the developmental one, can start at any age (Ingham, 1990).

When the brain areas involved in coordinating between the lips, tongue, and vocal cords, communication between the brain and these muscles becomes uncoordinated leading to speech disruptions and stuttering. These disruptions often include repetitions, unexpected pauses during speech, and difficulty initiating or maintaining speech flow. The researcher Richard Curlee (Curlee, R. F. (1993). *Stuttering and Related Disorders of Fluency*. Thieme Medical Publishers, p. 67.) emphasized in the article that the neurogenic stuttering is totally different from the developmental one in several ways. He argued that it does not involve any secondary behaviors like facial expressions or eyes blinking, and neurogenic stutterers are typically aware of their disfluency but do not experience the strong emotional struggle or fear typical in developmental cases.

1.5.3 Psychogenic stuttering

While William H. Perkins, Reymond D. Kent, and Richard F. Curlee (Curlee, R. F. (1993). *Stuttering and Related Disorders of Fluency*. Thieme Medical Publishers) introduced neurogenic stuttering, which is caused by brain damage. Another type of stuttering was introduced by Joseph Sheehan (1970), which is psychogenic stuttering. This type of stuttering begins suddenly and is not specific to any age range; it is linked to psychological and emotional issues rather than brain damage or neurological issues.

It appears after a person goes through an emotional shock, trauma, stress, or any psychological disorder. These issues result in speech disruptions such as repetitions, prolongations, blocks, yet they don't follow the typical patterns seen in developmental or neurogenic stuttering.

Moreover, in psychogenic stuttering, the breakdowns in speech may appear more random, occurring in almost all speaking situations rather than only under

pressure. Also, Individuals who develop psychogenic stuttering typically have minimal awareness or embarrassment about their disfluency, as opposed to the emotional conflict that typically accompanies developmental stuttering.

Furthermore, secondary behaviors such as facial grimaces, eye blinking, or bodily tension are typically absent or present only to a very limited extent. Additionally, psychogenic stuttering can on occasion improve rapidly with psychological therapy, particularly if the underlying emotional cause is properly addressed.

1.5.4 Acquired stuttering

Another type that somehow merges between the two last mentioned types is the Acquired stuttering. It mainly refers to the stuttering that begins suddenly in adulthood or adolescence, rather than during childhood (Lebrun, 1997). This stuttering type has diverse causes as they can be psychological or neurological. Psychologically, the adult can go through a heavy trauma or a major emotional shock (death of a close person…etc) that will trigger the stuttering within the person. Neurologically, any type of brain injury, stroke, tumor, or degenerative diseases, can cause the acquired type of stuttering and the adult will start to stutter. Also, Certain medications and illicit drugs have also been reported to be a cause of acquired stuttering. From medications, antidepressants such as Selective Serotonin Reuptake Inhibitors (SSRIs), specifically Fluoxetine (Prozac) and Sertraline (Zoloft), have been associated with new-onset stuttering or disfluency, particularly when patients start medication or undergo increases in dosage (Gérard, Delecluse, and Robience, 1998). Other antipsychotic medications such as Clozapine (Clozaril) for the treatment of schizophrenia and Olanzapine (Zyprexa) have been associated with speech rhythm and fluency disturbances.

In addition, stimulants such as Methylphenidate (Ritalin) used to treat ADHD have in a small percentage of cases caused worsening of stuttering (Bär, Häger, and Sauer, 2004). Abused substances can also play an important role in secondary speech

disfluencies acquired during later life. Cocaine will cause neurologic damage resulting in speech impairment, and chronic methamphetamine use will damage areas of the brain with speech motor function and create disfluency. Besides, long-term drinking of high levels of alcohol has been known to disrupt centers for speech production in the brain, leading to permanent or temporary symptoms of stuttering.

The researcher Barry Guitar (1998), in his book *"Stuttering: An Integrated Approach to Its Nature and Treatment,"* discussed that acquired stuttering in adulthood must be carefully diagnosed, as it may be neurological, drug-induced, or psychological in origin, and should not be mistaken for a relapse of developmental stuttering.

1.5.5 Persistent developmental stuttering

Now, as for the developmental stuttering in children, it may go either of two directions: it may develop into adult chronic stuttering or may recover spontaneously at an early age. Chronic (persistent) developmental stuttering is stuttering that begins normally between the ages of 2 and 5 years but does not cure and becomes entrenched in adolescence and adulthood.

Researchers Ehud Yairi and Nicoline Ambrose have tracked this phenomenon over time with longitudinal studies, a type of scientific study in which the same group of people are observed and tracked over a long stretch of time, sometimes for years or even decades (Yairi, and Ambrose, 1999).

They found that chronic stuttering would likely be associated with genetic factors and neurological abnormalities, particularly within regions of the brain responsible for transporting speech and language processing. Chronic risk factors include family history of stuttering, male gender, delayed language onset, and presence of more severe disfluencies at onset. They emphasized the importance of early detection and treatment as stuttering that persists beyond early childhood becomes progressively more difficult to correct with the passage of time.

1.5.6 Transient developmental stuttering

On the other hand, transient developmental stuttering is characterized by temporary disfluencies in young children, usually occurring between 2 and 5 years of age, that remit naturalistically without the aid of clinical intervention. Charles Van Riper, one of the pioneers of research on stuttering, described transient stuttering as a process of normal speech development, a byproduct of the spiraling development of linguistic and cognitive skills that temporarily overtaxed a child's ability to produce organized fluent speech (Van Riper, 1982, p. 32).

During this phase, children may exhibit repetitions, prolongations, or brief pauses, but they generally lack emotional reactions such as frustration or embarrassment. According to Van Riper (1982), if handled properly with patience, supportive communication environments, and without drawing unnecessary attention to the disfluency, most children naturally outgrow these temporary disruptions. His findings underline the idea that not all early disfluency is pathological and that many children experience a self-limiting period of non-fluent speech as part of normal development.

1.5.7 Idiopathic stuttering

Finally, idiopathic stuttering is one of the most interesting types of stuttering. This type refers to cases of stuttering in which no identifiable cause is proposed or presented. Stutterers often don’t show any neurological injury or any psychological trauma whatsoever. The term “idiopathic” literally means "arising spontaneously" or "of unknown origin." Even though standard brain imaging is typically normal, researchers believe that subtle neurological deficits in speech processing do indeed exist but are simply not yet identifiable with current technology. Luc De Nil (De Nil, L. F., & Kroll, R. M. (2001). The search for the neural basis of stuttering: Recent advances and future directions. *Journal of Fluency Disorders*), a speech-language pathologist and neuroscientist, is among those who have made important contributions to the study of idiopathic stuttering.

Using functional brain imaging techniques such as fMRI and PET scans, De Nil demonstrated that in the absence of overt brain damage, individuals who stutter also show unusual patterns of brain activity, namely over activity of the right hemisphere and underactivity of the left hemisphere, which are involved in the production of fluent speech (Nil, and Kroll, 2001).

His work supports the hypothesis that idiopathic stuttering has a basis in neural functional differences, even without discernible structural defects, and it lends credibility to the argument that stuttering has a real and measurable biological underpinning.

1.6. Traditional Therapeutic Approaches

Stuttering in children is diagnosed and treated with many forms of treatment, classical ones dominating the market. The treatments most commonly used are breathing exercises, practice of repetition, syllable-timed speech, and relaxation. Classical treatment, based on tried clinical practice, attempts to maximize fluency by gaining more control over the production of speech and by less nervousness in speaking.

1.6.1 Fluency Shaping Techniques

The fluency shaping approach gained momentum in the 1970s,Ward, D. (2018) suggests that the primary goal of such strategy is not to change the way children stutter but to fully replace stuttering with a disfluent uninterrupted speech. The way in which to achieve speech fluency is done by utilizing a set of fluency controlling methods, such methods tend to change in which phonotation, respiration and articulatory systems are coordinated to produce fluent speech. When first introduced, the fluency shaping approach neglected paramount emotional and psychological features of struggling with stuttering and how it impacts the stutterer, as the fluency shaping approach directly aimed to manipulate and fix the motor aspects to achieve fluent speech sounds.The fluency shaping techniques applied tend to encourage fluency in a general sense, the main focus is on achieving fluency.

One prominent technique is the easy onset of voicing, the fundamental purpose of such technique is to demand the speaker to begin speech with a significant reduction in physical tension allowing them to say utterance in a much easier start. When it is combined with a reduced speech rate it becomes a crucial tool in achieving smoother fluent speech. From a phonological perspective the nasal sounds (m, n, ŋ - ng) are produced with an open velopharyngeal port, giving the air a smooth path to flow freely in the nasal cavity the oral cavity may be closed at different points for instance utilizing the lips for the sound /m/ and velum /ŋ/.Such continuous airflow makes the nasal sounds easier to produce with a gentle onset excluding any tension happening at the level of articulation minimizing stops or any bursts of air. In addition vowels tend to be produced with a more open vocal tract and a smooth continuous airflow.In this therapeutic sequence such sounds are likely to be initiated with a glottal stop by closing the vocal folds also known as the glottis and then releasing the air. (Ward, D., 2018).

1.6.1.1 GILCU (Gradual Increase in Length and Complexity of Utterance)

The Ryan's Gradual Increase in Length and Complexity of Utterance (GILCU) (1974,1984) approach is based on the principle that fluent speech is a behavior that could be achieved through the correct introduction of reward and punishment. Fundamental linguistic parameters that are given a focus on are the length (number of words sentences) and the syntactic complexity of discourse units. This method is regarded as a highly structured programme since the child goes through a sequence of three phases that include establishment, transfer and maintenance. The establishment phase represents basically a sequence of 54 steps in an attempt to develop fluent speech.

In the first activity, the child is required to produce very short utterances of fluency (10 in a row). In this way, there is reduced pressure on the motor system, thereby enhancing the possibility of fluent speech. Having achieved such good production, they move on to step two, i.e., the fluent production of two words since in this step a very simple syntactic relationship is introduced. This step from one-word utterances to two words focuses on the development of combining lexical items. Once it is mastered, the child moves on to a more linguistically challenging task. That is, on step three, the child

tries to utter three fluent words; then on stage four, the child utters four fluent words and so forth until stage seven is reached.

When the foregoing steps are obtained successfully, Stage seven also requires the child to generate a full grammatical unit of a sentence.

This evaluates the child's capacity to sequence and develop words according to syntactic principles in order to build a correct utterance. The child is then, in stage eight, requested to produce two fluent sentences, stage nine three sentences, and so on up to stage eleven. Continuing with the establishment phase, stage eleven requests the child to come up with a completely fluent speech generation for 30 seconds. This also brings up the issue of connected speech since this demands not just grammatical but also discourse competence. In this stage, the child is requested to attempt to use speech in every one of the modes: a conversation, monologue, and reading, with the goal being not more than two instances of stuttering. Stuttering instances are greeted with punishments in the form of "Stop, Speak more fluently" episodes, and when the child utters fluent speech, they are greeted with verbal compliments in the form of "You did amazing, keep on going!"

The transfer phase requires the speaker to utilize the previously learned fluency skills in real life settings, on everyday environment with different listeners therefore the child will have to adapt to different set of situations of the spontaneous nature of real discourse, by interacting as such, increased pragmatic demands of the communication will increase, as the child will have to navigate through complex social settings and situations. Once this has successfully been achieved the child progresses into the maintenance phase where they are assigned with review status with the gradual decrease of clinical monitoring. This phase is finalized after 22 months. (Ward, D., 2018, p.234)

1.6.2 Speech Modification Therapy

The Rationale of the speech modification approach is that speech is managed by interconnected motor speech subsystems being at the respiratory level where a whole generation of breathing is cycled for speech, A laryngeal level where the air is turned

into voiced and voiceless sounds and an articulatory level where lips and tongue shape these sounds into a comprehensible linguistic unit from phonemes to syllables to words.

This model suggests that stuttering may arise by consequence of disorganization within a given system, between these motor speech subsystems or from a combination of the two.

1.6.2.1 Tools of the speech modification therapy:

1.6.2.1.1 Smooth Airflow

Speech is generally based on the premise that it begins with a consumption of air Pursued by an exhalation. In order to produce a fluent and correct speech a smooth and continuous air flow is essential to achieve such an act, hence the clinicians first and foremost start by verifying the client's breathing patterns, if it is functioning correctly or falsely. One prevalent starting point to achieve such smooth airflow is the diaphragmatic breathing technique. The rationale behind this is that the lungs hold and preserve more air further down than the narrow top part.

Children who suffer from stuttering reveal that one prominent characteristic of their stuttering is the lack of breathing right at the beginning of the sentence or even close once starting it. Some children may face a particular problem with controlling exhalation for speech, therefore clinicians put their focus on enhancing control by approaching a more efficient use of lung-air. Many clinicians however still resort to utilize the diaphragmatic breathing as a matter of method for all clients, such breathing technique incorporates the use of the diaphragmatic muscle as the clinician puts a light pressure on the midpoint between the naval and the xiphoid process once the client breaths in the hand is seen to be gradually rises as the diaphragmatic contracts as the air is released the hand would be back to its resting point.

The essence of diaphragmatic breathing technique may be achieved in a structured way. First the client may be asked to control breathing by starting with a slow inspiration for a few seconds followed by a slow exhalation for a similar time, Eventually the client

will become more confident and comfortable with their breathing pattern the next step is to extend the exhalation.

This is done by making an audible sound in [S] like **sssssoft** and later shifting to another sound like [A]. The importance of diaphragmatic breathing is that it is critical to the point that the additional lung air ath the speaker's handling with give rise to a greater time within which to implement fluency controlling methods

1.6.2.1.2 Soft Glottal Onsets

This method is highly based on the previous technique of smooth airflow and adds a combination of softly initiating vocal folds vibrations, this is mainly used in vowels and semi vowels such as the [y] sound and the [w] sound. A core thought is that the clinician should make sure that an effective air stream is launched by use of the smooth airflow techniques this is further enhanced in practical exercises One crucial point of "stuttering" is that blocking and pauses on vowels are arised due to the fact that a spasmodic laryngeal closure happens. When this phenomenon occurs the vocal folds are surprisingly and involuntarily brought together occluding the airway and prohibiting vocal fold vibration.

The clinician may introduce the concept of hard/soft glottal onsets before a vowel for instance the hard glottal onset [ʔɑ] and the soft glottal onset [hɑ],the hard glottal onset involves a full closure of vocal cords then released abruptly this result in a forceful sound at the beginning of the vowel thus it would be a point of tension for individuals who stutter,Soft glottal onsets on the other hand is produced by narrowing the vocal cords allowing the air to pass through with friction without the vocal cords being vibrated for voicing if placed before a vowel there will be no forceful closure like the former onset leading to a much more soft and gentle onset for stutterers so in [hɑ] the onset is soft because the vowel is preceded by a breathy [h] sound which makes it easier to produce

1.6.2.1.3 Soft Consonant Contact

This speech modification method aims to reduce the articulatory tension and is employed with word initial consonants and also semi vowels. The consonant speech sounds are formed by two articulators which may incorporate teeth, lips and tongue. The consonants can further be classified into categories depending on how the airflow is built in the vocal tract, these categories include the: Plosives which are produced by bringing the upper and lower lips together and completely blocking the airflow for a moment then releasing it, such sounds are for example [p] [b] [t] [k] and [g] Fricatives involve a narrow obstruction that causes a friction filled air passage. Some of the speech sounds are [v, θ, z, h].

