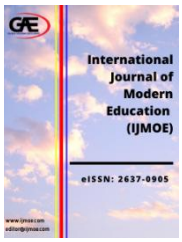
International Journal of Modern Education
EISSN: 2637-0905
Volume 7 Issue 28 (December 2025) PP. 1251-1260
DOI: 10.35631/IJMOE.728086



INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

BILINGUALISM AND STUTTERING: HOW BILINGUAL INDIVIDUALS ARE MORE PRONE TO STUTTERING

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Article Info:

Article history:
Received date: 29.10.2025
Revised date: 12.11.2025
Accepted date: 24.12.2025
Published date: 31.12.2025

Abstract:

Stuttering is a complex speech disorder which affects millions of people worldwide, while bilingualism plays a significant role in affecting its presence and severity. Therefore, this paper attempts to critically examine the relationship between bilingualism and stuttering risk and severity, which is fulfilled by investigating how language proficiency, language dominance, and cognitive load influence speech fluency. Thus, the Dynamic Restructuring

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 28 (December 2025) PP. 1251-1260
DOI: 10.35631/IJMOE.728086

To cite this document:

Shaharudin, I. F. M., Nizam, N. M. A., Za'im, N. H. M., Yahya, S. N. N., Mahayudin, N. A. M., Che Mohd Nassir, C. M. N., Ahmed, M. A., Md Tajudin, H. H., & Jaffer, U. (2025). Bilingualism And Stuttering: How Bilingual Individuals Are More Prone to Stuttering. *International Journal of Modern Education, 7* (28), 1251-1260.

DOI: 10.35631/IJMOE.728086

Model and the Dual Diathesis-Stressor model are used to provide insights into the interaction between bilingualism and stuttering, emphasizing the role of cortical regions as well as emotional and linguistic stressors in speech disfluencies. In integrating Islamic perspectives, the study highlights the importance of culturally sensitive and neurophysiologically informed approaches that align with neural and cognitive demands, as well as holistic well-being of individuals. Meanwhile, gaps and limitations mentioned in the current study include small sample sizes, inconsistent methodologies, and limited literature, which hinder the generalizability and applicability of findings. By addressing these gaps, this review aims to inform future research and enhance treatment approaches for bilingual individuals who stutter.

Keywords:

Stuttering, Bilingualism, Neuropsychology, Literature Review

Introduction

Stuttering, a complex speech disorder, affects approximately more than 70 million people worldwide, which is about one percent of the population, and is defined by involuntary interruptions of speech (SheikhBahaei & Maguire, 2020). The cause of this disorder has not been finalized, as the disorder is the result of multiple interacting factors, but research points to it having genetic as well as environmental factors (Onslow, 2023). Of these environmental factors, bilingualism has been shown to be related to the presence and severity of stuttering, as mentioned by Choo and Smith (2020). The relationship between stuttering and bilingualism is a topic of interest in physiological psychology since, in bilingualism, people have a unique pattern of speech disfluency.

The current research shows that bilingual people who stutter may present inconsistent fluency across the two languages because stuttering may fluctuate due to language proficiency, language dominance, and context of use (Chaudhary et al., 2021). Another study identified that bilingual speakers who stutter are much more likely to exhibit disfluencies in the second language than in the first language and that using a second language would further both normal and stuttering-like disfluency (Woumans et al., 2021). Moreover, the performance rate in the second language was significantly related to a reduction in disfluent behaviors. From a neurophysiological view, both stuttering and bilingualism are characterized by alterations in the function and structure of the brain, mainly in areas that are involved in language regulation and executive processes. Knowledge of these neural mechanisms is crucial to the design of appropriate therapeutic strategies that may be subsequently used for the bilingual population.

According to Bagchi and Reddy (2022), since more than half of the world population speaks two or more languages, bilingual stuttering presents problems with the conventional perspectives used in defining and analyzing stuttering. Consequently, it influences research, measurement, and treatment of stuttering, as stated in Krawczyk (2018). Stuttering, when diagnosed as being a result of bilingualism, poses a big risk to the client's self-esteem and the clinician's self-esteem with the patient. It also leads to wrong and ineffective treatment. Thus, as stuttering is not included in insurance coverage, full or in part, the medical cost skyrockets with no gain or productivity (Bagchi & Reddy, 2022). This makes it important to investigate

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IJMOE
EISSN: 2637-0905
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bilingual stuttering extensively to enhance the approaches of therapy and to increase our knowledge regarding the mechanisms of the generation of speech.

