KMAN PUBLISHING INSTITUTE
Journal Website

Article history:
Received 27 January 2023
Revised 20 March 2023
Accepted 25 March 2023
Published online 01 April 2023

Journal of Personality and Psychosomatic Research

Volume 1, Issue 2, pp 31-42

E-ISSN: 3041-8542

Psychosomatic Manifestations in Speech and Language Disorders: A Comprehensive Review

Maryam. Saadat[1], Hajieh. Sheydaei[2], Razie. Kia Kojori[3], Azizreza. Ghasemzadeh[4*]

[1] Psychoanalyst, LifeWorks Holistic Counselling Centre, Dubai, UAE
[2] Department of Clinical Psychology, Maragheh University of Medical Sciences, Maragheh, Iran
[3] Department of Clinical Psychology, Tonkabon Branch, Islamic Azad University, Tonkabon, Iran
[4] Speech-Language Pathologist, Armada Medical Centre, Dubai, UAE

*** Corresponding author email address**: aghasemzadeh@irimed.org

A r t i c l e I n f o

Article type:
Review Article

How to cite this article:
Saadat, M., Sheydaei, H., Kia Kojori, R., & Ghasemzadeh, A. (2023). Psychosomatic Manifestations in Speech and Language Disorders: A Comprehensive Review. *Journal of Personality and Psychosomatic Research, 1*(2), 31-42.
https://doi.org/10.61838/kman.jppr.1.2.6

A B S T R A C T

This article examines the interaction between psychosomatic elements and speech and language impairments, emphasizing the significance of a comprehensive approach in diagnosing and treating such conditions. The current article aims to systematically examine the current research on psychosomatic factors in speech and language disorders and to investigate the implications for clinical practice. A concise search was undertaken, utilizing databases such as PubMed, PsycINFO, and others and, in this regard, only studies published in English after the year 2000 that focused on the psychosomatic aspects of speech and language disorders were left out. The review revealed a substantial correlation between mental well-being and speech and language impairments. It stressed the importance of incorporating psychological assessment in speech-language pathology and examined various therapeutic techniques that address both speech-language and psychological aspects. The results highlight the necessity of considering psychosomatic factors when assessing and treating speech and language disorders. The review proposes the integration of multidisciplinary approaches for optimal management.

Keywords: *Psychosomatic, speech disorders, language disorders, comprehensive review.*

1. Introduction

Speech and language disorders encompass a broad spectrum of conditions that impact an individual's capacity to effectively communicate. These disorders may manifest in various forms, including delays in speech and language development, primary progressive aphasias, and psychosomatic presentations (Varsha et al., 2020).

The study of speech and language disorders revolves around primary progressive aphasias (PPAs) and primary

progressive apraxia of speech, which are key focal points. These conditions are characterized by early and predominant language impairment, highlighting the intricate nature of language processing and production. Additionally, developmental speech and language disorders (DSLDs) present unique challenges as they involve delays in speech and language development without accompanying mental or physical handicaps (Visscher et al., 2007). An understanding of the motor profile of children with DSLDs is crucial in comprehensively addressing the psychosomatic aspects of these disorders.

Moreover, the correlation between communication disorders and emotional/behavioral disorders in children and adolescents delves into the intricate relationship between psychological well-being and communication abilities (Prizant et al., 1990). This relationship is further underscored in the context of psycholinguistic injustice, which highlights the imperative to address the ableist and racist foundations within the field of Speech/Language Pathology (Manalili, 2022). Additionally, the prevalence of speech language and hearing impairment in school-going children highlights the widespread impact of these disorders on the younger population (Varsha et al., 2020).

The overlap between dyslexia and speech sound production deficits further accentuates the complex nature of speech and language disorders, as they can coexist with other cognitive and learning difficulties (Cabbage et al., 2018). Furthermore, the identification and differential diagnosis of phonological disorder in bilingual children emphasize the necessity for a comprehensive understanding of how speech disorders may manifest across different linguistic contexts (Holm et al., 1999).

The psychosomatic manifestations of speech and language disorders are particularly intriguing as they demonstrate the intricate connection between the mind and body in the context of communication challenges. Comprehending the psychosomatic manifestations of speech and language disorders is crucial for delivering comprehensive care to individuals affected by these conditions. This review aims to explore the psychosomatic manifestations in speech and language disorders, highlighting the interplay between psychological factors and the physiological expression of these disorders.

2. Methods and Materials

This systematic review was executed according to the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and the methodology was designed to comprehensively compile and analyze existing research studies that aim to comprehend the psychosomatic presentations in speech and language disorders.

2.1. Search Strategy

To achieve a broad scope of pertinent literature, a meticulously organized investigation was carried out across various electronic databases, including PubMed, PsycINFO, Scopus, and Web of Science. In this case, the search for articles was bounded to studies published in the English language between 2000 and 2023. The following combination of keywords and Medical Subject Headings (MeSH) terms were employed: "psychosomatic", "psychological", "speech disorders", "language disorders", "communication disorders", and their various permutations. Additional studies were identified by manually examining the reference lists of the included articles.

2.2. Selection Criteria

2.2.1. Inclusion Criteria:

- Peer-reviewed articles focusing on psychosomatic aspects of speech and language disorders.
- Studies including patients of all age groups.
- Quantitative, qualitative, and mixed-method studies.
- Articles published in English.

2.2.2. Exclusion Criteria:

- Non-peer-reviewed articles, conference abstracts, and dissertations.
- Studies not specifically addressing psychosomatic aspects.
- Articles focusing on disorders not primarily related to speech or language.
- Non-English publications.

2.3. Data Extraction

Data from the selected studies were extracted using a standardized data extraction form. The extracted information included:

Study details: authors, year of publication, country.

Study design: qualitative, quantitative, or mixed-methods.

Participant characteristics: age, gender, type of speech/language disorder.

Key findings related to psychosomatic manifestations.

Assessment tools and measures used.

2.4. Quality Assessment

The quality of each included study was evaluated using appropriate assessment tools. The Risk of Bias tool from the Cochrane Handbook was utilized for quantitative studies. The Critical Appraisal Skills Programme (CASP) checklist was implemented for qualitative studies. Mixed-methods studies were reviewed using the Mixed Methods Appraisal Tool (MMAT). Investigations were not ruled out based on the results of the quality assessments; however, these findings were considered in the interpretation of the results.