The affricates speech sounds tend to incorporate the plosives followed by fricatives and at the same place in the vocal tract, in English some of the voiceless and voiced affricates incorporate the sounds at the beginning of the words ‘’ chew’ and ‘jam as an instance

One common widely used soft consonant contact exercise is for the therapist to work and use non-words (made up words) as such the stutterer is not influenced by the meaning of the utterance but rather focuses on how to actually produce it, these non-words are designed to start with various kinds of speech sounds (plosives fricatives etc.) so that the sutterer can work on all types of sounds, the clinician however may start by sounds which are formed by the use of more visible articulators such as the lips/teeth. The clinician would also introduce the hard/soft glottal method by making the client produce simple words with different degrees of articulatory tension for instance in producing a word containing a plosive speech sound the therapist might inform the client to put pressure on the bilabial [b] for instance in the word ‘’big’’ this will reflect the high chance of stuttering leading the therapist to resort to soft production of consonant, here there will be a much more soft contact between the articulations, the therapist may inform the client to produce the same word however this time with a more gentle way (to keep the articulation tension to the bare minimum),the lips just lightly would touch for the [b] sound therefore the client would feel that there is no pressure /lack of tension

in producing the sound and that it's easier to say, no delay would happen and the chance of stuttering will decrease giving chance to fluency (Ward, D., 2018, pp. 248-251).

1.6.3 Effectiveness and limitations of the Traditional therapeutic approaches

The essence of the traditional approaches has long been considered to be the cornerstone and a foundational pillar in the treatment of stuttering. Despite the fact that technological and modern therapeutic approaches have emerged over the past several decades, clinicians still rely heavily and resort to such classical approaches as a standard and established norm for therapy. This is due to several reasons partially attributed to the fact that some clinicians are resources limited to only the traditional methods (lack of access to modern approaches that integrate technological devices for instance).

The utilization of the traditional methods has proved to be effective with their structured framework, as it offers a clear opportunity to make enhanced improvements to achieve fluency on their speech. An instance is the speech modification therapy where a focus is put on breathing has shown to reduce stuttering. In a study conducted by Anke Kohmäscher, Annika Primaßin, Sabrina Heiler, Patricia Da Costa Avelar, Marie-Christine Franken, and Stefan Heimb,on seventy three children who stutter showed that the speech modification program ‘’Kinder Dürfen Stottern’’ demonstrated that at 3 months post randomization significant differences in the impact of stuttering as measured by the Overall Assessment of the Speaker’s Experience of Stuttering–School-Age (OASES-S). Moreover, analysis of treatment outcomes over a 12-month period highlighted substantial improvements in OASES-S scores as enhanced phonological fluency took place.

The research suggest that the kids speech modification therapy is effective as it showed that improvements in stuttering behavior were transferred outside the clinics.Likewise for the fluency shaping approach GILCU which has been proved to be easy to administer to clients as The programme has been conducted successfully by many different trained clinicians (Ryan, 1981, 2001a).This latter requires the therapist to be able to identify the stuttered words/syllables and for the stutterer to produce more

fluent utterances over a gradually longer period of time. GILCU has been used in the United Kingdom (Rustin et al., 1987) Additionally, GILCU has been used successfully in several countries in a non-English language: Mandarin (Ryan, 1998) and German (Scheppe and Jehle, 1985).

The traditional approaches have also showed some limitations which could hinder their long-term effectiveness across communicative contexts. The speech modification therapy could be time consuming as it consists of multiple phases that the stutterer has to go through multiple phases in order for the fluency to be established as it also imposes daily practices upon the stutterer often with self-monitoring. With no frequent repetition the strategies may not be effective on spontaneous and real life setting.

1.7. Modern Therapeutic Methods

Since traditional therapeutic methods and approaches for stuttering such as Fluency shaping therapy, stuttering modification therapy, and other traditional techniques had shown limitations and weren't that effective for speech therapist; they had been obliged to find a solution to enhance the therapy for the stuttering phenomena. Stuttering as it is known, is a complex speech disfluency, and is still not very well understood by therapists and researchers. Therefore, finding good therapeutic methods has to be challenging and problematic for every party in the field.

Comparing traditional and modern therapeutic methods, therapists have shifted more towards neurolinguistics and psycholinguistics therapy based methods. This shift is largely driven by the understanding of the causes of stuttering which are strongly related to neurological or psychological mechanisms, rather than only behavioral factors.

1.7. 1 Phonological Working Memory Training

Firstly, stuttering is often represented with stops, prolongations, or repetitions, and all these characteristics are related to sounds and phonetics in general. Phonological Working Memory (PWM) is a part of a greater memory system, which allows individuals to hold and manipulate sequences of speech sounds for a short time. This

working memory system is highly important for speech planning and production, which refers to the neural processes that before speech and during speech; it includes conceptualisation to form meaning, formation to form a correct linguistic structure, and articulating using all the speech organs (tongue, teeth, lips….etc). When there is an impairment within this system, disfluencies such as stuttering occur. Leading to difficulties in encoding, storing, or retrieving the sound structure of words in real-time, and making fluent speech harder. Moreover, Phonological Working Memory Training (PWMT) was introduced. It is an approach that Strengthens phonological encoding (sound processing) through exercises like nonword repetition or syllable sequencing.

This training also involves specific exercises designed to improve a person's ability to process and retain sound sequences. Firstly, nonword repetition tasks, which refers to repeating nonsense syllables and words such as “dapiko” or “trolfa” to force the individual and the stutterer to rely on the phonological encoding without the help of meaning. (Saltuklaroglu, T., & Kalinowski, J. (2010). Phonological working memory and stuttering: Intervention strategies.)

The procedure of this therapy often follows a specific order. First, the speech therapist starts by presenting a nonword orally or using an audio, the stutterer then starts repeating the nonword again and again, whilst the therapist is scoring the stutterer in terms of syllables accuracy, stress pattern perseverance, and the order of the phonemes. Next, the speech therapist starts increasing the length and complexity of the nonwords by adding more and more consonants, vowels and syllables while keeping the word meaningless. This activity is very important for the therapy of stuttering, as it sharpens the internal auditory and articulatory timing, reducing pauses and stops while speaking.

The next activity in the phonological working memory training is called the “syllable sequencing”. It is a *motor-linguistic training task* where a person is asked to reproduce verbal strings of syllables in the correct order. These syllables are usually *nonsense combinations* (i.e., no semantic meaning), such as "ba-da-ka" or "ta-na-pa-ma." The task is designed to challenge and develop the planning, programming, and execution of speech movements. These exercises are very useful for training people in planning and

generating smooth speech. For people who stutter, the process is typically disrupted. The main goal of the therapy is to train the brain to remember and work with speech sounds and control how they are produced.

In practice, the therapist starts with brief, easy-to-reiterate syllable strings and progressively lengthens the sequence as a function of stutterer performance. The patient's response accuracy and response time are measured to monitor progress. These tasks engage the brain's speech-motor control system, Broca's area and supplementary motor area (SMA), both of which have been found to be essential for planning and production of speech. Such training for stutterers repairs timing and sequencing deficits believed to generate disfluency. As a result of better sequencing, stutterers often improve on spontaneity of speech and fluency and confidence on spontaneous speech.

The last activity is "sound manipulation tasks", and it mainly refers to analysing and manipulating sounds and phonemes in words. It is mostly related to cognitive and linguistic fields. Sound manipulation exercises aim to develop the establishment of phonemic awareness, which is a fundamental component of phonological processing. In these exercises, stutterers are asked to remove, delete, replace, or rearrange single phonemes within words. For instance, they might be required to say the word "plant" without the initial sound /p/ (getting "lant"), or to replace the /k/ sound in the word "cat" with /h/ to obtain "hat." These exercises are not semantic in nature and rather check the client to determine whether he or she can access and manipulate the phonological structure of words.

Such tasks are designed to strengthen the ability of working memory to detect, maintain, and transform speech sounds, a process that is typically weaker for children who stutter or those with learning disabilities in language. To perform such tasks, there needs to be intact internal speech rehearsal processes and phonological output monitoring. From a neurocognitive perspective, these drills engage regions like the *left inferior frontal gyrus* and the *dorsal stream* that are responsible for projecting sound onto articulatory patterns (Guenther, F. H. (2016). Neural control of speech. MIT Press.). Habitual repetition with sound handling has been observed to increase fluency

by enabling more stable and efficient phoneme organization, hence reducing the cognitive burden of spontaneous speech.

All of these activities contribute to the treatment process of stuttering making it faster and more effective. Pascal van Lieshout (2004) (University of Toronto) is a key figure in speech motor control and stuttering. In his work with Hulstijn titled *"Component analysis of stuttering: A review of psycholinguistic and motor control approaches"* (published in *Journal of Speech, Language, and Hearing Research*, 47, 3, 573–582) discusses the hypothesis that people who stutter may have subtle deficits in phonological encoding. The article talks about the way these deficits become more apparent under certain environmental factors such as stress or pressure, and/or linguistic conditions (van Lieshout, P., & Hulstijn, W. (2004). Component analysis of stuttering: A review of psycholinguistic and motor control approaches. Journal of Speech, Language, and Hearing Research, 47(3), 573–582.).

They found that Deficits in phonological working memory are strongly associated with stuttering, which is why improving phonological working memory can facilitate better speech motor control leading to a more fluent speech. Furthermore, the theoretical basis of the PWMT is strong and studies of PWMT and stuttering suggest that it has untapped potential for therapy. It is currently a promising but underutilized method in fluency treatment.

1.7.2 Cognitive Behavioural Therapy (CBT)

Not only is the PWMT method considered as a modern method for curing stuttering, but Cognitive Behavioural Therapy (CBT) is increasingly recognized as a valuable approach in treating stuttering. CBT is a type of psychological treatment that addresses thoughts, feelings, and behaviours that are reinforcing or aggravating stuttering. Unlike speech therapy (which addresses fluency strategies), CBT addresses the psychological effects of stuttering (i.e., shame, avoidance, anxiety). Some key components of this approach are applied to stuttering treatment specifically.

To address this, it focuses on cognitive restructuring, i.e., on dealing with and revealing negative and automatic thoughts resulting in fear and avoidance of speaking, e.g., a child might have a thought that others will think he is stupid if he stutters. In this case, the speech therapist's task is to reassure the child by asking him questions such as: "Is there real evidence people evaluate you in this manner?".

The purpose of such questions is to replace irrational beliefs with more realistic and balanced ones because this reduces internal pressure and fear and makes the speaker focus less on fearing to speak to people but rather on speaking to them. Second, the speech therapist will put the stutterer in a feared situation. This is called exposure therapy, and it consists of the therapist helping the stutterer gradually face feared speaking situations that have been avoided due to stuttering. Example tasks could include placing a call to a stranger, ordering food at a restaurant, or speaking in a group discussion. The therapist then builds a hierarchy of situations from the least to the most feared and practices them successively with the stutterer. Somewhere along the line, the stutterer would find that feared outcomes like rejection would hardly occur, which reduces anxiety and builds more confidence in the speaker. Thirdly, behavioural experiments are also a part of the therapy process of CBT. They are planned “tests” that allow stutterers to challenge their beliefs about stuttering through real-life actions. For example, one might strongly believe, "If I stutter on a job interview, I'll get rejected."

With therapy, they might conduct an experiment by rehearsing the interview context with a therapist or attending an actual interview and observing what occurs. Most of the time, the result is less negative than expected; the interviewer will respond positively, or the person will know that they still communicated effectively. Such occurrences have a tendency to disconfirm rigid, fear-based expectations and demonstrate that fluency is not the core measure of communicative success. This leads to less avoidance, greater confidence, and more open engagement in speaking activities over time.

Finally, the therapist focuses on the relaxation and mindfulness of the stutterer more using some techniques. These techniques play a very important role in reducing stress and fear by helping the stutterers to control their feelings and emotions. Many stutterers

experience heightened physiological arousal such as increased heart rate, shallow breathing, and muscle tension before or during speech. The therapist helps the stutterers observe their thoughts and emotions non-judgmentally, which helps break the cycle of stress and tension through mindfulness. Moreover, techniques like controlled breathing and progressive muscle relaxation calm the body's "fight-or-flight" reaction, which otherwise can worsen stuttering.

By reducing overall stress and putting the body into a more relaxed state, these techniques pave the way for smoother, more confident speech. While all these therapy methods and techniques might seem similar, each one has a special focus and serves a specific purpose for the sake of reducing stuttering within the speaker. Cognitive restructuring opposes disadaptive thinking patterns, while exposure therapy lessens avoidance by gradually approaching feared speaking situations. Behavioral experiments experimentally disconfirm these dreaded consequences in naturalistic contexts. At the same time, mindfulness and relaxation skills ease the body's stress response, offering a less volatile stage from which to practice fluent speech. They address each of the cognitive, behavioral, and physiological aspects of stuttering in a complementary fashion.

Menzies et al. (2019) conducted a randomized controlled trial to assess the effectiveness of Cognitive Behavioral Therapy (CBT) in addressing the psychological dimensions of stuttering, particularly social anxiety. Their study included 92 adult participants aged 18 to 70. These adults were randomly assigned to two groups: the first group received eight weekly one-hour CBT sessions, it was called the “experimental group”, and the second group, called the “control group”, received no intervention during the study period. The CBT sessions followed the structured CBTSA Program (Cognitive Behavior Therapy for Stuttering and Anxiety), developed by Menzies and his team.

The main key findings were that the experimental group showed significant reductions in social anxiety measured via the *Unhelpful Thoughts and Beliefs About Stuttering Scale*, UTBAS, compared to the control group who did not receive any

treatment (Menzies, R. G., Onslow, M., Packman, A., & O'Brian, S. (2019). Cognitive behavior therapy for adults who stutter: A randomized controlled trial. Journal of Speech, Language, and Hearing Research.). They also showed improvements in self-reported communication confidence and social participation making their quality life better. Moreover, the group did not show any change in objective stuttering frequency, but reduced subjective distress about stuttering.

Notably, these psychological and behavioral benefits were sustained at six-month follow-up, with implications for the long-term effects of CBT. The study highlights that CBT is not necessarily going to diminish stuttering in itself but has a core function in reducing the emotional and behavioral effect of the disorder. Through helping participants alter their assumptions, reduction of anxiety, and avoidance reduction, CBT helps individuals who stutter to communicate more freely and interact more confidently with everyday life.

While Cognitive Behavioral Therapy (CBT) is often described as a psychological intervention, its effect is closely tied to both psycholinguistic and neurolinguistic processes. Psycholinguistically, stuttering is vulnerable to cognitive burden in language production, namely, lexical retrieval and sentence planning. CBT reduces anxiety and negative self-monitoring, thus easing this cognitive burden and allowing for more fluent linguistic processing. This is in line with predictions that emotional interference can disrupt phonological encoding and increase disfluencies. Neurolinguistically, CBT can also rebalance neural activity involved in speech production. For example, chronic anxiety in stuttering has been linked to overactivation of the amygdala and impaired prefrontal control over speech-motor circuits. By reducing anxiety, CBT could facilitate better activation of the left inferior frontal gyrus and prefrontal cortex, brain areas responsible for speech planning and articulation (Guenther, 2016). Therefore, CBT doesn't modify fluency in itself but makes it possible for cognitive and neural processes involved in successful language production to take place, linking therapeutic treatment with elementary linguistic mechanisms.