The rationale for evaluating previous research is to determine the relationship between bilingualism and stuttering risk and severity, inclusive of bilingual language proficiency, language dominance, and cognitive load, elements that have been established to impact speaking fluency in bilingual speakers (Woumans et al., 2021). Thus, the purpose of the current review is to refine recent findings that have pointed to the fact that bilinguals may be more likely to stutter than monolinguals and to identify the processes that underlie this trend. This analysis will also highlight the specifics of stuttering therapy in bilingual persons and the importance of accounting for the person's bilingualism when prescribing therapy (Chaudhary et al., 2021; Kornisch, 2021). In other words, this review is expected to compile the existing research in order to inform future research and treatment approaches in the area of stuttering in bilingual individuals.

Methodology

A comprehensive and systematic search strategy was utilized to compile a collection of literature suitable for this review. The search was conducted through several online academic databases such as Google Scholar, ScienceDirect and APA PsycNet. Additionally, a library database from the institution was used to locate a few hard copy literatures on related topics. The keywords used for the search were "bilingual students," "bilingualism," "stutter individuals," and "stuttering" while the Boolean operators (AND, OR) were used to assist the search.

Inclusion and Exclusion Criteria

All articles reviewed were published from 2020 to 2024 to ensure recent discussions and information. Additionally, the literature included in this review consisted of original research studies and systematic reviews that were obtained from the online search engine. Additionally, the review also explored the literature from books retrieved through the library. Studies regarding the emotional and physiological aspects of bilingualism and stuttering were also included to enrich the findings. Studies published before 2020 were excluded from this review. Furthermore, the participants of interest were mainly from the student samples, while studies studying samples with older adults were excluded.

Data Extraction

A standardized form was created to extract the data. The main findings gathered from the data extraction were; objective(s) of study, results, limitation(s) and future direction. Consequently, from the data extracted, a few subthemes emerged.

Findings

Definitions of Bilingualism and Stuttering

The term bilingual, in the literal sense, means "two languages." It is derived from the prefix bi-, which means "two," and lingua, the Latin word for "language." However, the literal definition seems too simple to portray the degrees to which every bilingualism differs in its context. Bilinguals are well known to be benefited with increased cognitive performance (Giovannoli et al., 2023). However, it may also pose challenges, particularly among people with speech disorders, as this research aims to explore the complexities of stuttering.

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Bilingualism in this research refers to individuals who learn two languages during childhood as well as those who learn a single language from childhood and a second language after adolescence (Kohnert et al., 2021). Stuttering can be viewed from several approaches namely objective definition which focuses on the observable speech behaviors, internal definition which focuses on the speakers' personal experience and perceptual definition which requires a reliable observer to judge the person's stuttering (Onslow, 2023). Meanwhile, Yairi and Seery (2023) propose two types of definitions of stuttering; disordered speech and a complex disorder. Stuttering in this research refers to the definition by Sheikh et al. (2022) which is a type of speech disorder characterized by involuntary pauses and sound repetition which synchronizes with the approach of the objective definition proposed by Onslow (2023).

Theories Related to Stuttering

According to Alqhazo et al. (2024), stuttering may be explained by the Cerebral Dominance Theory which suggests that stuttering happens because of the unusual activity in the brain's hemisphere. The left hemisphere of the brain plays an important role in speech. However, people who stutter (PWS) experience simultaneous action of controlling speech from both the left and right hemispheres. The lack of clear dominance of one hemisphere for language processing, thus, according to the aforementioned study, disrupts the fluency of speech. A model that could explain the stuttering phenomenon is the working memory model which closely works with the phonological encoding process, where the process of selection and organization of sounds to become words happens (Kuriakose et al., 2024). Meanwhile, a study by Kim et al. (2021) supports the Dual Diathesis-Stressor model which posits that emotional stressors can activate underlying vulnerabilities in children who stutter, leading to increased disfluencies.