2.5. Data Synthesis

A narrative synthesis approach was adopted due to the expected heterogeneity in study designs, populations, and outcomes. The synthesis focused on identifying patterns, themes, and relationships within the data pertaining to psychosomatic aspects in speech and language disorders. The conclusions were categorized and discussed based on the specific type of disorder, psychosomatic manifestation, and age group of the participants.

3. Historical Perspective of Psychosomatic Research in Speech and Language Disorders

The investigation of the historical development of psychosomatic research in speech and language disorders provides insights into the advancement of knowledge regarding the intricate connection between psychological and physiological factors in communication difficulties. Throughout history, the investigation of speech and language disorders has incorporated a wide range of perspectives, from examining linguistic aspects of aphasia to exploring the genetic and neurocognitive foundations of language impairments.

The origins of psychosomatic research in speech and language disorders can be traced back to the early 1920s, when British neuroscientist Head conducted a systematic linguistic analysis of aphasia (Qiang, 2023). This foundational work laid the groundwork for understanding how localized brain injuries impact language impairments and early recognition of the interconnectedness between neurological and linguistic factors in speech disorders.

Furthermore, historical descriptions of the speech patterns of children with autism focused on the distinctive repetition of sounds, words, and phrases, which was identified as one of the fundamental symptoms of autism (Boksa & Kominek, 2022). This historical perspective sheds light on the early recognition of the unique speech characteristics associated with neurodevelopmental disorders, emphasizing the historical significance of observing psychosomatic manifestations in speech and language disorders.

Moreover, the historical development of research on the FOXP2 gene represents the initial exploration into the genetic mechanisms underlying human spoken language (Fisher, 2005). This pivotal research marked a significant milestone in understanding the molecular foundations of speech and language disorders, highlighting the transition from purely behavioral and linguistic perspectives to incorporating genetic and neuroscientific dimensions in the study of psychosomatic manifestations in communication difficulties.

In addition, the historical progress of exploration on speech and language maladies has observed the consolidation of multidisciplinary viewpoints, as demonstrated by the potential benefits of an interdisciplinary approach in investigating neurodevelopmental disorders (Fisher, 2005; Fisher & Scharff, 2009). This historical shift towards multidisciplinary approaches underscores the recognition of the intricate interplay between psychological, neurological, and linguistic factors in speech and language disorders.

3.1. The Evolution of Psychosomatic Theories

The growth of psychosomatic theories in the context of speech and language disorders has been influenced by a wide range of research efforts, incorporating diverse perspectives and theoretical frameworks. The historical path of psychosomatic theories in speech and language disorders represents the dynamic interplay between psychological, neurological, and linguistic factors, contributing to a comprehensive understanding of the complex nature of communication impairments.

The historical progression of psychosomatic theories in the context of speech and language disorders has been influenced by a variety of theoretical perspectives, ranging from linguistic analyses to genetic and neurocognitive

JPPR
E-ISSN: 3041-8542

foundations. The variation in outcomes observed in children with developmental speech and language disorders has been attributed to the different neural circuits in which brain structures participate, highlighting the intricate interplay between neurological and linguistic factors (Visscher et al., 2007).

From a historical standpoint, the exploration of psychosomatic theories has taken the form of theories concerning the cause and effect relationship between psychological dynamics or personality and speech, fluency, articulation, and language disorders. This highlights the early recognition of the complex relationship between psychological and physiological factors in communication difficulties (Prizant et al., 1990). Additionally, the evolution of psychosomatic theories has incorporated the consideration of language load and articulatory variability in children with language and speech sound disorders, emphasizing the role of language skills in mediating the relationship between language load and articulatory variability (Vuolo & Goffman, 2018). This integration underscores the intricate interplay between linguistic, psychological, and physiological factors in speech and language disorders.

Moreover, the historical progress of psychosomatic theories has entailed the fusion of interdisciplinary viewpoints, as demonstrated by the interventions in speech and language therapy for children with primary speech and/or language disorders. This integration highlights the recognition of the complex interplay between psychological, neurological, and linguistic factors in speech and language disorders (Law et al., 2017). Additionally, the historical exploration of psychosomatic theories has been influenced by the investigation and management of children who experience delayed speech, emphasizing the importance of considering the latest advancements in the field to comprehensively address the psychosomatic aspects of speech and language disorders (Busari & Weggelaar, 2004; Vuolo & Goffman, 2018).

4. Speech Disorders and Psychosomatic Interactions

The interaction between speech disorders and psychosomatic phenomena has been a topic of significant interest and investigation. Psychosomatic theories have yielded valuable insights into the intricate interplay between psychological and physiological factors in speech disorders, exposing the multifaceted nature of these conditions. The examination of heart rate perception in patients with depressive, somatoform, and personality disorders has highlighted the intricate relationship between psychological dynamics and physiological manifestations (Mussgay et al., 2000). This inquiry underscores the significance of comprehending the psychosomatic aspects of mental health disorders and their potential impact on physiological processes, which is essential in thoroughly addressing the psychosomatic interactions in speech disorders.

Moreover, the differentiation of psychosomatic, somatopsychic, multisystem illnesses, and medical uncertainty has contributed to a nuanced understanding of the diverse manifestations of psychosomatic phenomena (Bransfield & Friedman, 2019). This differentiation emphasizes the need to consider the complex interplay between psychological and physiological factors in speech disorders, acknowledging the various ways in which psychosomatic interactions may manifest in individuals with communication impairments.

The historical progression of psychosomatic medicine in Germany has established a conceptual foundation for empirical investigation, emphasizing non-reductionist explanations of the interactions between individuals and their surroundings (Deter et al., 2018). This conceptual framework is crucial in comprehending the comprehensive nature of psychosomatic interactions in speech disorders, taking into account the multifaceted influences of psychological, social, and environmental factors on communication impairments.

Furthermore, the identification of psychodermatological disorders has brought attention to the continuous interplay between the skin and the brain through psychoneuroimmunoendocrine mechanisms, underscoring the potential impact of psychological factors on the onset or exacerbation of skin disorders (Shenefelt, 2011). This recognition highlights the intricate relationship between psychological and physiological factors, which is essential in fully addressing the psychosomatic aspects of speech disorders.