1.7.3 Delayed and Altered Auditory Feedback (DAF & AAF)

Next, Stuttering has long been recognized to be more than merely mechanical disruption of speech; it is solidly rooted in the interaction among auditory feedback, motor control, and psychological processing.

Among the current technical treatments grounded on this understanding are Delayed Auditory Feedback (DAF) and Altered Auditory Feedback (AAF). These methods change the way individuals hear their own speech in real-time, breaking up auditory feedback loops to enable smoother production of speech. Though normally applied in a clinical or technological environment, their mechanisms and effects are highly correlated with concepts within both neurolinguistics and psycholinguistics, making them viable tools within a linguistically derived therapeutic framework for stuttering.

DAF and AAF act by modifying auditory feedback, which is a critical part of the speech monitoring mechanism of the brain. DAF does this by interposing a small delay (typically 50–200 milliseconds) between perception and production of speech, which creates an echo-like effect that slows speech and stabilizes timing. AAF uses other manipulations such as pitch-shifting and white-noise masking. These sound changes restructure the speech-motor loop, compelling the speaker to rely less on disrupted auditory information and more on sensory and proprioceptive feedback systems. This on-line intervention has been shown to lead to immediate reductions in stuttering, especially in formal situations like reading aloud or rehearsed speech.

A classic paper by Kalinowski and Stuart (1996) demonstrated that adults who stutter exhibited high levels of fluency improvement with DAF, particularly when the delay is adjusted between 50 and 75 milliseconds (Kalinowski, J., & Stuart, A. (1996). Stuttering amelioration at various auditory feedback delays and speech rates. European Journal of Disorders of Communication, 31(2), 131–142.). The paper showed that this treatment disrupts faulty closed-loop auditory feedback loops to which stutterers are prone to over-reliance. By deviating monitoring to somatosensory channels, DAF helps to remap speech motor control in real time. While clinical outcomes are variable across users, a few report up to 70–80% reductions in severity of stuttering when such devices are used.

However, these improvements are largely context-dependent and tend to disappear once the device is removed, raising questions about long-term efficacy and generalizability.

The success of DAF/AAF is rooted in neurolinguistic research on speech-motor networks and auditory feedback loops. Neuroimaging studies, including fMRI data by Chang et al. (2019), demonstrate that DAF can normalize speech-related brain activity, e.g., in the left inferior frontal gyrus (Broca's area) and superior temporal gyrus, which both contribute to the generation of language and listening (Chang, S. E., Garnett, E. O., Etchell, A. C., & Chow, H. M. (2019). Functional and structural neural bases of developmental stuttering. Current Topics in Behavioural Neurosciences.). Furthermore, the basal ganglia-thalamocortical loop responsible for controlling motor timing is often disrupted in stutterers. DAF's impact on slowing speech appears to counteract this dysfunction, allowing for more fluent expression. Stuttering is typically aggravated psycholinguistically by cognitive overload and hypervigilance in language planning. AAF relieves these tensions through the reduction of auditory input complexities, which helps to lower anxiety, lighten lexical retrieval loads, and improve sentence formulation in real time.

The most common applications of AAF and DAF are wearable devices (e.g., SpeechEasy) and mobile apps (e.g., DAF Pro, Fluency Coach). These are typically situation-specific, e.g., for use on phone calls or when giving presentations, and can be employed to supplement mainstream speech therapy. While AAF and DAF are beneficial, they have their disadvantages. They are inaccessible to some users because of the cost, and constant dependence on prosthetic feedback may erode the acquisition of personal fluency. According to this, researchers suggest the integration of auditory feedback devices with behavioral treatment like fluency shaping, sustained speech, or Cognitive Behavioral Therapy (CBT) in an attempt to have more enduring effects.

DAF and AAF therapies are examples of how neurolinguistic and psycholinguistic theory can support practical and immediate stuttering treatment. With their direct manipulation of interrupted auditory-motor loops and reduction of cognitive effort engaged in real-time speech processing, these therapies offer effective but temporary

disfluency relief. Although they are not final cures, they have helped us understand sensory and cognitive processes involved in stuttering and are useful adjuncts to more comprehensive, individualized approaches to therapy. As research moves into more tailored and integrative approaches, the application of DAF and AAF will increasingly shift from isolated technological aids to key components of complex speech therapy programs.

1.7.4 Neurofeedback Training (NFT)

Additionally, among the most promising developments in neuro linguistically-directed stuttering therapy is Neurofeedback Training (NFT). This intervention without treatment applies live EEG feedback to help the patient self-regulate aberrant brainwave patterns responsible for speech disfluency. Unlike traditional speech modification therapies, NFT targets neurological dysregulation in brain regions involved in speech planning and production ; Broca's area and the supplementary motor area (SMA). As a neuroplasticity-based method, NFT is capable of bringing about long-term fluency improvements through reorganizing the brain's functional architecture.

NFT is based on operant conditioning: individuals learn to adjust brain activity by receiving moment-to-moment visual or auditory feedback in synchrony with immediate EEG activity. For the case of stuttering, NFT protocols typically aim to reduce theta wave (4–8 Hz) activity, indicative of idling and wasteful processing, and increase beta activity (13–30 Hz), which is associated with focused cognitive control and motor coordination. Sensors are usually placed over Broca's area and SMA, key hubs for articulatory planning and sequencing of motor activities. During sessions, users are engaged with interactive stimuli (game interfaces or audio feedback) rewarding concentrated brainwave patterns, so that the brain is essentially taught to remain in a state conducive to spontaneous speech.

In one of the most robust studies to date, Kayılı et al. (2020) investigated the effect of NFT on 24 adult participants with developmental stuttering. Participants were assigned to either a treatment group, which was given 20 sessions of NFT over a period

of 10 weeks, or a sham (placebo) feedback control group. EEG sensors were placed over Broca's area and the SMA to record and modulate oscillatory activity. The outcome was interesting: the NFT group showed a 35% reduction in frequency of stuttering, with no change in the control group. EEG analysis showed a decrease in theta power and an increase in beta activity, consistent with improved neural efficiency in speech-producing areas (Kayılı, G., Yıldız, B., & Özdemir, H. (2020). Effects of neurofeedback therapy on developmental stuttering. NeuroRegulation, 7(1), 17–25.). Notably, fluency gains were sustained at a 3-month follow-up, underlining the long-term neuroplastic benefits of this form of training.

NFT particularly addresses neuro-linguistic deficits that participate in stuttering. Broca's area, which is usually responsible for speech formulation and syntactic processing, has a tendency to show abnormal oscillatory activity in individuals who stutter. NFT, through its normalization of beta and theta wave activity, enhances the brain's capacity for correct speech timing and articulation. It also has the potential to increase connectivity in the corticostriatal circuit (basal ganglia and thalamus) that co

controls the initiation and sequencing of speech which are basic issues in fluency disorders. Psycholinguistically, NFT reduces cognitive load in speaking, enabling more efficient lexical access and syntactic planning. Moreover, by stabilizing the brain's monitoring networks, it helps with the reduction of hypervigilant self-monitoring, a known cause of speech-related anxiety and disfluency.

Moreover, NFT is used most typically with adults who have chronic developmental stuttering, in whom steady neural patterns may be tracked and conditioned. It is often used with special EEG systems such as NeuroField or BrainMaster, and structured according to protocols by Roger J. Ingham, a prominent researcher in NFT. The protocols target SMA and Broca's area to fine-tune motor planning circuits. While NFT is an emerging mainstream practice, therapists more and more recommend its integration with traditional speech therapies (for example, fluency shaping) or CBT to establish a hybrid model addressing both neurological and psychological causes of stuttering.

In conclusion, Neurofeedback Training is a significant innovation in stuttering therapy that incorporates vital principles of neurolinguistics and psycholinguistics to challenge the disorder at its neurological origin. It has been highly successful in fluency enhancement by regulating brainwave activity in critical regions of speech and enabling lasting neuroplastic adaptations. As research improves, new areas include AI-personalized NFT protocols, combination treatments (e.g., TMS + NFT), and early use in children in an effort to take advantage of greater neural plasticity. In combining brain science and speech pathology, NFT is an excellent fluency treatment.

1.7.5 Transcranial Magnetic Stimulation (TMS)

Finally, Transcranial Magnetic Stimulation (TMS) represents a breakthrough in neuroscience-based treatment of stuttering as it bypasses the brain's electrical circuits directly in the speech areas. As a non-invasive approach to neuromodulation, TMS subjects neural circuits of speech production, particularly with impaired hemispheric balance or hyperactivity, to targeted magnetic pulses. In stutterers, more evidence is being found of overactivity in the right hemisphere and reduced left-hemisphere activity, mostly in areas like Broca's area, which are core to fluent speech. TMS seeks to redress these imbalances, offering a direct path to affect neuro linguistic architectures and psycholinguistic mechanisms of processing that lead to fluency. Furthermore, TMS gets its effects by applying magnetic pulses to specific areas of the brain's cortex. For stuttering, the treatment has been to use repetitive TMS (rTMS) low-frequency (1 Hz) pulses designed to inhibit hyperactive sites, or high-frequency pulses to stimulate hypoactive sites. Some research aims to target the right orbital frontal cortex (OFC) in an attempt to reduce the OFC's hyperactivity, associated with too much monitoring and fear of speech. Alternatively, left inferior frontal gyrus stimulation is designed to facilitate the motor planning circuits engaged in fluent articulation and syntactic organization. Through this modulation, TMS attempts to re-establish left-hemispheric dominance, characteristic in fluent speakers.

Moreover, An influential study by Maguire et al. (2020) in Brain Stimulation examined the effectiveness of rTMS in a randomized clinical trial of 45 adults with

chronic developmental stuttering. Participants were randomly assigned to an active rTMS group, who underwent ten sessions of 1 Hz stimulation over the right OFC, or the sham group, who received placebo stimulation. The results were interesting: the active treatment group had a ~30% lessening of stuttering severity on the Stuttering Severity Instrument (SSI-4), but the control group had minimal improvement. fMRI scans showed reduced right OFC activity and increased left-hemisphere speech area connectivity, suggesting support for the hypothesis that TMS can reset networks for fluent speech. The improvements persisted for up to three months, although some regression was observed, highlighting both the potential and limitations of durability in rTMS outcomes.

TMS is highly consistent with neurolinguistic stuttering models of hemispheric coordination disruption. with fluent speakers, the left hemisphere typically has more activity in regions like Broca's area and SMA. In individuals who stutter, though, there typically is right-hemisphere hyperactivity during speech production that interferes with fluent articulation and timing. TMS makes it easier to reverse this activity to the left hemisphere, facilitating better processing of syntax, phonology, and articulation. Psycholinguistically, reduced right OFC activity also lowers hyper-self-monitoring and cognitive load. This, in turn, facilitates access to lexical and syntactic representation during speech, reduces anxiety-induced interruptions, and allows more fluent language building.

To summarize, Transcranial Magnetic Stimulation is a groundbreaking, neuroscience-driven, direct disorder-specific treatment for stuttering's neurological underlying disruptions. Through adjustments of hemispheric function and improvement of speech-motor network architecture, TMS produces significant gains in fluency for a majority of adults particularly for those for which traditional approaches have been unsuccessful. Not a cure, TMS advances us along our stuttering neurophysiology and presents a new avenue for combined, multimodal therapies. With advancing technology and treatments being continually optimized, it is likely that TMS will lead future evidence-based treatments for stuttering.

1.7.6 The lidcombe program :

the direct therapeutic approach lidcombe program have a tendency to directly target stuttering,by putting an emphasis on modifying the child's speech patterns,This frequently involves methods which would increase the awareness of stuttering moments.The lidcombe program a widely utilized direct approach as it entails parents delivering verbal feedback to their child in regard of their fluency.This approach is mainly based on the principles of behaviourism (operant conditioning),the main goal is for the child to produce a speech output of less than 1 percent of syllables stuttered (Onslow, Packman, & Harrison, 2003 as cited in Ward, 2018)).Since it has a tendency towards behaviourism the child would be praised if the output is fluent/stuttering-free likely he/she would be "punished" if the utterance is stuttered (By having the child repeating the same stuttered utterance).This approach is considered to be direct in the sense that the speech is directly focused on.Unlike other operant approaches there is no direct physical change applied on the vocal tract coordination but it focuses of systematic verbal reinforcement techniques (Jones et al., 2005 as cited in Ward, 2018). The examination of the Lidcombe program lies for different reasons,this latter approach is highly programmed integrating the same basic procedures of individual variations in child variables. The examination of the Lidcombe program lies in different reasons.Unlike the former approach PCI this direct approach is highly programmed,integrating the same basic procedures of individual variations in child variables The difference between the two approaches is that the PCI approach refers to the involvement of parents,Meaning adjustment and adaptation of parental style and other environmental variables to help the child develop fluency.The lidcombe program parents are trained to apply some therapeutic strategies that have been considered the domain of the qualified language clinician.These strategies involves providing praise and correction for fluent speech and managing the child's speech fluency

The rationale as suggested by professor mark onslow in the 1990s and his colleagues put forward the reasoning to this approach that while stuttering could develop into a complicated speech disorder in its early stages it could be treated and cured without the

recourse to any theory how stuttering arrives.Onslow argues that stuttering, especially in its early stages, can be treated effectively without needing to fully understand the exact causes of the disorder. It doesn't require a comprehensive theory of how stuttering develops. Instead, it can simply be seen as a behavior that can be changed through operant techniques (such as reinforcement and shaping behaviour).

Despite the fact that the choice of the approach of having the principles of the operant conditioning,it is impossible to exclude the environmental factors as they may also contribute to the improvement of the child's speech fluency (despite not being totally related to the Operant conditioning). Some scholars have speculated that the success of such approach is related to the neural plasticity available in younger children (Rousseau, Onslow, & Packman, 2005; Venkatagiri, 2005), however the explanation of the LP's success from an organic POV is quite hard to explain.That said,irrespective of the factors that cause stuttering,it still could be early treated as an operant.The fact of asking a young child to repeat a stuttered word could "in a sense" achieve fluency in speech,However this is contrasted and opposed to their adult peers or a much more older child as being asked to repeat a stuttered word could be considered as the most feared scenario these individuals may face and it would mostly result in increased stuttering The LP approach could be considered as a complex therapeutic method that there are a number of factors which could determine the success rate of such procedures.First if the child would commence such therapy at an early age will have the advantage of motivated parents and there are no interferences of second language difficulties as well as no dyspraxia (However objective data are lacking).Likely the success of the LP is highly dependant on the clinician's skill in administering and applying the programme,as if the LP protocol is followed inaccurately or with deviation,The approach will fail and consequently damaging the achievement of fluency.In order for the treatment to be successfully applied,The clinicians are obliged to be qualified in the Lidcombe program.This involves therapists enrolling in specialized training to guarantee a whole theoretical understanding of the approach so that they utilize and apply it to treat stuttering in young children.

The Lidcombe program follows a very structured chain of steps that are essential for its efficiency and success.