Neurological Mechanism in Bilingualism

According to Pliatsikas (2020), the Dynamic Restructuring model could explain how the brain changes in individuals with bilingualism throughout the learning of a second language. He proposed that neuroanatomical adaptation happens in stages whereby it is based on the duration of the second language exposure and the cognitive demands resulting from it. The stages start during the early exposure to the second language. According to the model, there is an increased reliance on the cortical regions responsible for cognitive control and short-term memory. The cortical regions involved are the inferior frontal gyrus, anterior cingulate cortex, inferior parietal lobule or the superior parietal lobule, and hippocampus. During the second stage, or can be known as the consolidation stage, increased use of the second language leads to stronger connections between the brain regions. Therefore, this strengthening could improve communication between areas that are involved in language and attention. Meanwhile, the subcortical grey matter also increases during the consolidation stage while some cortical grey areas return to normal size as they are used less. At the final stage, which is called peak efficiency, the brain becomes highly efficient as the person already performs extensive practice and uses the second language in a long-term commitment. The increase of cerebellar grey matter as well as the decrease in frontal connectivity denote that the second language processing has become more automatic and no longer needs active control from frontal areas (Cong et al., 2021; Silveri, 2020).

This model, along with the Cerebral Dominance Theory, working memory model and Dual Diathesis-Stressor model are able to explain the mechanism of stuttering and bilingualism, respectively. However, none of the mentioned theories and models can be used to explain how

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bilingualism and stuttering connect because they present valid arguments for each condition separately. This is especially true for the Dynamic Restructuring model which despite providing ample evidence explaining the process of second language acquisition, is unable to explicate stuttering among bilinguals. Additionally, the studies done by Alqhazo et al. (2024), Kim et al. (2021) and Kuriakose et al. (2024) exploring the mechanism of stuttering discussed stuttering for monolinguals since all participants can only speak one language. This indicated that while the above theories and models can be used to separately discuss the processes of stuttering and bilinguals, the gap of understanding the neuropsychological processes of stuttering in bilinguals still remains.

Relationship between Stuttering and Bilingualism

Literatures highlight several mediating factors that enhance bilinguals to develop stuttering. Chaudhary et al. (2021) and Woumans et al. (2021) pointed out that bilingual individuals who stutter are less fluent in their less proficient or non-dominant language. However, the study by Sokolov (2020) contradicts Chaudhary et al. (2021) and Woumans et al. (2021) whereby it is found that there are no significant differences in stuttering frequency or types of disfluencies between the usage of two languages. This consistency might be due to the concurrent treatment given in both languages that allow similar patterns in conveying both the languages. The findings from Sokolov (2020) are then supported by Rojas et al. (2023) where their study revealed that there were no statistical differences in total disfluencies or stuttering-like disfluencies between Spanish and English languages among the bilingual children, only that they are more prone to the risk of disfluencies as compared to the monolingual English-speaking children.

Meanwhile, Kumari et al. (2022) in their study on phoneme monitoring abilities demonstrated that bilinguals who do not stutter took more time to identify the presence or absence of target consonants compared to those who do stutter, thus, resulting in a higher number of correct responses in the phoneme monitoring task. The study by Woumans et al. (2021) corroborates Kumari et al. (2022) by showing that bilingual individuals who stutter produced more disfluencies in their non-dominant language compared to their dominant one as stuttering may originate from devoting too much attention to speech monitoring. They have also explored the influence of cognitive and attentional dimensions of stuttering in bilingual individuals due to the divided attention for speaking and another one, language control purpose, that leads to typical disfluencies such as pauses and repetitions.

Future Research Directions

Every approach has its strengths and limitations to their respective research. In the context of bilingualism and stuttering, several studies have commonly demonstrated having limitations in sample sizes. Sokolov (2020) and Kumari et al. (2022) have reported having a small sample size which may distort the generalizability and variability of the findings, thus leading to misinterpretations of estimates. The limited sample size has plausibly skewed the results as it causes a lack of statistical significance differences between the two languages in which the bilinguals speak (Sokolov, 2020). Therefore, a larger sample size is preferred in order to deepen the understanding of stuttering among bilinguals. Rojas et al. (2023) have proposed that an even larger sample, comparable to their research, is recommended for a more in-depth apprehension in the variability in disfluencies across bilinguals.