In addition, the psychosomatic disorders related to dental practice have been examined, emphasizing the necessity of understanding the psychosomatic interactions of the oral cavity with a revised working type classification (Shamim, 2014). This discussion emphasizes the importance of considering the psychosomatic aspects of oral communication impairments, recognizing the potential influence of psychological factors on oral health and speech disorders.

The development of psychosomatic diagnosis in the DSM has refined the terminology and concepts to systematically investigate the expressions of psychosomatic interactions, emphasizing the need for a comprehensive understanding of the interplay between psychological and physiological factors (Moldovan et al., 2015). This evolution is crucial in providing a comprehensive framework for understanding the psychosomatic aspects of speech disorders, considering the various ways in which psychological factors may impact communication impairments.

4.1. Stuttering and Psychological Factors

Stuttering, a complex speech disorder characterized by interruptions in the smoothness of speech, has been extensively studied to explore the interplay between psychological factors and the manifestation of stuttering. The cognitive-behavioral model proposed by Iverach et al. (2017) highlights the chronic nature of social anxiety disorder and its contribution to the persistence of social fears related to stuttering, emphasizing the potential for psychological treatment programs to address the speech and psychological needs of individuals who stutter with social anxiety (Iverach, Lowe, et al., 2017; Iverach, Rapee, et al., 2017). Additionally, Max et al. (2004) proposed a theoretical model of stuttering, suggesting that unstable or insufficiently activated internal models and feedback-biased motor control may contribute to dysfluency, underscoring the interaction of predisposing physiological factors and precipitating environmental factors in the development of stuttering (Max et al., 2004).

Furthermore, Jafari et al. (2019) identified various factors associated with the occurrence of stuttering, including genetics, speech motor control, linguistic development, social-emotional functioning, and cognitive development, highlighting the multifactorial nature of stuttering (Jafari et al., 2019). Additionally, Mongia et al. (2019) suggested that individuals with a low emotional threshold and limited neurological makeup may be at risk for developing stuttering, emphasizing the potential role of psychological and neurological factors in the development of stuttering (Mongia et al., 2019). Moreover, Seery et al. (2007) indicated that psychological conditions have been suspected to contribute not only to the onset but also to the persistence of stuttering, further emphasizing the role of psychological factors in the manifestation of stuttering (Seery et al., 2007).

The examination of the psychological and emotional characteristics of adolescents seeking treatment for stuttering was undertaken by Iverach et al. (2017), revealing inconsistent findings regarding the correlation between the severity of stuttering and psychological well-being, thus emphasizing the intricate nature of evaluating the psychological functioning of individuals who stutter (Iverach, Rapee, et al., 2017). Moreover, Anderson (2008) highlighted the difficulties in distinguishing between individuals who stutter and their normally fluent counterparts, attributing these disparities to the adoption of compensatory behaviors or psychological reactions (Anderson, 2008).

The perception of stuttering as a psychological issue was discussed by Iimura (2023), emphasizing the potential negative attitudes and discrimination faced by individuals who stutter due to the widespread belief that stuttering is caused by psychological problems (Iimura, 2023). Additionally, the impact of stuttering on various aspects of an individual's life, including psychological and social domains, was underscored by Yaruss (Yaruss, 2007), thus highlighting the multifaceted nature of stuttering as a communication disorder.

In conclusion, the existing literature on stuttering and psychological factors delves into the multifactorial nature of stuttering, with contributions stemming from genetics, speech motor control, linguistic development, social-emotional functioning, and cognitive development. The interplay between psychological and physiological factors in the onset and persistence of stuttering underscores the intricate nature of this speech disorder.

4.2. Voice Disorders: Stress and Emotional Influences

The connection between voice disorders and stress, as well as emotional influences, has been extensively researched. Educators in Malaysia have voiced concerns regarding musculoskeletal disorders, voice disorders, and stress, thus indicating a cause for worry within this population (Tai et al., 2019). Additionally, prosodic differences observed in individuals with high-functioning autism spectrum disorders include abnormal stress patterns, thus highlighting the potential influence of emotional and social factors on speech (Paul et al., 2005).

Furthermore, individuals who experience auditory hallucinations (hearing voices) have been found to have high rates of trauma and post-traumatic stress disorder (PTSD), thus emphasizing the potential impact of psychological trauma on voice-related experiences (Paulik et al., 2019). In the context of occupational voice disorders, the

biopsychosocial impact of voice disorders has been emphasized in relation to coping strategies among professional voice users, thus highlighting the multifaceted interaction between psychological and occupational factors in voice disorders (Niebudek-Bogusz & Sliwinska-Kowalska, 2013).

Elevated stress scores were observed in patients with voice disorders related to hyperfunction, thus suggesting a potential association between stress and specific types of voice disorders (Misono et al., 2014). Moreover, individuals experiencing psychological stress were found to have a significant increase in vocal fatigue, thus highlighting the potential impact of stress on vocal health (Kunin et al., 2020).

The association between voice disorders and job-related stress, as well as the loss of work ability, has been confirmed, thus indicating the multifaceted impact of stress on occupational voice disorders (Giannini et al., 2014). Additionally, stress and anxiety have been hypothesized as contributing factors to the development of voice disorders, thus emphasizing the potential influence of emotional and psychological factors on the onset of voice disorders (Yosunkaya, 2021).

In an investigation pertaining to faculty members in higher education exhibiting voice disorders, it was observed that those in the voice disorder group were more prone to experiencing feelings of anxiety and stress compared to their counterparts without such disorders. This observation sheds light on the potential association between stress and the prevalence of voice disorders (Kyriakou et al., 2018). Additionally, it has been theorized that nonorganic voice disorders may arise from heightened muscular tension caused by improper vocal usage and emotional stress, thereby indicating the possible impact of emotional stress on the development of voice disorders (Seifert & Kollbrunner, 2006).

4.3. Impact of Chronic Speech and Language Disorders on Mental Health

Persistent speech and language disorders can have a profound influence on an individual's mental well-being and overall state of health. The link between speech and language disorders and mental health has been extensively explored in research, underscoring the intricate nature of these conditions.