First and foremost the child is seen and assessed by the clinician and a case history is considered. The key goal is to figure out the frequency of stuttering measured in percentages of syllables stuttered,as well as taking into account some behavioural and cognitive factors. Here the clinician puts an emphasis on the explanation of the main points to the parents with the notion that they will be the first therapy providers to the child while the clinician acting as a monitor.The parents are taught how to give suitable feedback in the form of verbal functions (a very crucial point since it is a behaviouristic feature)

An example would be the praising of the parents to the child once a fluent speech is uttered ‘’You did an amazing job producing such a fluent word’’ (Or sentence for that matter),Likely the child would also be met with punishment if stuttering ever occurs ‘’Your produced the lexeme with a bumpy manner’’ pushing the parents/therapist to further ask the child to repeat (Punishment) the stuttered utterance ‘’Try saying the word once more with no bump’’.Concerning children who are diagnosed with a high rate of stuttering,punishment is minimized and reduced,as one of the programme's goal mainly focuses on maximizing the fluency of speech as it is to eradicating the moments of stuttering. In the early stages of such therapy the parents are taught how to control complex linguistic aspects in their child so that high levels of fluency would be achieved from an early stage This therapy approach can include turn taking strategies (Interruptions,pausings) sentence completion and asking closed questions.The parents are taught how to record the level of stuttering on a record sheet rather than counting syllables.

Once the treatment is done at the clinic, The parents would dedicates two blocks of 10-15 minutes to practise fluent speech with the child at home,keeping in mind the use of verbal contingencies and length of the utterance.On a daily basis the parent is obliged to record the stuttering severity rates upon subjective reflection and one key component is that aside from the special time sessions the child’s stuttering will absolutely not

invoke parental comments as this latter might develop further anxiety and insecurity which may harm and regress the child's stuttering to the worse.By this,with the assistance of the structured sessions,speech fluency will gradually develop empowering the parent to progressively increase the length of the utterance by carefully adjusting the speech stimulus.Eventually the child's speech is put into real life spontaneous contexts.With the frequent weekly meeting with the therapist,the parent is asked to report the progress done at home,likewise the clinician will provide feedback on the usage of the behavioural reinforcement and punishment during an evaluation session at the clinic

1.7.7 Parent child interaction approach

The parent child interaction is a cognitive therapeutic method which puts an emphasis on enhancing the parents child interaction communication leading to reduced stuttering,this approach could be utilized with both preschool children and their school-aged peers.The intervention of such approach lies on the modification and manipulation of the child's environment and more importantly the interaction styles between both the parents (as by this approach they are the cornerstone of achieving fluency) and children,as this paves the way for permanent fluency.By the evolving literature concerning this approach,many clinicians and even scholars have perceived and argued that such method is a vast concept to be accounted for only on the clinic-value dimension,as such these therapists associate this approach to a much more multifactorial model as they believe that stuttering involve other dimensions namely ;the linguistic and motor speech outlooks this multifactorial tendency of stuttering may give rise to the notion that the treatment of this phenomenon might as well require Multifaceted interventions,however this has been criticized in a debate as , Onslow & Millard, (2012) points out and argues that despite the fact that stuttering might be perceived as a manifestation that has diverse foundations it would be a common misconception to believe that it requires a multifactorial treatment approach.

By recognizing the dimensions mentioned above (linguistics motor speech), the

treatment would become more holistic, putting an emphasis on the diverse aspects that contribute and cause stuttering, rather than focusing solely on speech production. This perspective aligns with the growing recognition that stuttering is not simply a speech disorder, but rather a complex interaction between cognitive and emotional components that must be addressed in treatment.The philosophy of such approach is commonly utilized by many clinicians worldwide (e.g. Conture & Melnick, 1999; Manning, 1996; Starkweather, Gottwald, & Halfond, 1990; Zebrowski, 1997, 2007),however it has been criticized for the absence of its empirical evidence concerning its effectiveness, this was arised due to the fact that this approach was perceived as a reflection of ‘’oversimplification’’ of such a complex and intricate speech disorder, Nevertheless this was an older critic which has been addressed in recent years and now it is proved to be an effective strategy of treating stuttering and it is still in function in various clinics worldwide.(Millard, Nicholas, & Cook, 2008; Nicholas & Millard, 2003; Nicholas, Millard, & Cook, 2004).

The rationale behind this approach lies on the premise that stuttering is a multifactorial phenomenon (Smith & Kelly, 1997; Starkweather & Gottwald, 1990 as cited in Ward, 2018).As mentioned before stuttering could be seen as a manifestation which could be caused by many various factors coming from different areas broadly speaking linguistics, psychological,neurological and physiological,Thus the literature has it that stuttering may emerge from an imbalance occurring between those factors,where disruptions happening in one area may lead to the onset and persistence of the disorder

The palin assessment of stuttering :

The palin parent child interaction assessment is a widely used detailed evaluation tool utilized to assess the communication skills of children particularly those who suffer from stuttering.It involves examining and observing the linguistic interactions between parents and their children during play day activities.The goal here is to establish a sense of communication between the two in order to investigate and identify any kind of stuttering-related challenges that may arise during the

conversation,comprehend the impact of such hurdles on the child and family as well (most often) and develop a future treatment plan for the child's needs.Earlier versions/models of the approach requires the assessment a significant portion of time during the day to be accomplished,Steps and protocols of the assessment have been modified in recent years but it still demands a face to face 1 hour and a half meeting with the child and an additional two hours and a half time with the parents.The therapists also has to dedicate time in order to transcribe and analyse data to transfer in various forms.Finally there is formulation in which a developed therapeutic approach is explained to the parents.The steps of the PCI assessment is explained below

The first step of the assessment begins with a short screening protocol.This procedure takes up to 20 minutes,the purpose here is to gather the necessary data on the risk stuttering and how to best progress through the programme.

Step number requires the attendance of both the parents and the child at the clinic,as they are asked to answer a set of questions regarding exposure to persistence. These questions include the whole history of stuttering in the family and/or any other speech and language disorder that existed in the family,length of time the child has stuttered.Questions are added to reveal the child's awareness about the disorder and concern or attitudes towards stuttering.If the responses are negative the clinician would then put the child on an ''advice and monitoring program'' where a consolation and comfort are introduced to the child stating that disfluencies are totally normal and that parents are not the ones who actually caused stuttering (a common disbelief amongst infants who stutter).If a yes response is given implies the fact that child is vulnerable to persistency and then a full assessment begins upon an arranged meeting mutually agreed on an convenient date. (Ward, 2018)

The approach's assessment would the become a more ''full assessment'' as the testing procedures of the Parent child approach begin to take place this requires the obliged presence of both the child and the parents at the clinic.This stage falls into

the essence of two parts first the child's own assessment and second a case history or even parental assessment would be taken in to account

The first assessment of the child commences with a video recording of the child playing with his/her own up to a 1-1 hour and a half time period,during this phase the clinician must put an emphasis on ;Language,speech and communication skills of the child more particularly the syntactic structures and vocabulary (receptive language) and use of language,syntax and word finding ability (expressive language), the focus here is completely linguistic. Another points worth of putting an emphasis on are the severity level of stuttering and the child perspectives toward this phenomenon, as the child has to elaborate their state of mind concerning their speech fluency, as indeed they are also frankly and directly asked if they actually would like an aid and assist with their speech.Here the therapist takes an attempt to dig deeper into the child's insights and perceptions regarding stuttering alongside this they also tend to detect any behaviours that might arise in resistance to stuttering (eyes avoidance,facial tensions and body movements)

To record and transcribe such data would take a period of time up to one hour once this is done the data would be saved on an assessment booklet which would be again stored in a summary chart.This latter chart consists of five main areas The first four reflect the multidimensional accounts of stuttering the final one has a direct connection to stuttering,elaborated mainly in:

The Linguistic aspects :it consists of a history of delayed speech which refers to the fact that stuttering could be related to a speaker's experience with past language development this may suggest that the language system could previously have been struggling with developing effectively therefore such challenges lead to the likelihood of stuttering.Limited language proficiency is also discussed as this refers to the speaker's limited linguistic competence in utilizing the language having challenges in expressing vocabulary constructing correct grammatical structures and comprehending complex syntax,issues with speech sounds as some children tend to face challenges in producing speech sounds in addition that certain word or sentence

complexity would likely to influence the severity of stuttering inconsistencies within or between languages, and the impact of multilingualism.

The psychological aspects :It involves the self confidence of the child and the ability to manage the adaptability to change and the child's response to their stuttering.

The Environmental variables : The Suitability of behaviours,School/preschool considerations (bullying,teasing even name calling) and pace of life

Stuttering/Social communication :As mentioned it deals with a direct connection to stuttering,its onset,frequency/severity of stuttering and the development of interactive styles

This summary chart gives the clinician permission to observe which of the former mentioned prescriptives needs to be targeted first,this allows him/her to proceed with the therapy.

As mentioned above the clinician also has to conduct an interview with the parents/caregivers. By doing so the therapist would gain multiple insights about some events that may have impacted the child's stuttering both in a positive and negative manner. This process is completed in a two hours period of time and again it is also video recorded.Usual inquiries are asked during this session mostly about the perceptions and emotions concerning language development,family routines,child's relationships,Nevertheless sensitive points such as personality traits and sensitivities are all approached in a careful manner by the clinician.All of this require a direct answer from the parents upon careful reflections and reasoning,expectations of the therapy are taken from both the father and the mother separately and very frequently when both of them answer in a quite different way (a mismatch in the answers) this could also lead to a more significant finding

This stage allows the therapist to consolidate all the interview's and assessment findings and present them to the family.During this stage (the formulation stage),The

clinician make a good use of the data collected from the assessment and best explain to the parents the difficulties their child is facing,in respect with the context of the multifactorial view of stuttering.The clinician in revising the assessment's finding point out to the most crucial findings and even comments on the relevant areas on the chart (mentioned above),starting from the linguistic and physiological areas since they are the most important and could be seen as prevalent contributing factors to stuttering,and then the therapist would continue with the remaining areas psychological environmental and emotional as these could be seen as enduring factors.Positive factors are also stressed while presenting the feedback to the family an instance would be the absence of secondary stress or that the parents are already utilizing a good rate of speech while engaging in a conversation with their child

1.7.7.1The Parent child interaction therapy :

This approach requires the child to consult the clinician on the basis of six one hour per week sessions followed by a six week consolidation period.During this phase the assessment conducted would have already put a whole identification on both strengths and weaknesses that affect the child's stuttering both in terms of predisposal characteristics (genetics) and the ones that involve the environmental aspects (family dynamics,the child's interaction with the parents).The main objective of the therapy is to loosen stuttering by concentrating on the use of certain strategies that ease fluency and reduce those which could pose danger or detrimental "effects" on the child.

The parent-child interaction model suggest that the observations carried upon the exchange/communication between the child and his/her parents provide the clinician an opportunity to evaluate and assess the actual current family dynamics,by doing so the therapist will have ascertain perception about the interaction styles between both the parents figures and their offspring.However,given justice that parents are actually concerned about their child's stuttering more so at the same time confused in all terms.

Parenting styles may vary (sometimes negatively) in an attempt to have control over stuttering as some parents may be insistent on the what is called high levels of correct verbal performance,an instance would be stopping the child at the moment of stuttering and insisting that they take a deep breath before conversing again. ‘the principal aim of this therapeutic approach is to help parents restore confidence in their parenting skills, to understand the complexity of this disorder and to find ways of interacting with the child that will facilitate fluency’ (Rustin, Botterill, and Kelman 1996 as cited in Ward, 2018 p.255)

1.7.7.2 Session scheduling :

As mentioned above the children are observed for six one hours per week sessions over a six week period where new,dynamic interaction styles are developed,an additional six week consolidation period is introduced during which the effects of the newly developed interaction styles should be apparent and observable

- Session number 1

During this session the clinician reviews the assessment and outlines a therapeutic procedure and integrates the notion of ‘’special times’’,this refers to a time set only at home when there is an interaction between the child and their parents with no interference originating from their siblings or any other source. During this five minute special time,the parents must put an attention on the child more particularly the speech content uttered by the child rather than fluency of the output,as the parents must not exceed this five minute interaction and must record too what have been uttered by the child as well as their reactions to it this helps ensure the child’s verbal output is accurately and precisely captured, including any new linguistic patterns,vocabulary or sentence structures that may emerge.

A focus should be put on implementing pre-identified interaction strategies as well. Before this special time, the parent has been given specific strategies or goals (referred to as "targets") to work on with the child. These strategies could involve things like encouraging turn-taking, expanding on the child’s speech, or modeling

correct sentence structures by doing so the syntactic and semantic structures would correctly be developed by modeling correct and appropriate language use. The parent's role is to focus on using these strategies during the five minutes to support the child's communication development.The parent would then take a recording of what occured during each of these special times and add their reactions to it on a ''special times'' task sheet.In addition to this the parents are informed by the therapist that change to linguistic fluency may not be achieved too quickly as regression is also possible in the early stages

- Session number two :

The second session begins by discussing and commenting on the special times done by the parents,verbal feedback is also provided in addition to timing difficulties or keeping up with the five minute length. Here the clinician discusses the abilities of the child as well as what the parents are attempting to do to help achieve the fluency of the child,No reverse questions asked (for instance asking if the parents believe that their assistance is unhelpful). Two main questions are asked from the part of the clinician ''what do they know about the parents child'' and ''what does the child Necessitate to achieve fluency'' the answers to such questions are actually discussed prior to watching the videos recorded by the parents during the special times and the parents are asked to comment individually on their recordings and how did they approach the situation of helping the child's fluency. Parents are given the chance to comment on aspects of naturalness,balance of talking time and the like.Here the clinician functions and acts as guide providing suggestions and drawing out responses where necessary in the most positive and supportive manner.

CHAPTER

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Chapter Two : Data collection and analysis

2.1. Introduction

This chapter aims at reporting the different methodological procedures that have been followed during the practical phase of the investigation. The essence of the following chapter revolves around the various therapeutic methods utilized in the community of Tlemcen, more particularly children. Through extensive field work, this research explores how traditional and modern methods are applied in real life situations/settings, with a special attention to the implementation of Quran recitation in treating stuttering. By investigating how speech therapists use these approaches and what they signify to the wider population, this chapter aims to have an empirically informed comprehension of therapy interventions in Tlemcen in order to investigate how effective and useful they are in the local context through the use of a mix of data collection methods.

In addition, this chapter explains how these interventions impact not only the child's linguistic growth, but also their emotional health, self-esteem, and adaptation to their social world. By way of discussion of real-case scenarios and lived experience in Tlemcen, the chapter provides an insight into how cultural values, parental involvement, and therapist experience influence treatment decisions. Finally, it aims to work towards an improved understanding of how therapeutic strategies function with the local population and what that might have for future practice, awareness, and advocacy on behalf of children who stutter.

2.2. Research Methodology

This research uses a comparative design analysis to explore and compare the various therapy techniques used to address stuttering among children in the Tlemcen community. The primary aim of this design is to analyze the effectiveness of both traditional speech therapy techniques, modern techniques, and alternative techniques, particularly Quranic recitation, through comparing their application, impact, and attitudes in real therapeutic practice.

Chapter Two : Data collection and analysis

The study draws on a qualitative and quantitative mixed-methods approach, enabling a comprehensive understanding of how different therapeutic practices are applied and perceived. By collecting data, multiple sources have been implemented including speech therapists, Quranic teachers, and the general public. The research seeks to establish a well-rounded view of the therapeutic landscape.

The comparative nature of this design allows for a determination of similarities and contrasts in technique, patient response, and therapist preference, allowing for an informed choice as to which methods are more beneficial, especially in children aged between four (4) and nine (9). The findings attempt to contribute to the scholarly field of speech therapy and applied linguistics.