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Besides, another common theme that is revealed from the analysis is the lack of past literatures in the field. The lack of substantiating data in the existing literature for influence of linguistic typology on the manifestation of disfluencies in bilinguals who stutter has led to the lack of uniformity in the methodology of assessing and reporting language dominance and proficiency (Chaudhary et al., 2021). Sokolov (2020) has also reported the same weakness in their research where they called for a need for more studies in this area as there is insufficient existing research on stuttering in bilingual speakers. The lack of supporting literatures has may or may not instigated the use of an adapted, rather than validated, language proficiency measure in investigating the phoneme monitoring abilities in the English language among bilingual adolescents and young adults who stutter (Kumari et al., 2022).

While significant progress has been made in understanding stuttering in bilingualism, addressing the gaps in literature is crucial in rectifying the underexplored areas. A lack of commonly agreed definitions of 'bilingualism' and 'stuttering' has made it difficult to compare the studies in this domain (Grosjean, 2012; Yairi & Ambrose, 2013, as cited in Chaudhary et al., 2021). Therefore, the research proposed that future studies employ recommended tasks and metrics to assess disfluencies in bilinguals who stutter, in order to improve the compatibility of findings across studies. Woumans et al. (2021) have raised a similar concern in which they suggest a more in-depth study on the effects of training programs similar to attentional training, to assess the extent of benefit they bring to the quality of life of people who stutter. Whereas, Rojas et al. (2023) suggested the need for the establishment of appropriate norms for bilingual children as the study found that the bilingual children had higher rates of disfluencies compared to monolingual English-speaking norms.

Discussion

Application to Current Issue

Stuttering among bilingual individuals presents unique challenges and considerations, particularly in relation to speech fluency, language dominance, and cognitive load. The interplay of bilingualism and stuttering, as observed in prior research, highlights the need for context-specific therapeutic interventions. The insights provided by the Cerebral Dominance Theory and the working memory model can be effectively applied to address the neurophysiological mechanisms underlying bilingual stuttering. This also reiterates the need for more research regarding bilinguals who stutter to bridge the knowledge on this issue. As discussed by Bagchi and Reddy (2022), recent methods of treatment for and assessing patients who stutter are tailored to monolinguals due to the scarce of information. Consequently, clinical decisions and therapies are not immune to biases and misdiagnosis when it comes to patients with more than one language spoken.

From a neurological perspective, bilingualism and stuttering share common neural mechanisms. For instance, the Dynamic Restructuring Model suggests that brain adaptation during second-language acquisition involves increased reliance on cortical regions responsible for cognitive control, such as the inferior frontal gyrus and anterior cingulate cortex, which are also implicated in stuttering (Pliatsikas, 2020). While not providing practical intervention for the issue, these findings underline the importance of tailoring therapy for bilinguals to account for the neuropsychological changes underlying cognitive demands of managing two languages. In this sense, the model provides a valid theoretical basis to advance a neuroscientific framework to assist in treating and assessing bilinguals who stutter.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
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Additionally, the Dual Diathesis-Stressor model provides a framework for understanding how emotional and linguistic stressors exacerbate stuttering in bilingual individuals. Emotional stress, combined with the cognitive load of switching between languages, can amplify disfluencies (Walden et al., 2012). This is especially relevant for children with more than one language acquisition, which informs clinicians to include assessments of temperament, personality and emotional regulation in understanding stuttering patients. Consequently, this framework highlights a crucial need for individualized assessment and treatments for language disfluencies that integrate the emotional aspects as needed by patients, underscoring the necessity for therapies to focus not only on speech techniques but also on stress management strategies.

From a clinical perspective, a major issue is the potential misdiagnosis of stuttering in bilingual individuals due to normal disfluencies associated with second-language acquisition (Brundage & Ratner, 2022). A misdiagnosis can happen when clinicians believe a patient is experiencing pathological stuttering when in fact, it is a second language disfluency. This may occur when a patient's cultural factors and language proficiency are discounted. Moreover, patients who stutter might not be diagnosed if clinicians attribute stuttering to second language acquisition. To avoid such concerns, studies recommend clinicians account for language dominance, proficiency, and cultural factors when assessing bilingual individuals. This can be done through observations to assess the way they articulate each language which can help to differentiate pathological stuttering and normal L2 disfluencies (Byrd et al., 2015). Effective assessment will prevent unnecessary therapy sessions for patients while ensuring accurate clinical decisions for treatment providers. This is equally important to detect patients who truly stutter so that early interventions can be provided to prevent long-term disfluencies.