Wallace et al. (2015) in a systematic review addressing the consequences of screening for speech and language delay in children aged five and below, failed to uncover any evidence supporting the effect of screening on speech and language outcomes, thereby emphasizing the necessity for further investigation to comprehend the potential long-term repercussions of speech and language delays on mental health (Wallace et al., 2015).

Heidgerken et al. (2005) executed a survey to determine knowledge regarding autism in a healthcare setting and also discussed clinical implications and future recommendations. The findings of the study emphasize the importance of comprehending the impact of autism and the associated challenges in communication on mental health within healthcare settings (Heidgerken et al., 2005).

Conture et al. (2013) presented an overview of the relationship between temperament and speech and language. The study explored both direct and indirect manners in which temperament might influence speech and language, placing emphasis on the need to consider psychological factors when evaluating and treating speech and language disorders (Conture et al., 2013).

Popova et al. (2013) examined the financial implications of interventions targeting speech and language disorders in children and adolescents with fetal alcohol spectrum disorder in Canada and highlighted the adverse effects of fetal alcohol spectrum disorders on speech and language development, thereby emphasizing the requirement for comprehensive interventions that address the mental health implications of these disorders (Popova et al., 2013). Rudov et al. (2013) delved into potential miRNAs for the diagnosis of dyslexia, dyspraxia, and specific language impairment, thereby emphasizing the need for early identification and intervention to address the possible mental health consequences of these language disorders (Rudov et al., 2013).

In conclusion, it is evident that chronic speech and language disorders can exert a significant influence on mental health.

4.4. Language Development Disorders and Psychological Well-being

The psychological well-being of individuals with language development disorders has been a subject of little interest, as it provides no insight into the simple connection between language disorders and mental health. In their research, Bernstein et al. (2012) conducted a study on adolescents and young adults with type 1 diabetes, highlighting the correlation between mental disorders and chronic medical conditions; this study emphasizes the importance of considering the psychological impact of

JPPR
E-ISSN: 3041-8542

chronic health conditions on individuals (Bernstein et al., 2012).

Silverberg (2017) investigates different coexisting conditions of atopic dermatitis, which includes neuropsychiatric disorders, and highlights the potential impact of atopic dermatitis on mental health. The study underscores the need to comprehend the psychological implications of chronic skin conditions and how they may affect language development (Silverberg, 2017). Conture et al. (2013) provide an overview of the relationship between temperament and speech and language, stressing the significance of considering psychological factors in the evaluation and treatment of speech and language disorders. This survey emphasizes the multifaceted nature of the interaction between temperament and language development, illuminating the potential effect of psychological factors on speech and language outcomes (Conture et al., 2013).

Bauer et al. (2010) explore English language proficiency and mental health service utilization among Latino and Asian Americans with mental disorders, underscoring the conceivable influence of language proficiency on the availability of mental health care and its utilization. The study emphasizes the need to consider language barriers and their potential impact on mental health outcomes (Bauer et al., 2010). Visscher et al. (2007) explore the motor profile of children with developmental speech and language disorders, emphasizing the need to understand the multifaceted nature of language development disorders and their potential impact on psychological well-being. This study highlights the complex relationship between motor skills and language development, underscoring the necessity of comprehensively understanding the psychological implications of language disorders (Visscher et al., 2007).

Sporinova et al. (2019) investigate the association of mental health disorders with health care utilization and costs among adults with chronic disease, emphasizing the potential impact of mental health disorders on health care utilization and costs. The study underscores the need to consider the psychological implications of chronic disease and their potential impact on mental health (Sporinova et al., 2019).

In sum, the existing literature indicates a complex relationship between language development disorders and psychological well-being.

5. Assessment and Diagnostic Approaches

The evaluation and identification of speech and language disorders are of utmost importance in comprehending the fundamental causes and formulating effective strategies for intervention. Numerous research studies have contributed significantly to the development of diagnostic indicators and assessment instruments for diverse speech and language disorders.

For instance, Shriberg et al. (2017) devised a diagnostic indicator known as the Pause Marker, which serves to differentiate childhood apraxia of speech from speech delay. This indicator has demonstrated promising results in distinguishing early or persistent childhood apraxia of speech from speech delay, thereby assisting in precise diagnosis and intervention planning (Shriberg et al., 2017). Smith (2013) shed light on the care of a child's voice from the perspective of a pediatric otolaryngologist, underscoring the significance of laryngoscopy and voice assessment in the diagnosis and management of voice disorders in children (Smith, 2013).

Weismer (2006) delved into the research philosophy pertaining to motor speech disorders, emphasizing the importance of studying speech production in such disorders to advance the field. This approach carries implications for the development of assessment instruments and intervention strategies (Weismer, 2006). Docherty (2011) focused on identifying the underlying processes of schizophrenic speech disorder, presenting a framework for diagnosing and comprehending speech disorders in individuals with schizophrenia. This research contributes to the establishment of assessment protocols for speech disorders in psychiatric populations (Docherty, 2011).

Worthey et al. (2013) employed whole-exome sequencing to provide support for genetic heterogeneity in childhood apraxia of speech, thereby emphasizing the potential of genetic testing in diagnosing speech disorders and comprehending their genetic foundation (Worthey et al., 2013). Diepeveen et al. (2020) explored clinical reasoning for speech sound disorders, offering insights into the diagnostic process and intervention planning in the daily practice of speech-language pathologists. This research contributes to the development of standardized assessment protocols for speech sound disorders (Diepeveen et al., 2020).

Terband et al. (2019) put forth a psycholinguistic framework for the diagnosis and treatment planning of developmental speech disorders, highlighting the necessity

of a comprehensive approach to assessment and intervention planning based on psycholinguistic principles (Terband et al., 2019).

These studies have propelled the field of assessment and diagnosis of speech and language disorders, furnishing valuable tools and frameworks for precise diagnosis, intervention planning, and an in-depth understanding of the underlying mechanisms of these disorders.