2.3 Data Collection Methods:

The investigation of the subject matter was approached both qualitatively and quantitatively with the adoption of three main primary methods. First and foremost, semi-structured and structured interviews were conducted with speech therapists. These interviews also offered a glimpse into the techniques utilized in practice, the personal experiences of the therapists, and their views regarding the efficacy of the traditional and contemporary approaches, including the use of Quranic recitation. Second, a survey questionnaire was administered to a randomly selected sample of the population in order to gain general attitudes and beliefs regarding the possible therapeutic effect of recitation of the Quran on stuttering. This quantitative instrument was meant to validate or falsify the research hypothesis from the general social point of view. Finally, direct observation of therapy sessions with speech therapists was done to assess the practical application of various techniques, compare their outcomes, and identify trends of improvement in children undergoing various types of therapy.

The findings of each of these methods will be presented and analyzed in the sections to follow so that a fair and unbiased judgment of the methods in question can be established.

Chapter Two : Data collection and analysis

2.4 The Sample Population:

The investigation of the research incorporated three major participant groups. The first group consisted of **four speech therapists**, who currently operate in the region of Tlemcen. These therapists were selected using **purposive sampling**, as they were chosen based on their expertise and relevance to the research focus. Each therapist was interviewed individually in order to get data about the techniques they include in their practice to treat stuttering, as well as their point of views in terms of effectiveness of such techniques, whether traditional, modern, or a combination of both.

The next group consisted of **five** children who had a problem of stuttering, and ranged in age from **four to nine years old**; gender was not used as a determiner of sampling because it was discovered to be nonessential with regard to the research issue, as the study focuses more on the treatment of stuttering rather than the emergence of the phenomena. They were selected using **convenience sampling**, based on accessibility and their ongoing participation in therapy. The observations were conducted in order to document the speech development of the children as well as their engagement to the techniques implemented and their responses over time.

The third group consisted of **two Quranic teachers** chosen through **purposive sampling** due to their potential use of Quranic recitation as a form of speech therapy. They were interviewed to gather data about how Quranic recitation would help children who stutter overcome stuttering. In addition, a questionnaire was distributed using online platforms such as Facebook and Instagram, among the general population using convenience sampling. It was accessible to any interested respondent with the aim of establishing the public attitude towards Quranic recitation as a treatment for stuttering.

All the ethical standards were strictly upheld during the carrying out of the research. Informed consent was taken from all the participants, Quranic teachers, and speech therapists before participation. For data collection purposes, voice recording of the interviews was carried out with the open agreement of each of the participants,

for the purposes of ensuring accuracy of transcribing and analysis. In the situation of children, prior therapist consent had been obtained with respect to observation of therapy sessions of children, and no interview and recording directly with children were done. The identities of all the participants have been kept anonymous for the purposes of maintaining their confidentiality. No personal identifiable information was gathered and all the data have been used only for academic and scholarly purposes in accordance with the ethical standards of the research.

3. Research Findings:

3.1 Interviews:

3.1.1 Interviews with speech therapists:

In-depth, structured and semi-structured interviews with speech therapists in Tlemcen provided a glimpse into the methods, limitations, and attitudes toward stuttering therapy. The findings were organized into five themes: the types of approaches used, their perceived effectiveness, challenges faced by therapists, the importance of parental involvement, and therapists' attitudes toward different therapy approaches. Every theme represented significant trends that indicate both the advantages and constraints of present practices in the treatment of stuttering.

3.1.1.1 Types of approaches used

Tlemcen therapists use a combination of traditional, modern, and to an extent Quranic approaches in treating children who stutter. Traditional approaches like breathing exercises, relaxation, and syllable-timed speech remain the most practiced, particularly with young children. Except for two therapists, all therapists view these approaches as the point of departure because they are simple and because of the immediate, evident outcomes they tend to produce during treatment. But other therapists warn that although the old techniques have limited short-term potential, they cannot always be relied upon to work in the longer term, especially if they are not applied on a continuous basis outside therapy.

Besides conventional methods, some therapists have started dealing with modern approaches, the most prominent of which is Neuro-Linguistic Programming (NLP). NLP is a psychological model that investigates the connection between language, neurological processes, and patterns of behavior. It involves processes like anchoring and reframing, mirroring, and swish patterns. Anchoring involves putting links between a stimulus and a state of mind that you want. Reframing involves changing the manner in which one views a situation. Mirroring is where one subtly mimics a person's body language to gain confidence. These processes, despite their usefulness, are still underused in Tlemcen because of the lack of exposure and formal training.

Interestingly, Radjaa who is a therapist that works in ICOL INSTITUTE (TOUCHATOU) as a speech therapist with children of 4 to 9 years old. She is one of the therapists who have incorporated NLP skills into her work, in a way. She uses mirroring to establish trust and comfort with the child by unconsciously imitating the posture, tone, or rate of speech of the child, which helps to release tension and encourage interaction. But she does not draw on the broader range of NLP techniques, oftentimes for want of comprehensive training or materials, and thus circumscribes the possible success of this approach. Ilhem, by contrast, demonstrates a more holistic application of modern approaches, using both neuro linguistic games and sports activities like swimming and jogging to reinforce breath control and anxiety reduction—both of which are indirectly linked to fluency.

Spiritual interventions, especially recitation of the Quran, were also mentioned by some therapists as being helpful, especially with children who come from religious families. The melody and rhythm of the Qur'an, along with the emotional comfort it is believed to bring, was said to enhance articulation and decrease stuttering. Some therapists noted dramatic change when children recited verses such as Surah Al-Fatiha with correct tajweed. However, the use of Quranic therapy is usually threatened by cultural misconceptions; e.g., a therapist said that some parents link Quranic schools with harsh discipline or bullying and are therefore reluctant to accept their implementation in therapy. In general, therapists interviewed leaned towards an

integration of classical with selectively chosen new or religious techniques. Tool selection is frequently based on the child's personality, receptiveness, and home life, as therapists accommodate their practice to fit both the psychological and cultural aspects of the healing process.

3.1.1.2 Observed Effectiveness of the Methods

The efficacy of the therapeutic methods reported varied extensively during the interviews, with results often being dependent on the **nature** of the method, the **experience** of the therapist, and the particular **situation** of the child, both within the home and parent-child relationship. Traditional methods, such as controlled respiration, which basically refers to the intentional regulation of breathing patterns, especially the timing and depth of inhalation and exhalation, to support smooth and fluent speech ; syllable-timed speech, (rhythmic pattern of speaking in which each syllable is spoken with a structured time interval to create an even and stable speech flow), and progressive relaxation training (a method involving the systematic tension and relaxing of muscle groups to remove physical tension associated with stuttering) were highly praised as having beneficial outcomes in the short term.

Therapists reported notable improvements in fluency in well-structured therapy sessions, particularly with young children who quickly accommodated to physical cues. The strategies were extremely effective in helping children manage anxiety more effectively and reduce physical tension, both of which are now established as contributing factors in causing stuttering to become worse. However, therapists also found that gains were short-termed and strongly dependent on repetition and reinforcement outside the therapy situation. Where parents did not maintain practice at home, regression was the typical outcome, with some children going back to the same level and severity of stuttering within weeks.

Alternatively, modern therapy methods, although still relatively out of the ordinary in the field due to a lack of training and availability of materials, had fair chances of maintaining neurodevelopmental gains in the longer term. One therapist emphasized particularly the value of games that have a cognitive basis, like those

modeled after the Stroop effect, that challenge children to handle conflicting information and promote executive language skills. Not only do these games develop attention and brain quickness, but also motivate children to anticipate and cope with moments of stuttering. Though still in the experimental phase with local therapists, such methods were described as being highly interactive with youth and had some of a few therapists eager to utilize them more extensively if appropriate tools and training were made accessible.

Moreover, one of the strongest findings of the interviews was the self-described efficacy of Qur'an recitation as a single therapeutic treatment, particularly for religiously backgrounded children. Many therapists said that if they got children to repeat Quranic verses, particularly rhythmic or melodic ones like Surah Al-Fatiha, their speech became more fluent and they had greater control over speech. This was attributed to several factors: the calming psychological effect of religious participation, the regulated breathing required for recitation, and the repetitive character of most of the verses, which helps to ensure rhythm and articulation. Therapist 4 indicated a personal observation in which a child who otherwise stuttered excessively spoke normally when reciting memorized Quranic verses, especially during sessions conducted in a quiet familiar environment.

While these positive remarks were uttered, the use of Quranic therapy was not without its limitations. Its success was often premised on cultural and family acceptance. Most parents, especially those with minimal exposure to Qur'anic recitation's religious or therapeutic nature, were hesitant to include religious content in what they considered as a medical matter. Others held negative attitudes towards Quranic schools due to fear of outdated or disciplinary forms of discipline. Such resistance at times slowed and blocked children from benefiting from methods otherwise having a high potential of linguistic and emotional growth to help reduce stuttering.

In all the above-mentioned results, one observation by therapists in general was that there is no single method that works with all children. Factors such as the child's age, the type and severity of the stuttering, their cognitive and emotional

profile, and most importantly, their home and social environment, all have a critical bearing on the success of therapy. Therapists also placed stress on creating individually specific therapy plans that are adaptable, responsive, and grounded in scientific knowledge as well as cultural sensitivity. The most effective interventions were those that *combined* elements of a number of approaches by blending traditional instruments, modern cognitive exercises, and culturally appropriate practices like the recitation of the Qur'an, specifically adapted to the individual needs and circumstances of each child.

3.1.1.3 Challenges Faced by Therapists

Tlemcen therapists face an overwhelming number of issues that heavily impact the overall quality and consistency of stuttering therapy for children. The most pressing problem mentioned by them is a lack of access to advanced equipment and technological materials. Equipment such as Delayed Auditory Feedback (DAF) machines, which have reportedly been shown to generate positive results in stuttering treatment in other clinics globally, is unavailable within local facilities. Such equipment is not available on the Algerian market or is too expensive for smaller centers. As a result, most therapists have no choice but to employ more low-tech, low-cost methods even when more advanced, evidence-based treatments may be able to provide better long-term outcomes. This technology gap contributes to a stop of therapeutic innovation, since therapists feel obligated to operate within the limitations of antique or very traditional techniques.

No less problematic is the random involvement of parents in the therapeutic process. Although parent involvement is convincingly established as a determinant of the success of speech therapy, a number of therapists in Tlemcen complained about a lack of reinforcement at home. In most cases, exercises started during sessions of therapy are not carried through in everyday life, with resulting plateaus or full regression. Such inconsistency is especially exasperating to young children, who require repeated encouragement and reassurance in order to build confidence in their speech. In some cases, parents, too, have been a real obstacle to progress, according to some therapists. One made it clear that certain families exclude or merely refuse

approaches such as Qur'anic recitation, not due to religious objections, but due to cultural stereotypes and ignorance; most of all, the thought that Qur'anic schools are too strict or poor learning environments. Such doubt shortens the therapist's flexibility to employ an approach that addresses the child's emotional and spiritual needs.

Nevertheless, beyond the family, there is a challenge posed by attitudes in the community. Several therapists mentioned the widespread cultural conservatism and unwillingness to hear about new ideas in Tlemcen. Compared to more urbanized locations such as Algiers, where numerous workshops, professional meetings, and inter-disciplinary working relationships are commonplace, possibilities for continuous professional and treatment developments in Tlemcen are limited. Most therapists rely on individual effort to gain access as they often rely on new information from the internet or casual conversations with colleagues, which can be time-consuming and not always reliable. The lack of official support makes it harder to adopt new methods and leads to professional isolation, making it difficult for therapists to stay up to date.

A second set of challenges is created by the psychological and emotional state of the children themselves. All the younger patients approach therapy with an existing anxiety, communication fear, and poor self-esteem, all of which will restrict their acceptability of treatment. These emotional defences are reinforced by adverse interpersonal contacts, like mockery at school or overpowering parents. In some instances, children begin to identify therapy with failure, especially when progress is slow or labile. Therefore, therapists do not only treat speech fluency but also assist in regaining the self-worth of the child, a process which requires sensitivity, patience, and which is usually done in coordination with a psychologist.

3.1.1.4 Parental Involvement and Role in Therapy

Parental cooperation was the determining factor in therapy for stuttering, with its effectiveness varying extensively, however. While therapists argued that parental engagement explained "more than 60% of therapy success," others noted difficulty as a result of inconsistent co-operation or refusal to adopt proposed methods. Parents

who cooperated actively in home exercises, regularly reported to therapists, and gave emotional support tended to speed their child's progress. However, most struggled to be consistent, citing factors of time or doubt about goals of therapy. Socioeconomic and educational background also influenced parents' participation: parents with low education were inclined to fully trust all decisions of the therapists, while those with greater education sometimes insisted on newest approaches without being aware of applicability.

There were tensions too that occurred culturally, particularly where Quranic-based approaches were not accepted by some parents due to negative stereotypes in religious education or social stigma fears. In order to bridge such gaps, therapists recommended formal intervention in the form of workshops and modified home practice manuals to educate families, dispel myths, and promote teamwork. Tailoring the communication to various parental backgrounds and conducting regular follow-ups were identified as the principal strategies to bridge trust gaps and align home efforts and clinical goals.

3.1.1.5 Therapist Preferences and Emerging Trends

Tlemcen therapists enjoyed diverse preferences when it came to treating stuttering, and most claimed that they used a combination of traditional and modern means. Traditional methods, such as breathing exercises, were popular for their simplicity and good results. However, some practitioners criticized their limitations, noting that traditional means are biased towards neglecting the neurological nature of stuttering. Instead, they promoted recent methods like neuro-linguistic programming (NLP) and competitive language games, which attempt to reprogram speech patterns for fluency over the long term.

Quranic recitation was generally viewed as a culturally appropriate additional tool, valued for its rhythm and religious reassurance. Therapists warned, though, of the necessity of careful monitoring to ensure proper pronunciation and avoid misinterpretations that might cause families to be excluded.

One of the key emerging trends was heightened emphasis on neurobiological models. One of the therapists that was interviewed felt like stuttering was not only a psychological disorder but ought to be treated as a neurological disorder, shifting attention away from anxiety management towards brain-training routines. Prescriptions included the addition of physical exercises (e.g., swimming, jogging) and mental games to enhance neural plasticity and fluency of speech.

Despite all these advances, there were structural barriers in Tlemcen, such as scarce resources, inadequate training, and outdated institutional support, which hindered the adoption of modern techniques. Classic habits continued to be dominant among many therapists.

Finally, The study identifies the intricate dynamics of stuttering treatment in Tlemcen, where traditional methods conquer but are increasingly complemented by modern and Quranic methods. Success hinges on making interventions person-centered, engaging parents, and breaking through cultural and logistical barriers. Persistent challenges such as resource scarcity, erratic parental engagement, and skepticism toward innovation demand systemic reforms.

3.1.2 Interview with Quranic Teachers:

This summary includes views from two Qur'anic teachers living in Tlemcen who had an experience with teaching students who stutter. One of the participants is a young male teacher in his mid-40s, with over 15 years of experience teaching tajweed. The second teacher is also a male teacher aged in his mid-50s with a background in Qur'anic education and over 20 years of experience.

Both lecturers offered helpful comments on how recitation of the Qur'an, or more precisely its rhythmic and phonological content, can be used to enhance fluency in individuals with speech disorders. Through their response, they captured certain key themes, individual approaches, and sage advice on how elements such as rhythmic speech rhythm, repetition, and spiritual engagement can be effectively integrated into a supportive environment for speech. Their impressions were not only

based on practical class experience but also on a firm belief in the cognitive and affective rewards of learning the Qur'an in a formal, systematic manner.