Islamic Perspective

The Islamic perspective offers profound insights illuminating the relationship between language, spiritual, and psychological well-being, emphasizing individuals' holistic development as a divine creation of Allah SWT. Parallel to this review, the Quran (17:82) highlights the importance of seeking knowledge and remedies when it comes to treating any kinds of illnesses with the understanding that all conditions are treatable with the right intervention plans. Therefore, this verse serves as an important basis for developing treatment plans with the aim to provide help and comfort to patients while emphasizing that with enough research, a suitable treatment will be developed for each individual.

Genetic and environmental factors, including bilingualism, influence the complexity of stuttering as a speech disorder. The acknowledgement of bilingualism as a potential factor in stuttering reflects the diversity Allah has created among individuals, as highlighted in Surah Al-Hujurat (49:13), which refers to the variation in Allah’s creations, resulting in the diversity of people around the world. This diversity creates different languages and individual differences which is celebrated by the Quranic verse, encouraging researchers to approach bilingualism not just as a factor but as a unique aspect of Allah's creation that requires understanding and respect.

Based on the critical review, various neurophysiological models are proposed to explain stuttering in bilingual individuals such as the Cerebral Dominance Theory and Dual Diathesis-Stressor Model. These models highlight how cognitive load and emotional stressors exacerbate disfluency. Referencing the application to the current issue section, Islam provides a guideline

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on managing stress through spiritual practices, such as prayer (salah) and remembrance of Allah (dhikr), since it can reduce anxiety and promote emotional resilience. The Quran (13:28) connects psychological resilience and emotional regulation with the remembrance of Allah. These practices can serve as complementary strategies for managing stress in bilingual individuals who stutter, aligning with modern therapeutic approaches that address emotional triggers.

Furthermore, the application section underscores tailoring therapy for bilingual individuals by addressing their unique neural and cognitive demands. For clinicians, this practice aligns with the principle of ihsan (excellence), which encourages striving for perfection in one's actions including providing personalized care for bilinguals. Additionally, the concept of rahmah, or mercy, can be profoundly applied to the treatment application of stuttering in bilingual individuals by fostering an environment of compassion and understanding. Therapists can embody this principle by creating a safe and supportive environment where clients feel valued and understood. This approach encourages open communication, allowing individuals to express their feelings about stuttering without fear of judgment.

Additionally, the research highlights the importance of considering cultural factors in diagnosis and treatment. Islam's emphasis on adl (justice) ensures that individuals are treated fairly and without bias. Clinicians should avoid misdiagnosing stuttering in bilingual individuals by taking into account that normal speech interruptions are common when learning a second language. Hence, this approach reflects the Islamic values of fairness since clinicians can prevent unnecessary treatment that may put a burden of healthcare costs on the patient by considering cultural influences when evaluating.

Conclusion

This review aims to investigate the relationship between bilingualism and stuttering in the light of neuropsychological perspective to answer the questions, do bilinguals stutter more than monolingual and what are the physiological processes involved? Answering the questions will help inform future research of the topic and improve treatment plans for people who stutter. Additionally, the mechanism of stuttering has been explained using three different models; the Cerebral Dominance Theory, the working memory model, and the Dual Diathesis-Stressor model. Meanwhile, bilingualism has been explored through the Dynamic Restructuring model which explains the neurological changes in bilingual individuals throughout acquiring a second language.

Further, the review explored the factors mediating stuttering and bilingualism, while providing the strengths and limitations of past research to inform future directions. The Islamic concepts of ihsan, Rahmah and adl were further discussed as the pillars to encourage better interventions that are suitable with the needs of individuals who stutter. From the synthesis of papers, this review points out to the need for more research to understand the neuropsychological aspects of stuttering in bilinguals in the effort to develop suitable treatment plans for the population. It is evident that research on stuttering patients has been focusing on monolinguals, tailoring insufficient intervention strategies for multilinguals which posits an immediate need for research-based treatments that are culturally relevant.

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EISSN: 2637-0905
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Acknowledgement

I would like to express my gratitude to everyone who supported me in the completion of this research. In addition, no potential conflict of interest was reported by the author(s).

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