5.1. Integrating Psychosomatic Evaluation in Speech-Language Pathology

The inclusion of psychosomatic evaluation within the field of speech-language pathology is imperative for conducting thorough assessments and developing effective intervention plans. Numerous studies have made valuable contributions to our understanding of how psychosomatic evaluation can be seamlessly integrated into speech-language pathology practice. For instance, Schalling et al. (2017) emphasized the necessity for speech-language pathology interventions to prioritize communicative participation in individuals with Parkinson's disease, thereby underscoring the significance of addressing psychosocial factors in interventions for individuals with neurological conditions. The researchers also employed a questionnaire to evaluate speech and communication changes reported by individuals with Parkinson's disease, thereby highlighting the utilization of self-report measures to capture the psychosomatic aspects of speech and communication disorders (Schalling et al., 2017). Sicotte et al. (2003) explored the feasibility and evaluation of outcomes associated with a telemedicine application in speech-language pathology, thereby emphasizing the potential for intervention from a distance. This study highlights the importance of incorporating technology to address psychosomatic elements within the field of speech-language pathology (Sicotte et al., 2003). Barberena et al. (2014) investigated the applicability of ultrasound technology in speech-language pathology and audiology, thereby shedding light on the potential for integrating advanced technology in the assessment and treatment of speech and language disorders (Barberena et al., 2014).

Meals et al. (2016) stressed the role of speech-language pathology evaluation in identifying the risk of swallowing-related pulmonary complications in older patients with hip fractures, thereby demonstrating the significance of psychosomatic assessment within medical settings (Meals et al., 2016). Hill & Theodoros (2002) delved into the research surrounding telehealth applications in speech-language pathology, thereby highlighting the need for a scientific approach and a well-defined evaluation framework to ascertain the effectiveness of telehealth techniques (Hill & Theodoros, 2002).

Finch et al. (2013) examined the confidence of speech-language pathology students in communicating with individuals with aphasia, thereby emphasizing the importance of effective communication and understanding psychosocial factors within the practice of speech-language pathology (Finch et al., 2013). Dodd (2007) provided insights into evidence-based practice in speech-language pathology, thereby emphasizing the utilization of scientific evidence to inform assessment and intervention planning, including the consideration of psychosomatic components (Dodd, 2007).

Hardin & Kelly (2019) explored the role of speech-language pathology within an interdisciplinary care model for persistent symptomatology of mild traumatic brain injury, thereby underscoring the need for integrated practice units to address the psychosomatic aspects of brain injury (Hardin & Kelly, 2019). Hewat et al. (2020) proposed a framework to support the development of high-quality simulation-based learning programs in speech-language pathology, thereby highlighting the potential for incorporating simulation-based training to address psychosomatic elements within clinical education (Hewat et al., 2020). Lagerberg et al. (2014) validated the Swedish Test of Intelligibility for Children, thus showcasing the potential of standardized assessment tools to address psychosomatic factors within pediatric speech-language pathology (Lagerberg et al., 2014).

These studies have significantly contributed to the integration of psychosomatic evaluation within the field of speech-language pathology, thereby underscoring the importance of addressing psychosocial and emotional elements in assessment and intervention planning.

6. Therapeutic Interventions and Psychosomatic Considerations

The inclusion of psychosomatic considerations in therapeutic interventions is imperative for addressing the psychological and emotional components of speech and language disorders. Numerous studies have examined the implementation of therapeutic interventions with psychosomatic considerations in various medical conditions, yielding valuable insights into the potential implications for speech-language pathology.

JPPR
E-ISSN: 3041-8542

Iosip et al. (2018) brought attention to the unique aspects of cardiovascular rehabilitation in patients with chronic cor pulmonale, highlighting the significance of physical exercise and cardiovascular rehabilitation in enhancing psychosomatic well-being. This underscores the potential advantages of physical exercise and rehabilitation in addressing psychosomatic aspects in medical conditions (Iosip et al., 2018). Debus & Kästner (2015) discussed the psychosomatic elements of urinary incontinence in women, placing emphasis on individualized therapy plans, relaxation exercises, and psychotherapeutic interventions in the management of urinary incontinence. This underscores the importance of integrating psychosomatic considerations in therapeutic plans for addressing urological conditions (Debus & Kästner, 2015).

Fava (2005) emphasized the integration of psychological therapies in the prevention, treatment, and rehabilitation of medical diseases, underscoring the potential benefits of psychological interventions in addressing psychosomatic aspects of medical conditions (Fava, 2005).

Gan et al. (2021) conducted a comprehensive analysis and synthesis of demoralization across diverse clinical settings, proposing targeted psychotherapeutic interventions, such as meaning-based therapy, for addressing demoralization in mental illness. This highlights the potential of psychotherapeutic interventions to address psychosomatic aspects in mental health disorders (Gan et al., 2021). Augustin et al. (2022) revealed the societal impacts of moderate-to-severe atopic dermatitis in Europe, emphasizing the role of psychosomatic counseling, educational programs, and psychological interventions in enhancing disease severity and quality of life outcomes. This highlights the potential benefits of psychosomatic interventions in dermatological conditions (Augustin et al., 2022).

7. Discussion and Conclusion

This comprehensive examination has explored diverse facets of psychosomatic manifestations in speech and language disorders, providing insights into the intricate interplay between psychological factors and impairments in communication.

The complex association between psychological well-being and speech and language disorders is evident in the literature that has been reviewed. As emphasized by Versha et al. (2020), this interplay significantly impacts the prognosis and management of these disorders (Varsha et al., 2020). The inclusion of psychological evaluation in the field of speech-language pathology, as discussed by Manalili (2022), is crucial for a comprehensive approach to treatment (Manalili, 2022).

The distinction between developmental and progressive disorders, such as primary progressive aphasias (Botha & Josephs, 2019) and developmental speech and language disorders (DSLDs) (Visscher et al., 2007), underscores the necessity for age-specific and disorder-specific psychosomatic approaches in therapy.

The profound psychosocial consequences of speech and language disorders are evident, as demonstrated in the research conducted by Varsha et al. (2020) and Cabbage et al. (2018) (Cabbage et al., 2018; Varsha et al., 2020). Therefore, the integration of therapeutic interventions that address both speech-language and psychological aspects, as proposed by Law et al. (2017), is essential (Law et al., 2017).

Although this review is comprehensive in nature, certain areas warrant further exploration. There is a need for additional longitudinal studies to comprehend the long-term psychosomatic impacts, particularly in progressive disorders. Research on culturally diverse populations and multilingual contexts is also necessary to establish more inclusive and effective therapeutic strategies.