3.1.2.2 Fluency Through Rhythm and Structure

Both teachers explained that Qur'anic recitation, especially when performed with tajweed, which is the art of proper pronunciation and phonetic accuracy. They said that it can significantly enhance fluency in stuttering students. This is due to the unique linguistic and rhythmic nature of the Qur'an, which provides a cognitive and physio logical model for speech production. The cyclical melodic patterns, syllable balance and measured rhythm create a speech rhythm which stutterers are often unable to reproduce on their own in spontaneous speech.

Teacher **A** described a very good example of one such student who stuttered while speaking in conversation but could recite the Qur'an fluently without any hesitation, he stated " أنا لا أستطيع أن أشرح لك كيف يتغير صوته... كأن الثقة ترجع له فجأة لما يبدأ التلاوة. لا خوف، لا تردد، فقط هدوء وكلمات تخرج بسلاسة.". This radical disparity suggests that the recitation form is a framework, assisting in the ease of the speaker's ability to build and generate language in an expected, controlled manner. In this case, the student does not need to generate speech spontaneously, and this reduces pressure and cognitive overload; two of the major reasons for stuttering attacks.

Accordingly, Teacher **B** affirmed this line of thought but took a slightly more technical perspective, highlighting how slow, teacher-led drills allow students to regulate their breathing and internal speech rhythm. When students repeat verses after the teacher they are not only practicing pronunciation but also mirroring the teacher’s pacing, intonation, and articulation. This form of guided imitation helps conditions the brain's speech centers to adopt more fluent and consistent patterns. By repeatedly following the teacher's rhythm and cues, students begin to internalize these patterns, which strengthens their muscle memory and gradually builds confidence. Over time, this repeated and structured practice contributes to noticeable improvements in fluency during both recitation and, increasingly, spontaneous speech.

In addition, Quranic verse predictability removes the uncertainty factor that triggers stuttering. In comparison to free speech, which requires continuous lexical access and sentence generation, recitation is supplied in memorized, prearranged form. This frees students from having to think about what to say and enables them to focus on saying it, directing their brainpower to articulation, pacing, and breathing control.

At a more fundamental level, the rhythmical phrasing of reading is remarkably close to many modern speech therapy techniques grounded in metronomic Pacing Therapy where a metronome is applied to pace the speaker to deliver one syllable per beat and promote fluency through the regularity of the timing. Reciting the Qur'an with tajweed naturally applies this kind of metrical timing, especially in verses with metrically symmetrical syllable structure, for example:"مَالِكِ يَوْمِ الدِّينِ," where the identical syllable gets the same time and emphasis.

Additionally, melodic intonation therapy (MIT) which refers to using melodic shapes and pitch variation to allow subjects suffering from stuttering to use language through the musical pathway. For instance, a child who stutters can be taught to say a sentence such as "I want to eat" over a plain melodic line and reduce stuttering through rhythm and tone. Recitation of lines such as "الرَّحْمَـٰنِ الرَّحِيمِ" in tone has the same impact naturally. Both forms of therapy utilize controlled rhythm and pitch to retrain the speech production system. The organic presence of the feature within Quranic recitation means that it could be used as a culturally embedded form of speech therapy, particularly for Muslim students, who may well have an emotional and spiritual connection to the practice.

In summary, the meter and structure of Quranic recitation hold more than just religious significance; they express a therapeutic framework that is in line with cognitive-linguistic and psycholinguistic accounts of fluency success. Through repetitive training with a systematic approach, musical instruction, and phonetic precision, stuttering learners are provided with a firm basis on which to rebuild confidence and redevelop their habit of speech.

3.1.2.3 Calming and Emotional Benefits:

The second phenomenon in both teachers was the emotional and spiritual calming that recitation of the Qur'an achieves. A phenomenon which appears to have a direct impact on fluency of speech. Stuttering normally tends to worsen with psychological problems such as anxiety, nervousness, or fear of criticism. Under these circumstances, recitation of the Quran can prove to be a powerful emotional modifier. Its spiritual depth, coupled with its rhythmic and contemplative nature, creates an inner sense of tranquillity that lowers the cognitive anxiety more commonly associated with speech disorders.

Teacher **A** compared the reciting experience as a journey to inner peace, noting how stuttering students became more cantered, focused, and less self-conscious when and after reciting. This natural attitude allows for the relief of mental tension that typically interrupts smooth speech. The predictive and iterative pattern of the Qur'anic surahs also allows for this calming environment, allowing students to become engaged with a familiar, holy rhythm that does not require improvisation or quick reaction.

Teacher **B** sympathized with this view, though, but insisted on the importance of the learning environment. He emphasized that apart from the recitation act itself, it must also be cultivated that a classroom atmosphere is soft, non-critical, and stress-free. To many stuttering pupils, the possibility of being mocked intensely will discourage progress significantly. A peaceful setting in which mistakes are handled softly and constructively becomes as therapeutic as recitation proper.

Together, these findings confirm the fact that emotional health and recitation performance are closely related. A quiet emotional state facilitates enhanced regulation of breath, reduces stress-related speech obstacles, and allows for students to engage more freely in recitation. Here, Qur'anic recitation is not just a religious exercise but also an emotional therapy that allows the stutterer to become more robust and capable of weathering speech challenges.

3.1.2.4 Surah Selection

Both instructors emphasized starting with short, melodically simple *surahs* that will facilitate easy memorization and recitation for stuttering students. Surah selections are not random; they are specifically paired against the linguistic and phonetic characteristics conducive to speech development.

Teacher A recommended initiating with Surah Al-Fatiha and Surah Al-Ikhlas. Al-Fatiha as the opening chapter of the Qur'an is elementary and widely memorized and has a balanced rhythm with repeated phrases like "Alhamdulillahi Rabbil 'Alamin" which help to maintain a steady pace. Its relatively plain phonetic structure and effortless movement make it an ideal place to begin to learn tajweed rules like *qalqala* (reverberating consonants) and *idgham* (unification of letters), providing students with an opportunity to practice smooth movement between sounds. Surah Al-Ikhlas, with its brevity and melodically uncomplex nature, mandates steady control over the breath and clear articulation without overburdening the student. The iteration of the words "Qul Huwa Allahu Ahad" offers chances for practicing repetition of clear utterance of consonants like the glottal stop (hamza) and the emphatic ha', that are essential to developing accuracy in speech.

Teacher B, although preferred Surah Al-Qadr and Surah An-Nas because they present phonetic diversity and difficulties in articulation. Surah Al-Qadr contains a combination of guttural sounds like qaf (ق) and kha (خ) that require diaphragm activation and throat control, necessary in building speech muscles typically weak among stutterers. The tajweed rules applied in Al-Qadr, such as ghunnah (nasalization) and tafkhim (heavy pronunciation), help learners to acquire control over voice modulation and airflow. Surah An-Nas contains a mix of dental and alveolar sounds such as nun (ن) and sin (س) ; necessary for tongue placement correction and regulation of air, two of the most important elements in the articulation of clarity.

Individualized surah selection based on the learner is a part of how instructors provide targeted phonetic practice along with maintaining interest through religious and musical motivation. The systematic focus on principles of tajweed serves not only to enhance proper pronunciation but also to advance therapeutic goals like increasing control over breathing, reducing tension in speech, and maximizing rhythmic fluidity. This customized approach makes recitation a multifaceted speech therapy tool for harmonizing spiritual practice with linguistic rehabilitation.

3.1.2.5 Working with Therapists and Parents

Coordination between the Qur'anic instructors and the speech therapists was found to be a critical element in facilitating the advancement of the stutterers. Teacher A explained how she coordinated with a speech therapist to ensure that the Qur'anic phrases and sounds done during recitation were in tune with the aimed-for phonetic objectives of the student's therapy. This intentional replication not only reinforced treatment objectives but also offered the student a chance to practice challenging sounds in a familiar, spiritually appropriate context. Teacher B contrasted with this by pointing out the need to modify drills to focus on hard Arabic letters—e.g., qaf (ق) and kha (خ)—and did so with direct parental input and feedback. These exercises were repeated at home, helping to reinforce the work that was done in the class and provide a sense of continuity to the child's learning environment.

Both instructors emphasized that open discussion and shared responsibility between parents, therapists, and instructors are the keys to maintaining and building students' achievements. When everyone works together, children who stutter will have a unified and supportive learning environment.

3.1.2.6 Challenges

Despite the clear benefits, both teachers also identified significant challenges. Teacher A mentioned shyness and fear of peer judgment that may reduce participation especially in group settings. Teacher B mentioned some teachers may lack patience, flexibility, or specialized training to deal with students who have speech disorders. Furthermore, both educators discovered that parents do have stereotypical

perceptions of Quranic schools by assuming that they are rigid, conservative, or unable to adapt to special learning needs. Such stereotypes may hinder collaboration or weaken early intervention. Addressing these challenges requires increased teacher training and attempts at reshaping perception through communication and transparency.

3.1.2.7 Therapeutic Integration

Both teachers do not consider Qur'anic recitation as a substitute, but as a complementary treatment method that may be used together with clinical therapy. Teacher A emphasizes its emotional and moral support, particularly for households with a strong religious background, as a spiritually grounded practice that allows a child to feel a sense of confidence and peace. As opposed to Teacher A, Teacher B envisions a more structured system in which trained Qur'anic teachers and physicians collaborate. They prescribe a standardized approach where the therapeutic and spiritual work is aligned in order to yield equal, effective, and measurable results.

Finally, Quranic recitation holds significant therapeutic potential for children who stutter, offering a powerful intersection of rhythm, spirituality, and phonetic structure. While Teacher A's approach highlights its emotional and religious potential, Teacher B's method accentuates its collaborative and mechanical potential. The merging of the two perspectives can open gates to culturally responsive and scientifically grounded interventions. As the two educators confirmed, the keys to unlocking a child's speech potential are patience, flexibility, and joy.

3.2 Observations

This section of the chapter reports the observational results of a series of therapy sessions with children who stutter, focusing specifically on the therapy techniques used and their observable impact on speech fluency, behavioural engagement, and communicative confidence. The goal of the observations was to study how a variety of therapeutic strategies influenced the children's verbal performance and responsiveness both during and following therapy.

3.2.1-Setting of the observations

The conducted observations took place in formal, child-friendly settings, particularly in speech clinics across Tlemcen. These were quiet rooms with the necessary therapeutic tools such as mirrors, reading materials, visual aids, and to an extent sound equipment (e.g., headphones for the use of Delayed Auditory Feedback). The sessions took place for between 30 and 60 minutes and were held once or twice weekly as agreed by both the therapist and the researchers.

Treatments were delivered by certified speech-language pathologists. Children were observed directly by the researchers via utilizing the support of an observation check-list in regard to fluency levels, behavioral engagement, and phonemic production throughout therapy. Precautions were taken to maintain constant observational conditions for all cases.

3.2.2 Observation Cases

- ***Case A:***

Patient 1 was seen for traditional speech therapy for four months, twice a week. Treatment strategies used included repetition drills, breathing coordination exercises, and reading aloud from organized texts. These were planned towards enhancing speech rhythm, airflow control, and strengthening normal patterns of articulation in a controlled setting.

Throughout treatment, the patient showed noticeable gains in fluency for practiced and predictable tasks. He was most responsive to systematic repetition and guided reading, in which the language content was known and speech rate could be controlled by the clinician. Progress within these contexts suggests that the structured nature of the treatment enabled him to anticipate the speech sounds and reduce stuttering.

Yet a definite pattern developed when the patient was put into less structured, spontaneous contexts, like open-ended narrative story telling or roleplaying

discussions. In those situations, his fluency fell off considerably. That breakdown pointed to an excessive use of external structure as a means of controlling speech. Without it, stuttering returned, and it was usually preceded by noticeable tension and hesitation.

This case points to a frequent shortcoming of classic fluency-shaping approaches: although highly effective in the treatment context, they might not be sufficient to make young children self-regulated and cognitively flexible enough to use unstructured speech in unpredictable, daily communication situations. This case implies that other therapy elements might be required to help the patient transition from structured to spontaneous communication.

- ***Case B:***

Sami received a twelve-month treatment with the traditional speech therapy techniques of mirror reading and syllable stretching. His treatment was delivered once a week for twelve months, with gradual but steady progress. The techniques applied were based on visual reinforcement, articulation pacing, and imitation of fluent speech patterns for internalizing speech rhythm and reducing disfluency.

Over time, Sami manifested consistent progress, especially in situations marked by routine, emotional security, and low communicative pressure. In therapy and reading activities, where content was predictable and expectations were set, his fluency was significantly enhanced. He manifested strong visual engagement on mirror activities and was extremely sensitive to slowed, syllabic breakdown of speech.

- ***Case C***

Lina’s case was approached by utilizing much more modern methods, as it required her to wear headphones to utilize Delayed Auditory Feedback (DAF), along with standard articulation practice. She was treated for a therapy session once a week for six months.

Throughout the therapy, Lina demonstrated immediate and significant improvements in fluency under therapy conditions with the headphones and the delayed feedback activated via audio device (headset). When using the device, the rate of stuttering significantly decreased this, increasing her communicative confidence. The acquired fluency tended to be almost perfect within the controlled situation, a sign of positive response to the technological treatment.

It was a noteworthy finding, however, that Lina's fluency was not sustained after the removal of the DAF. When spontaneous speech was required, especially in cases of spontaneous dialogue or emotional unpredictability, Lina regressed at a very rapid rate to pre-therapy levels of stuttering. That she depended on the device indicates that the therapy enhanced performance during the period but failed to adequately reinforce internal regulation of speech or coping mechanisms.

This example points to one of the DAF-based treatment's well-known limitations: being useful for fluency in short-term but risky to promote reliance on external support, so automatic implementation of fluency skills in everyday life becomes difficult without sustained technology use. Lina's therapy outcome underscores the need to accompany assistive devices such as DAF with practices that enable long-term generalization and independence from external support.

- ***Case D:***

The child was treated twice a week for four months, using Stroop-effect cognitive games and basic NLP mirroring techniques. They were intended to improve attention, speech control, and reduce anxiety. Enhanced fluency during structured conversation was observed in the child, along with coping strategies to prepare before stuttering. Speech in unstructured settings remained erratic, suggesting a need for further reinforcement.

The therapist's client was engaged in a therapy program integrating the concepts of cognitive control training and interpersonal communication technique. The main instruments used were Stroop-effect games, aimed at enhancing attention and mental flexibility, and NLP mirroring techniques, aimed at establishing rapport and easing communication anxiety. The child demonstrated obvious improvement in anticipatory control, that is, they began to sense when a block of stuttering was

approaching and took prophylactic action such as pausing or slowing down. These strategies contributed to role-play and scenario-based activities' increased fluency, in which the child could engage with a partner in semi-structured conversation.

In contrast to earlier cases that depended on either rigid structure (Cases A and B) or extraneous devices (Case C), this case demonstrated the potential of internalized cognitive devices for the attainment of fluency. Mirroring (where the therapist copies body posture and tone) also appeared to strengthen the therapeutic relationship, with the child feeling understood and safe in sessions. Although the complete toolkit of NLP techniques was not utilized, even low-level use of this approach appeared to facilitate more assertive social behavior. Nonetheless, the child's fluency in unstructured, high-pressure situations continued to be somewhat inconsistent. This suggests that although cognitive and interpersonal approaches had created a level of flexibility and self-monitoring, they might need to become more firmly entrenched and reinforced over time in order to reach long-term generalization to environments.