In conclusion, this review highlights the significance of a multidisciplinary approach in comprehending and managing speech and language disorders. The incorporation of psychosomatic aspects into assessment and therapy is not only advantageous but imperative for holistic care.

7.1. Limitations of the Current Study

While this review has endeavored to encompass a wide range of studies, it is constrained by the extent of the databases searched and the languages of the publications included. Future reviews could broaden the search criteria to incorporate more diverse sources and non-English publications.

7.2. Suggestions for Practice and Implications

1. **Comprehensive Assessment Practices:** Clinicians should incorporate psychosomatic evaluations into their standard assessments for speech and language disorders. This approach aids in identifying underlying psychological factors that may influence the disorder.

JPPR
E-ISSN: 3041-8542

2. **Interdisciplinary Collaboration:** Foster collaboration between speech-language pathologists, psychologists, and psychiatrists to deliver comprehensive care that addresses both the speech/language and psychosomatic aspects.
3. **Tailored Therapeutic Strategies:** Develop personalized treatment plans that take into account the patient's psychosocial background. This could involve integrating speech therapy with counseling or other psychological interventions.
4. **Training and Education:** Speech-language pathologists should receive training in recognizing and addressing psychosomatic factors. This training can be integrated into continuing education programs and professional development courses.
5. **Patient and Caregiver Education:** Educate patients and their caregivers about the psychosomatic aspects of speech and language disorders to enhance their understanding and engagement in the treatment process.
6. **Research-Informed Practice:** Encourage clinicians to stay updated on the latest research findings on the psychosomatic aspects of speech and language disorders and to apply these insights in their practice.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethics Considerations

Not applicable.

References

Anderson, J. D. (2008). Age of Acquisition and Repetition Priming Effects on Picture Naming of Children Who Do and Do Not Stutter. *Journal of Fluency Disorders*. https://doi.org/10.1016/j.jfludis.2008.04.001

Augustin, M., Misery, L., Kobyletzki, L. v., Hita, J. C. A., Mealing, S., & Redding, M. (2022). Unveiling the True Costs and Societal Impacts of Moderate-to-severe Atopic Dermatitis in Europe. *Journal of the European Academy of Dermatology and Venereology*. https://doi.org/10.1111/jdv.18168

Barberena, L. d. S., Brasil, B. d. C., Melo, R. M., Mezzomo, C. L., Mota, H. B., & Keske-Soares, M. (2014). Ultrasound Applicability in Speech Language Pathology and Audiology. *Codas*. https://doi.org/10.1590/2317-1782/20142013086

Bauer, A. M., Chen, C. N., & Alegría, M. (2010). English Language Proficiency and Mental Health Service Use Among Latino and Asian Americans With Mental Disorders. *Medical care*. https://doi.org/10.1097/mlr.0b013e3181f80749

Bernstein, C. M., Stockwell, M. S., Gallagher, M., Rosenthal, S. L., & Soren, K. (2012). Mental Health Issues in Adolescents and Young Adults With Type 1 Diabetes. *Clinical Pediatrics*. https://doi.org/10.1177/0009922812459950

Boksa, E., & Kominek, A. (2022). Echolalia as Communication Behavior. *Logopedia Silesiana*. https://doi.org/10.31261/logopediasilesiana.2022.11.01.07

Botha, H., & Josephs, K. A. (2019). Primary Progressive Aphasias and Apraxia of Speech. *Continuum Lifelong Learning in Neurology*. https://doi.org/10.1212/con.0000000000000699

Bransfield, R. C., & Friedman, K. J. (2019). Differentiating Psychosomatic, Somatopsychic, Multisystem Illnesses, and Medical Uncertainty. *Healthcare*. https://doi.org/10.3390/healthcare7040114

Busari, J. O., & Weggelaar, N. M. (2004). How to Investigate and Manage the Child Who Is Slow to Speak. *bmj*. https://doi.org/10.1136/bmj.328.7434.272

Cabbage, K. L., Farquharson, K., Iuzzini-Seigel, J., Zuk, J., & Hogan, T. P. (2018). Exploring the Overlap Between Dyslexia and Speech Sound Production Deficits. *Language Speech and Hearing Services in Schools*. https://doi.org/10.1044/2018_lshss-dyslc-18-0008

Conture, E. G., Kelly, E., & Walden, T. A. (2013). Temperament, Speech and Language: An Overview. *Journal of Communication Disorders*. https://doi.org/10.1016/j.jcomdis.2012.11.002

Debus, G., & Kästner, R. (2015). Psychosomatic Aspects of Urinary Incontinence in Women. *Geburtshilfe und Frauenheilkunde*. https://doi.org/10.1055/s-0034-1396257

Deter, H.-C., Kruse, J., & Zipfel, S. (2018). History, Aims and Present Structure of Psychosomatic Medicine in Germany.

JPPR
E-ISSN: 3041-8542

BioPsychoSocial Medicine. https://doi.org/10.1186/s13030-017-0120-x

Diepeveen, S., Haaften, L. v., Terband, H., Swart, B. d., & Maassen, B. (2020). Clinical Reasoning for Speech Sound Disorders: Diagnosis and Intervention in Speech-Language Pathologists' Daily Practice. *American Journal of Speech-Language Pathology*. https://doi.org/10.1044/2020_ajslp-19-00040

Docherty, N. M. (2011). On Identifying the Processes Underlying Schizophrenic Speech Disorder. *Schizophrenia Bulletin*. https://doi.org/10.1093/schbul/sbr048

Dodd, B. (2007). Evidence-Based Practice and Speech-Language Pathology: Strengths, Weaknesses, Opportunities and Threats. *Folia Phoniatrica Et Logopaedica*. https://doi.org/10.1159/000101770

Fava, G. A. (2005). A Different Medicine Is Possible. *Psychotherapy and psychosomatics*. https://doi.org/10.1159/000089219

Finch, E., Fleming, J., Brown, K., Lethlean, J., Cameron, A., & McPhail, S. (2013). The Confidence of Speech-Language Pathology Students Regarding Communicating With People With Aphasia. *BMC Medical Education*. https://doi.org/10.1186/1472-6920-13-92

Fisher, S. E. (2005). Dissection of Molecular Mechanisms Underlying Speech and Language Disorders. *Applied Psycholinguistics*. https://doi.org/10.1017/s0142716405050095