- ***Case E:***

The session that was observed took place at Icol Institute and was led by a qualified therapist, who has been working with the child for over a year. The child was a boy of 4 years old, and was originally diagnosed with language delay, subsequently developed stuttering, and is currently undergoing treatment that is focused on classical speech therapy techniques. The child also has organic issues, including fluid in the ears and throat gland swelling, which may be contributing to articulation issues and delayed phonological development, the therapist said. The session began with breathing exercises, a pillar of traditional fluency therapy. The child performed candle breathing, starting with one candle and working up to two, to develop breath control and timing. The therapist also included tongue movement exercises that were meant to increase oral flexibility, which she described as a necessary component of accurate articulation of sounds. In addition to these mechanical exercises, there were language development games, such as flashcards with three-word options. The child selected and labelled the correct response to

questions posed by the therapist, enhancing vocabulary understanding along with verbal production in a casual, game-like atmosphere.

The child employed a range of disfluencies like word and syllable repetition at the beginning of sentences and tension on the face of blocks. He did not, however, show overt anxiety or embarrassment, which suggests ease in the therapy setting. When disfluencies occurred, the therapist provided verbal cues by reminding the child to breathe, speak slowly, and such immediate correction had an immediate and positive effect on fluency. The child manifested self-corrective behavior, followed instructions carefully, and was open to the therapist's correction. There was high session engagement. The child was responsive, active, and smiling, particularly when doing game-like tasks.

Eye contact was maintained, and emotional withdrawal or frustration was not observed. There was one novel element, which was the memory game, but the therapist did not adequately explain how it was beneficial to fluency therapy. At the end of the session, the therapist led the child through a relaxation and visualization exercise in which he was told to imagine a future self who spoke fluently, which represents a positive reinforcement and mental imagery technique, though not a formally psycholinguistic one. Despite the session's general structure and emotional safety, it was noted that most techniques were rigidly traditional and may not have been sufficient in promoting long-term fluency gains. The therapist herself admitted that group therapy settings generally gave better results, possibly due to equal interaction and modelling. Furthermore, the therapist avoided neuro- or psycholinguistic therapies, and treatment seemed more directed at short-term fluency control rather than at more basic cognitive or emotional restructuring.

3.3 The Questionnaire

Chapter Two : Data collection and analysis

This section presents the results as reported from the questionnaire, which was a key significant instrument to gather empirical data on perceptions/attitudes concerning the implementation of the Quran as an approach to treat stuttering.
The questionnaire was designed to record a broad range of opinions from individuals either suffering from stuttering or knowing someone who does. It aimed to investigate attitudes towards the therapeutic quality of the Quran, its presumed influence on speech production, and if it was acceptable to mix religious practice with modern therapeutic treatment.

3.3.1 Awareness and Belief in Quran's Healing Properties

One of the crucial aspects of this study was to identify the general belief in the therapeutic efficacy of the Quran among the participants, i.e., its supposed ability to heal psychological and emotional conditions. The results indicate a widespread and firm basis for such a belief within the sampled population.

The findings indicated that there was a general acceptance of this belief among the sample population. An overwhelmingly large majority of the sample, i.e., 40 out of 42 subjects, definitely indicated their agreement or strong agreement with the assertion that the Qur'an is therapeutic in nature and induces psychological and emotional well-being. Only two respondents indicated neutrality towards this particular statement, thereby suggesting an almost universal acceptance of the Qur'an's general benefits for mental and spiritual health among the respondents. This general belief in the therapeutic qualities of the Quran provides a significant context for the understanding of attitudes towards its use in specifically such as stuttering.

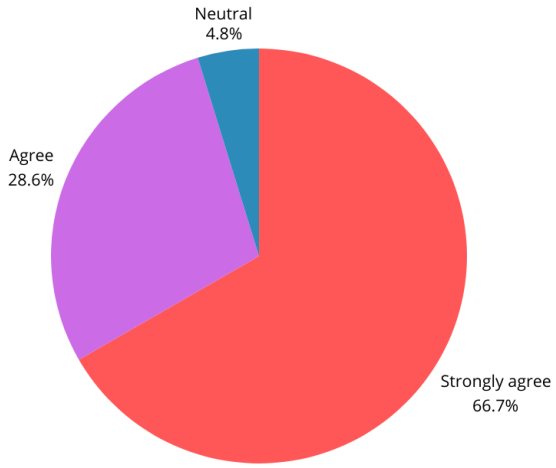

Figure 3.1: Participants' Belief in the Therapeutic Effectiveness of the Qur'an

It is also interesting to note here, though, that the vast majority of respondents, 28 out of 42, indicated that they had no pre-existing knowledge or awareness of the Quran being utilized or advocated as a treatment or cure for stuttering. On the other hand, thirteen of the participants did acknowledge that they had indeed heard of such an application. This juxtaposition indicates that while the overall spiritual and psychological efficacy of the Quran is relatively common knowledge, its actual therapeutic application for speech disabilities, such as stuttering, is less so. Even so, the general perception of its overall therapeutic qualities probably inclines many to believe in or consider its potential efficacy for speech disorders, even if they were not specifically aware of such practices beforehand. This general confidence in the Quran's broad healing ability appears to set the stage for a positive reception to its potential role in addressing communication problems.

3.3.2 Most Influential Aspects of the Quran's Therapeutic Effect

Besides the general conviction in the therapeutic effects of the Quran, the participants were asked to name the certain features of the Holy Book that they found most important in the prospective therapeutic impact, especially concerning speech disorders. Their answers revealed a multi-faceted perception, highlighting both the linguistic and the spiritual aspects of the Quran's influence.

- **Phonological Features (Speech Sound Production):**

The majority of respondents (28) particularly pointed to the phonetic and articulatory requirements involved in Quran recitation. The rigorous and precise articulation of the classical Arabic phonemes (letters) in recitation is viewed as a type of vocal exercise or training. This regulated speech sound production with an emphasis on accurate articulation is considered to enhance habitual articulation capacity and hence general fluency. This can be viewed to be within a motor learning model of speech, in which correct and repetitive movement results in increased control.

The respondents identified several key elements that contribute to this perceived therapeutic efficacy: Meaning (Semantics) and Spiritual Content: This element was often noted to have a significant impact. Subjects highlighted the deep spiritual resonance and inherent meaning within the verses of the Quran. It is believed that the deep wisdom, advice, and solace obtained from comprehending the messages in the Quran are likely to develop an inner peace, diminish anxiety, and enhance mental well-being. One participant said, "The calm it gives removes anxiety, which makes talking easier." This indicates the emotional and psychological calm derived from spiritual engagement is perceived as a direct cause of easier speech, by eliminating inner tension elements typically connected with stuttering.

A few of the responses directly referred to "Phonological aspects (speech sounds production)" and the "sound and melody" as the major determinants.

- **Repetition and Rhythm:**

The intrinsic repetitive quality and the distinctive rhythmical intonation patterns of Quranic recitation have been commonly quoted as therapeutic. The predictable and regular rhythm, combined with recurring repetition of phrases or sounds within the text, is believed to allow for a predictable and ordered framework for speech production. This rhythmic tempo can help to provide easier transitions from sound to word and hence potentially override stuttering. The metronomic rhythm can act as an external pacing device, helping people to control the flow of their speech. Repetition and rhythm were particularly highlighted by one respondent as an important factor, stressing its perceived effectiveness. Sentence Structure (Syntax) quoted less than other features, yet some participants identified the useful role of the syntactic structures in the Quran. The formalized and frequently repeated grammatical structures found in the Quran sentences are thought to aid language control and pronunciation. Working with such regular syntactic structures can reinforce fluent sentence building and production, and hence a more organized and less effortful linguistic output.

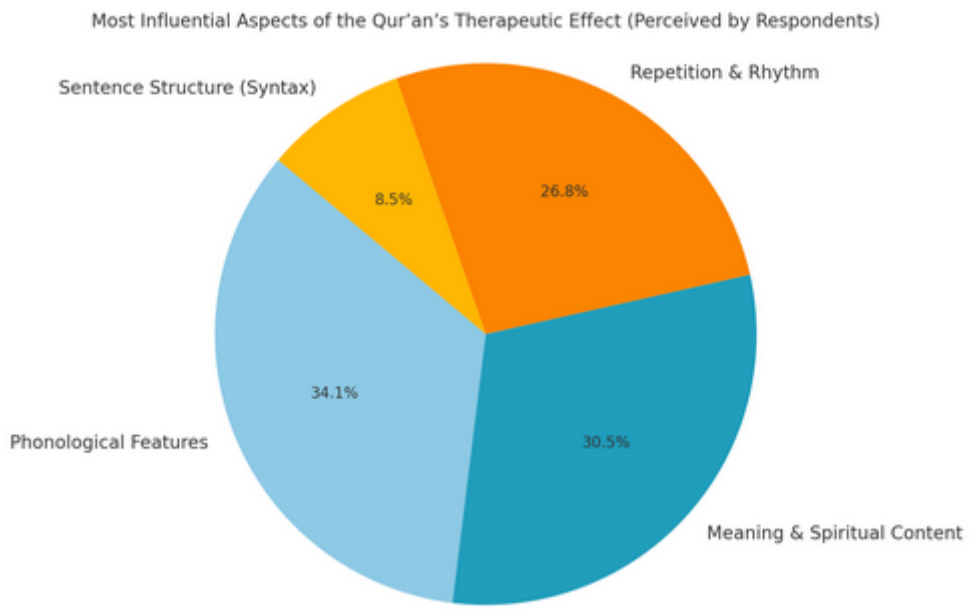

Figure 3.2: Perceived Therapeutic Features of the Qur'an

3.3.3 Attitudes Towards the Integration of the Quran in Speech Therapy

This segment analyses participants' acceptability and sentiments toward the integration of religious rituals, in the guise of Quran recitation, in standard therapeutic practices for stuttering. The findings show a relatively good level of acceptability of such integrative models with moderating influence of some nuanced opinions.

Overwhelmingly, 36 out of 42 (85.7%) respondents found it "Appropriate" to incorporate religious rituals like Quran recitation into standard therapeutic practice for stuttering. This reflects a common feeling that these two fields were not mutually exclusive but complemented one another in the management of speech disorders. Five (11.9%) respondents answered "No" to this integration, giving a minority opinion. This lone dissenting opinion unequivocally asserted, "I would think that mixing religion practices and science is ODD, referencing an ideological divide regarding the intersection of religious and scientific methods. One (2.6%) respondent adopted a more cautious stance, selecting "Perhaps" or "To a certain extent," a qualified acceptance or open to consideration. This slight dissent, nonetheless, underscores the

general willingness on the part of the majority to consider a multidimensional approach that embraces spiritual and scientific dimensions of healing.

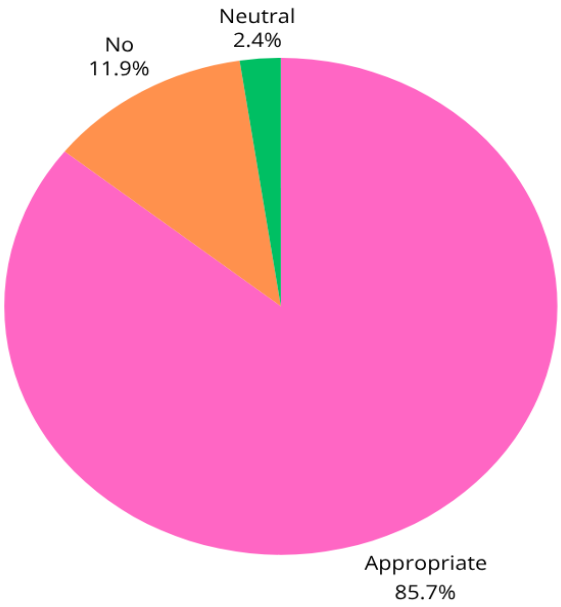

Figure 3.3: Attitudes Towards the Inclusion of Quranic Healing Professionals in Medical Teams.

Reflected here in this overall positive receptivity to integration, the acceptance of the provision of Quranic healing professionals on modern medical teams was markedly high. 81% (34 of 42) were "Accepting" or "Strongly accepting" of inclusion of this integrative model. This indicates a desire for interdisciplinary approaches that identify and respect culturally and religiously significant healing practices. Six (14.3%) of the respondents were "Neutral" or "Reluctant," reflecting a demand for further information or conservative approach toward adopting these specialized roles. Two (4.8%) of the respondents provided a "Don't accept" response once again reflecting low resistance to this integrated model.

4. Discussion

The initial goal of such research was to identify the frequency of stuttering therapeutic methods applied by speech therapists in Tlemcen, based on a hypothesis that traditional methods dominate in therapy due to a lack of exposure to more recent ones and difficult accessibility

Interview results with four therapists confirm that old methods such as breathing exercises, syllable-timed speech, repetition drills, and relaxation are indeed the most commonly used methods. All the therapists mentioned using the previously mentioned on a regular basis, especially with young children. New interventions such as NLP, cognitive behavior methods, or neuro-feedback were applied by just one or two therapists, and even then partly or restricted. observational evidence supported this pattern: in most cases, traditional and formal approaches were the chief intervention strategies

The findings firmly support the initial hypothesis, confirming Tlemcen speech therapy is still highly dominated by traditional practices. Such reliance appears to be driven by a combination of practical, institutional, and cultural factors. In practical terms, the majority of therapists report being provided with little or old-fashioned training and little access to new trends in neuro-linguistic or cognitive-based therapy practices, they also mentioned the lack of scientific conferences and reunions between each other to stay updated on new trends.

Moreover, the lack of access to such modern equipment such as delayed auditory feedback (DAF) units, neuro-feedback machines, or interactive computer programs which help to reduce the potential for employing modern techniques even when therapists are aware of their benefits.

At a cultural level, resistance to adopting new methods, particularly those perceived as unusual, too scientific, or incompatible with local culture, is observed. Traditional approaches are regarded as safer, more "natural," and easier to communicate to parents and families particularly where parental involvement is nonexistent. This gives rise to a conservative therapeutic environment where innovation must be accompanied by suspicion rather than curiosity.

Implications of the trend are significant. While older methods like breathing control and syllable-timed speech continue to offer core benefits. However, they are insufficient for obtaining generalized, long-term fluency in such situations as shifting or high-pressure speaking environments. Without adding more adaptable, tailored,

and neurologically-grounded techniques, numerous children are likely to plateau in progress or even to regress after the end of therapy. Therefore, there is an imperative need to develop capacity such as retrained therapist expertise, public awareness campaigns, and institutional commitment to existing therapeutic resources, in order to ensure that the Tlemcen community does not fall behind in offering effective, evidence-based speech therapy solutions.

Moreover, this study also sought to test the hypothesis that contemporary approaches are more effective than classical approaches in the therapy of stuttering in children. It sought to assess the relative effectiveness of classical, contemporary, and Quranic (complementary) approaches in actual treatment in Tlemcen settings using interviews, direct observation, and questionnaires as key sources of information.

The evidence provides a balanced picture that verifies and falsifies the hypothesis to some extent. Observation and interview evidence discovered established techniques like breathing exercises and syllable-timed speech to be most prevalent and effective in the short term, particularly with children who were younger in age. These interventions were highly accessible, simple to execute, and culturally suitable.