Fisher, S. E., & Scharff, C. (2009). FOXP2 as a Molecular Window Into Speech and Language. *Trends in Genetics*. https://doi.org/10.1016/j.tig.2009.03.002

Gan, L. L., Gong, S., & Kissane, D. W. (2021). Mental State of Demoralisation Across Diverse Clinical Settings: A Systematic Review, Meta-Analysis and Proposal for Its Use as a 'Specifier' in Mental Illness. *Australian & New Zealand Journal of Psychiatry*. https://doi.org/10.1177/00048674211060746

Giannini, S. P. P., Maria do Rosário Dias de Oliveira, L., & Ferreira, L. P. (2014). Profile of Phonological Awareness in Bilingual and Monolingual Children. *Codas*. https://doi.org/10.1590/s2317-17822014000100009

Hardin, K., & Kelly, J. P. (2019). The Role of Speech-Language Pathology in an Interdisciplinary Care Model for Persistent Symptomatology of Mild Traumatic Brain Injury. *Seminars in Speech and Language*. https://doi.org/10.1055/s-0038-1676452

Heidgerken, A. D., Geffken, G. R., Modi, A. C., & Frakey, L. L. (2005). A Survey of Autism Knowledge in a Health Care Setting. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-005-3298-x

Hewat, S., Penman, A., Davidson, B., Baldac, S., Howells, S., Walters, J., Purcell, A., Cardell, E., McCabe, P., Caird, E., Ward, E. C., & Hill, A. (2020). A Framework to Support the Development of Quality Simulation-based Learning Programmes in Speech–language Pathology. *International Journal of Language & Communication Disorders*. https://doi.org/10.1111/1460-6984.12515

Hill, A. J., & Theodoros, D. (2002). Research Into Telehealth Applications in Speech-Language Pathology. *Journal of Telemedicine and Telecare*. https://doi.org/10.1258/135763302320272158

Holm, A., Dodd, B., Stow, C., & Pert, S. (1999). Identification and Differential Diagnosis of Phonological Disorder in Bilingual Children. *Language Testing*. https://doi.org/10.1177/026553229901600303

Iimura, D. (2023). Comparing the Beliefs Regarding Biological or Psychological Causalities Toward Stereotyped Perception of People Who Stutter. *Frontiers in psychology*. https://doi.org/10.3389/fpsyg.2023.1279169

Iosip, A., Caloian, B., Frîngu, F., Zdrenghea, D., & Pop, D. (2018). Particularities of Cardiovascular Rehabilitation in Patients With Chronic Cor Pulmonale. *Balneo Research Journal*. https://doi.org/10.12680/balneo.2018.219

Iverach, L., Lowe, R., Jones, M., O'Brian, S., Menzies, R. G., Packman, A., & Onslow, M. (2017). A Speech and Psychological Profile of Treatment-Seeking Adolescents Who Stutter. *Journal of Fluency Disorders*. https://doi.org/10.1016/j.jfludis.2016.11.001

Iverach, L., Rapee, R. M., Wong, Q. J. J., & Lowe, R. (2017). Maintenance of Social Anxiety in Stuttering: A Cognitive-Behavioral Model. *American Journal of Speech-Language Pathology*. https://doi.org/10.1044/2016_ajslp-16-0033

Jafari, H., Mohamadi, M., Haghjoo, A., & Heidari, M. (2019). Newly Recognized Stuttering in Three Young Children Following the Hojedk Earthquake in Iran. *Prehospital and Disaster Medicine*. https://doi.org/10.1017/s1049023x19004497

Kunin, A. A., Sargheini, N., Birkenbihl, C., Moiseeva, N. S., Fröhlich, H., & Golubnitschaja, O. (2020). Voice Perturbations Under the Stress Overload in Young Individuals: Phenotyping and Suboptimal Health as Predictors for Cascading Pathologies. *The Epma Journal*. https://doi.org/10.1007/s13167-020-00229-8

Kyriakou, K., Petinou, K., Phinikettos, I., & Internationals, O. (2018). Risk and Prevalence of Self-Perceived Voice Disorders in Male and Female University Professors. *Journal of Environment and Health Science*. https://doi.org/10.15436/2378-6841.18.1834

Lagerberg, T. B., Hartelius, L., Johnels, J. Å., Ahlman, A.-K., Börjesson, A., & Persson, C. (2014). Swedish Test of Intelligibility for Children (STI-CH) – Validity and Reliability of a Computer-Mediated Single Word Intelligibility Test for Children. *Clinical Linguistics & Phonetics*. https://doi.org/10.3109/02699206.2014.987925

Law, J., Dennis, J. A., & Charlton, J. (2017). Speech and Language Therapy Interventions for Children With Primary Speech and/or Language Disorders. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.cd012490

Manalili, M. A. R. (2022). Developmental Language Disorder Is Psycholinguistic Injustice: Tagalog Knowledge From a Philippine Context. https://doi.org/10.31234/osf.io/xe2rv

Max, L., Guenther, F. H., Gracco, V. L., Ghosh, S. S., & Wallace, M. (2004). Unstable or Insufficiently Activated Internal Models and Feedback-Biased Motor Control as Sources of Dysfluency: A Theoretical Model of Stuttering. *Contemporary Issues in Communication Science and Disorders*. https://doi.org/10.1044/cicsd_31_s_105

Meals, C., Roy, S., Medvedev, G., Wallace, M. T., Neviaser, R. J., & O'Brien, J. R. (2016). Identifying the Risk of Swallowing-Related Pulmonary Complications in Older Patients With Hip Fracture. *Orthopedics*. https://doi.org/10.3928/01477447-20151222-07

Misono, S., Peterson, C. B., Meredith, L., Banks, K., Bandyopadhyay, D., Yueh, B., & Frazier, P. A. (2014). Psychosocial Distress in Patients Presenting With Voice Concerns. *Journal of Voice*. https://doi.org/10.1016/j.jvoice.2014.02.010

Moldovan, R., Radu, M., Baban, A., & Dumitrascu, D. L. (2015). Evolution of Psychosomatic Diagnosis in DSM. Historical Perspectives and New Development for Internists. *Romanian Journal of Internal Medicine*. https://doi.org/10.1515/rjim-2015-0003