However, more recent approaches, especially cognition-based ones such as the Stroop effect, Neuro-Linguistic Programming (NLP), and Delayed Auditory Feedback (DAF) held out greater hope for long-term improvement. Case studies employing DAF and cognitive games showed that children became more aware of their speech habits and developed greater anticipatory control. The approaches were rarely tried, however, reportedly because of a lack of training, equipment, and institutional support.

Finally, the last hypothesis was based on exploring Qur'anic recitation as a potential therapy for decreasing stuttering severity among children. The hypothesis was based on the fact that the Quran's repetitive, rhythmic composition, in addition to its psychological and spiritual comfort, might have a beneficial effect on fluency

and reducing stuttering. The hypothesis was strongly proven by quantitative and qualitative data obtained through interviews, and a questionnaire distributed across the community.

Both the religious teachers and therapists cited Qur'anic recitation as having special linguistic benefits. Reciting verses entails controlled breathing, precise pronunciation of classical Arabic sounds, and adhering to rhythmic patterns. Also, Participants in the studies referred to how these aspects work as natural speech exercises, causing correct sound production and fluency. At the same time, the religious nature of the Qur'an was constantly cited as a mode of emotional control. Many respondents stated that children are more calm, focused, and less anxious during recitation, which alleviates tension generally associated with stuttering attacks.

Both of these functions explain the observed therapeutic efficacy of the Quran in speech therapy contexts. Survey responses also generated these findings: 40 of 42 respondents agreed that the Quran could be therapeutic. The features most widely accepted were phonological clarity, melodic rhythm, repetition, and spiritual comfort. Respondents named reciting the Qur'an as both spiritually meaningful and an opportunity for habitual articulation practice and relaxation, both necessary for the management of speech disfluencies.

These findings are in line with comprehensive themes of the literature review. While Quranic therapy remains an under researched field within academic literature, existing research on music therapy, melodic intonation, and rhythmic speech treatment does validate that rhythmic, organized verbal output does improve fluency. In particular, repetition and timing of religious reading reflect methods utilized within syllable-timed speech and metronomic pacing.

Moreover, the effective returns specified align with the drift of psycholinguistic and CBT-based models, the focus of which is on the reduction of anxiety and promotion of self-confidence in fluency attainment. The comforting

effect of the Quran aligns with this psychological aspect, positioning it as a culturally normed example of mindful, rhythmic therapy.

Also, employing Quranic content in speech therapy aligns with a culturally responsive framework since this enhances the use of familiar and meaningful interventions to increase therapeutic engagement and outcomes.

5. Limitations

While this study offers insightful observations on the therapeutic process taken to cure stuttering in Tlemcen, some constraints and limitations were experienced during the data collection process which could have impacted the depth and breadth of the study.

Firstly, it was extremely difficult for the study to have parental participation. Although parental interviews were included in the original research design for those children undergoing speech therapy, most parents declined to participate. Others were reluctant to discuss their child's speech problem, while others appeared to consider the problem too intimate or even untouchable. The study is thus lacking first-hand data from the parents, which would have been important in terms of home support, support for therapy, and emotional impact on the family.

Second, scheduling interviews with speech therapists was an ongoing issue. In Tlemcen, speech therapists to practice are rare, and most professionals have very busy calendars. Some would commit but kept rescheduling or delaying the interviews, forcing the research team to be very flexible and patient. Although four interviews were conducted, the process was very time-consuming and occasionally broke the planned schedule of the study.

A third setback was that there were few numbers of observations of therapy. Observation was a key part of the design, but parental permission dominated access. Some parents did not feel at ease with inviting a stranger into their child's therapy session, most often due to privacy or cultural sensitivity issues. It was a powerful

restriction on the amount of observations and thus comparative study between therapy methods.

In addition, although the research aimed to collect a broader set of information from Qur'anic teachers, only two of the interviewees had prior experience with Qur'anic recitation in speech therapy. Most other teachers were unaware of its potential therapeutic use or had no experience with such cases, limiting data for this part of the research.

Lastly, one of the challenges was also the uncertainty some professionals had as to whether or not the research team was academically competent. As students of English (Language Sciences), the researchers were occasionally questioned or discredited by therapists who saw stuttering therapy as a clinical or medical-only professional occupation. A few of the therapists expressed surprise or puzzlement at the team involvement in the topic, stating that it was "not part of [their] speciality." Characterization of the linguistic foundation of speech disfluency and of psycholinguistics took more effort and, in a few cases, served as a barrier to initial trust and collaboration.

Though these challenges created some constraint, the research team remained committed to carrying out their research in a respectful, clear-headed, and ethical way.

6. Contributions

This study provides valuable insight into the arena of stuttering treatment within the Tlemcen population, introducing a unique intersection of traditional, modern, and religious approaches from a culturally grounded position. One of the contributions is the ongoing application of traditional methods rather than modern or religious ones such as the Quran.

A further key contribution is the exploration of the therapeutic potential of Qur'anic recitation, a previously underrepresented area in the literature. In shedding light on its dual linguistic and emotional benefits, namely, improvement in

articulation through phonetic precision and anxiety reduction through spiritual engagement, the study provides a culturally appropriate, community-accepted model that can potentially be developed and integrated into speech-language therapy in similar sociocultural settings.

Additionally, the study highlights parents' involvement and sociocultural factors that influence the therapy outcomes. The study brings to academic focus the resistance that therapists are routinely confronted with in implementing new approaches, particularly by parents or even professionals who question the linguistic input to speech pathology. Such dynamics necessitate interdisciplinary collaboration, public education, and professional training in under-served places like Tlemcen.

Finally, this research opens up possibilities for further investigation by showing that children who are frequent reciters of the Qur'an can attain quantifiable reductions in stuttering severity, with implications to develop hybrid models that merge traditional therapeutic interventions with religious and neuro psycholinguistic ones. The findings present both a roadmap and an invitation to researchers, therapists, and educators who work at the intersection of language, culture, and healing.

General Conclusion

General conclusion

In conclusion, this research sought to explore and evaluate varying treatment modalities used in the management of childhood stuttering among the population of Tlemcen, giving particular emphasis to the use of Qur'anic recitation as a speech device based on culture. With qualitative and quantitative data collection methods, the research confirmed that traditional methods remain most prevalent mainly due to availability, familiarity, and institutional limitations. But new and neuro-psycholinguistic methods had good long-term prospects, particularly if they were used systematically and innovatively by qualified therapists.

Further, the study strongly supports the hypothesis that recitation of the Qur'an as a speech therapy technique can be effective, combining rhythm, repetition, and religious comfort to enhance fluency and reduce speech fear. Despite initial resistance from parents and professionals, the reported phonological and emotional improvements suggest that this technique is therapeutically worthwhile, especially when adapted with standard therapy.

It also revealed inherent shortcomings in parental cooperation, community awareness, and professional education, which are factors that have an indirect impact on the therapy's effects. It also found a very strong set of educators and professionals who actively strive to develop innovative, ethnically diverse, and tailor-made care despite being in an under-funded setup.

Lastly, the findings imply a need for systemic change: investment in emergent technology, multidisciplinary collaboration, the use of culturally appropriate methods like Qur'anic therapy, and publicity campaigns to educate families. By its acknowledgment of the multilateral interplay of language, emotion, culture, and cognition, this study makes a significant contribution to the emerging field of speech-language therapy and lays a basis for more effective and inclusive stuttering treatment in Algeria and worldwide.

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Appendices

Appendices

Appendix A – Interview Questions for Speech Therapists

This appendix contains the list of semi-structured interview questions used to gather information from five speech therapists in Tlemcen. The questions aimed to explore the types of therapy used, perceived effectiveness, challenges, and attitudes toward Qur'anic recitation as a therapeutic tool.

For Hypothesis 1:

"In the Tlemcen speech community, traditional speech therapy methods such as fluency shaping and stuttering modification are more commonly used by speech therapists than modern neuro- and psycholinguistic approaches due to limited awareness and accessibility."

1. What are the most commonly used therapeutic techniques for stuttering in your practice? Could you name a few and explain why they are preferred?

2. How familiar are you with modern neuro- or psycholinguistic methods for treating stuttering (e.g., cognitive-behavioral therapy, brain-based interventions)?

3. In your opinion, what factors influence the choice between traditional and modern methods—are they more influenced by therapist training, patient preferences, or available resources?

4. Are there any challenges or barriers that limit your ability to apply modern treatment approaches in Tlemcen?

5. How do you perceive the level of awareness among speech therapists and patients in Tlemcen regarding newer scientific advances in stuttering treatment?

For Hypothesis 2:

"Children who regularly recite the Quran will show a measurable decrease in stuttering severity over time."

1. Have you ever observed or heard of cases where reciting the Quran has helped improve fluency in children who stutter?

2. Do any of your patients incorporate Quran recitation into their daily routines as a form of therapy or personal practice?

3. From a speech therapy perspective, how might repetitive and rhythmic recitation, such as Quran reading, affect speech fluency?

4. Would you consider integrating Quran recitation (or similar rhythmic speech practices) into a therapy plan if requested by parents or patients? Why or why not?

5. In your professional opinion, do you believe that spiritual or religious practices can complement clinical speech therapy? Please explain.

Appendix B – Interview Questions for Qur'anic Teachers

This appendix includes the interview questions used with two Qur'anic teachers to explore their experience with stuttering among students and their views on using recitation as a speech therapy aid.

1. How long have you been teaching the Qur'an, and what age groups do you work with?

2. Have you ever taught a child who stutters or has difficulty speaking fluently?

3. If yes, how did the child respond to Qur'anic recitation?

4. Do you believe that Qur'anic recitation can improve speech fluency or reduce stuttering? Why or why not?

5. Which aspects of the Qur'an do you think contribute most to its potential therapeutic effect (e.g., rhythm, pronunciation, repetition, spiritual connection)?

6. Do you intentionally use any specific surahs or verses when working with children with speech difficulties?

7. Have you ever collaborated with speech therapists or families to help improve a child's speech through Qur'anic recitation?

8. What challenges, if any, have you noticed when using Qur'an as a supportive tool for children who stutter?

9. Do you think religious recitation could be officially integrated into speech therapy programs?

10. What advice would you give to parents or therapists considering the Qur'an as a therapeutic aid?

Appendix C – Observation Checklist for Therapy Sessions

The following checklist was used during direct observations of therapy sessions with five children who stutter. It includes categories related to method application, child engagement, emotional response, and fluency outcomes.

Observation Checklist: Speech Therapy Sessions for Children Who Stutter

General Info (to be filled before the session):

Observer Name:

Date of Observation:

Location: Icol institute

Therapist Name:

Child's Age:

Session Number:

Type of Therapy Used: ☐ Traditional ☐ Neuro-/Psycholinguistic ☐ Mixed

1. Child's Linguistic Behavior

Behavior/Indicator	Yes	No	Notes
Frequent repetition of syllables or words			
Sound prolongations			
Blocks (sudden stops in speech)			
Use of fillers (e.g., 'uh', 'um')			
Avoidance of specific words/sounds			
Signs of anxiety or tension when speaking			
Improved fluency during session			
Attempts to self-correct			
Uses full sentences			
Makes phonological or grammatical errors			

2. Therapist's Techniques and Methods

Behavior/Indicator	Yes	No	Notes
Encourages slow and relaxed speech			
Uses breathing techniques			
Gives immediate feedback			
Uses visual aids or gestures			
Applies neuro-/psycholinguistic techniques			
Focuses on articulation or phonemes			
Engages child in conversation			
Uses praise and positive reinforcement			
Asks open-ended questions			
Adapts methods based on child's reactions			

3. Child's Engagement and Response

Behavior/Indicator	Yes	No	Notes
Actively participates			
Shows signs of frustration or withdrawal			
Smiles or laughs during session			
Responds positively to therapist's cues			
Maintains eye contact			
Appears motivated to speak			

4. General Notes & Comments:

_____.

Appendix D – Sample of Questionnaire Distributed Online

This appendix includes a copy of the online questionnaire distributed to a general population sample. The questions aimed to assess perceptions about stuttering, and awareness of Qur'anic therapy.

Section 1: Demographic Information

1. **What is your age?**
2. **What is your gender?**
    - Male
    - Female
3. **Do you suffer from stuttering or know someone who does?**
    - Yes
    - No
    - No, but I know someone who does
4. **Preferred language:**
    - English
    - Arabic

Section 2: Qur’an and Linguistic Aspects

5. **Do you read the Qur’an regularly?**

- Daily
- Sometimes
- Rarely
- Never

6. **Have you ever heard about treating stuttering with the Qur’an?**

7. **To what extent do you agree with the statement: "The Qur’an has healing properties for psychological and emotional conditions"?**

8. **Do you think listening to or reciting the Qur’an can positively affect speech disorders like stuttering?**

9. **What aspect of the Qur’an do you think has the most therapeutic impact?**

- Sound and melody
- Spiritual meaning and content
- Repetition and rhythm
- Syntax

10. **Do you think that the classical Arabic used in the Qur’an helps improve pronunciation?**

11. **Do you think training on articulation during Qur’an recitation can help improve daily speech sounds?**

12. **Do you believe studying Arabic grammar during recitation can help improve language control and pronunciation?**

13. Do you think the repetitive syntactic patterns in Qur’anic sentences help ease pronunciation?

Section 3: Qur'an as a Therapeutic Method for Stuttering

14 / **Do you believe it's appropriate to combine Qur'anic recitation with stuttering therapy?**
15 / **How important is spirituality or religious belief in treating speech disorders?**
16 / **To what extent do you accept integrating Quranic healers into modern medical therapy teams?**
17 / **How would you feel if a friend or family member used the Qur'an to treat stuttering?**
18 / **In your opinion, how effective is Qur'anic therapy in reducing symptoms of stuttering?**

Summary:

This study investigates the effectiveness of different therapeutic methods used to

treat childhood stuttering in Tlemcen. It compares traditional techniques, modern neuro- and psycholinguistic methods, and Qur'anic recitation. The research aims to determine the most widely used approaches, assess their efficacy, and explore the role of Qur'an recitation in enhancing speech fluency.

Key words: Stuttering, speech therapy, traditional methods, neuro-linguistics, psycholinguistics, Quran recitation.

Résumé :

Cette étude examine l'efficacité des différentes méthodes thérapeutiques utilisées pour traiter le bégaiement chez les enfants à Tlemcen. Elle compare les approches traditionnelles, les techniques modernes issues des neurosciences et de la psycholinguistique, ainsi que la récitation du Coran. L'objectif est d'identifier les méthodes les plus couramment utilisées, d'évaluer leur efficacité, et d'explorer l'effet de la récitation coranique sur l'amélioration de la fluidité verbale.

Mots-clés : Bégaiement, Orthophonie, Méthodes traditionnelles, Neurolinguistique, Psycholinguistique, Récitation du Coran.

الملخص

تسعى هذه الدراسة إلى مقارنة فعالية الأساليب العلاجية المختلفة المستخدمة في علاج التأتأة لدى الأطفال في مدينة تلمسان. تم التركيز على الطرق التقليدية، والطرق الحديثة المستندة إلى النظريات النفسية واللغوية العصبية، بالإضافة إلى تلاوة القرآن الكريم. تهدف الدراسة إلى تحديد أكثر الأساليب استخدامًا، وأكثرها فعالية، وكذلك تقييم أثر تلاوة القرآن على تحسين الطلاقة الكلامية.

الكلمات المفتاحية: التأتأة، علاج النطق، الأساليب التقليدية، اللغويات العصبية، اللغويات النفسية، تلاوة.