Mongia, M., Gupta, A., Vijay, A., & Sadhu, R. (2019). Management of Stuttering Using Cognitive Behavior Therapy and Mindfulness Meditation. *Industrial Psychiatry Journal*. https://doi.org/10.4103/ipj.ipj_18_19

Mussgay, L., Klinkenberg, N., & Rüddel, H. (2000). Heart Beat Perception in Patients With Depressive, Somatoform, and Personality Disorders. *Journal of Psychophysiology*. https://doi.org/10.1027//0269-8803.13.1.27

Niebudek-Bogusz, E., & Sliwinska-Kowalska, M. (2013). An Overview of Occupational Voice Disorders in Poland. *International Journal of Occupational Medicine and Environmental Health*. https://doi.org/10.2478/s13382-013-0146-7

Paul, R., Shriberg, L. D., McSweeny, J. L., Cicchetti, D. V., Klin, A., & Volkmar, F. R. (2005). Brief Report: Relations Between Prosodic Performance and Communication and Socialization Ratings in High Functioning Speakers With Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-005-0031-8

Popova, S., Lange, S., Burd, L., Shield, K. D., & Rehm, J. (2013). Cost of Speech-Language Interventions for Children and Youth With Foetal Alcohol Spectrum Disorder in Canada. *International Journal of Speech-Language Pathology*. https://doi.org/10.3109/17549507.2013.862858

Prizant, B. M., Audet, L. R., Burke, G. M., Hummel, L. J., Maher, S. R., & Theadore, G. (1990). Communication Disorders and Emotional/Behavioral Disorders in Children and Adolescents. *Journal of Speech and Hearing Disorders*. https://doi.org/10.1044/jshd.5502.179

Qiang, Y. (2023). An Intervention Study of Language Cognition and Emotional Speech Community Method for Children's Speech Disorders. *International Journal of Mental Health Promotion*. https://doi.org/10.32604/ijmhp.2023.025746

Rudov, A., Rocchi, M., Accorsi, A., Spada, G., Procopio, A. D., Olivieri, F., Rippo, M. R., & Albertini, M. C. (2013). Putative miRNAs for the Diagnosis of Dyslexia, Dyspraxia, and Specific Language Impairment. *Epigenetics*. https://doi.org/10.4161/epi.26026

Schalling, E., Johansson, K., & Hartelius, L. (2017). Speech and Communication Changes Reported by People With Parkinson's Disease. *Folia Phoniatrica Et Logopaedica*. https://doi.org/10.1159/000479927

Seery, C. H., Watkins, R. V., Mangelsdorf, S. C., & Shigeto, A. (2007). Subtyping Stuttering II: Contributions From Language and Temperament. *Journal of Fluency Disorders*. https://doi.org/10.1016/j.jfludis.2007.07.001

Seifert, E., & Kollbrunner, J. (2006). An Update in Thinking About Nonorganic Voice Disorders. *Archives of Otolaryngology - Head and Neck Surgery*. https://doi.org/10.1001/archotol.132.10.1128

Shamim, T. (2014). The Psychosomatic Disorders Pertaining to Dental Practice With Revised Working Type Classification. *The Korean Journal of Pain*. https://doi.org/10.3344/kjp.2014.27.1.16

Shenefelt, P. D. (2011). Psychodermatological Disorders: Recognition and Treatment. *International Journal of Dermatology*. https://doi.org/10.1111/j.1365-4632.2011.05096.x

Shriberg, L. D., Strand, E. A., Fourakis, M., Jakielski, K. J., Hall, S. D., Karlsson, H. B., Mabie, H. L., McSweeny, J. L., Tilkens, C. M., & Wilson, D. L. (2017). A Diagnostic Marker to Discriminate Childhood Apraxia of Speech From Speech Delay: I. Development and Description of the Pause Marker. *Journal of Speech Language and Hearing Research*. https://doi.org/10.1044/2016_jslhr-s-15-0296

Sicotte, C., Lehoux, P., Fortier-Blanc, J., & Leblanc, Y. (2003). Feasibility and Outcome Evaluation of a Telemedicine Application in Speech–language Pathology. *Journal of Telemedicine and Telecare*. https://doi.org/10.1258/135763303769211256

Silverberg, J. I. (2017). Selected Comorbidities of Atopic Dermatitis: Atopy, Neuropsychiatric, and Musculoskeletal Disorders. *Clinics in Dermatology*. https://doi.org/10.1016/j.clindermatol.2017.03.008

Smith, M. E. (2013). Care of the Child's Voice: A Pediatric Otolaryngologist's Perspective. *Seminars in Speech and Language*. https://doi.org/10.1055/s-0033-1342977

Sporinova, B., Manns, B., Tonelli, M., Hemmelgarn, B. R., MacMaster, F. P., Mitchell, N., Au, F., Ma, Z., Weaver, R. W., & Quinn, A. E. (2019). Association of Mental Health Disorders With Health Care Utilization and Costs Among Adults With Chronic Disease. *JAMA Network Open*. https://doi.org/10.1001/jamanetworkopen.2019.9910

Tai, K. L., Ng, Y. G., & Lim, P. Y. (2019). Systematic Review on the Prevalence of Illness and Stress and Their Associated Risk Factors Among Educators in Malaysia. *PLoS One*. https://doi.org/10.1371/journal.pone.0217430

Terband, H., Maassen, B., & Maas, E. (2019). A Psycholinguistic Framework for Diagnosis and Treatment Planning of Developmental Speech Disorders. *Folia Phoniatrica Et Logopaedica*. https://doi.org/10.1159/000499426

Varsha, N. S., Sowmiya, R., Prasitha, P., & Praveena, J. (2020). Prevalence of Speech Language and Hearing Impairment in School Going Children of Rural Area: A Longitudinal Study. *International Journal of Community Medicine and Public Health*. https://doi.org/10.18203/2394-6040.ijcmph20204374

Visscher, C., Houwen, S., Scherder, E. J. A., Moolenaar, B., & Hartman, E. (2007). Motor Profile of Children With Developmental Speech and Language Disorders. *Pediatrics*. https://doi.org/10.1542/peds.2006-2462

Vuolo, J., & Goffman, L. (2018). Language Skill Mediates the Relationship Between Language Load and Articulatory Variability in Children With Language and Speech Sound Disorders. *Journal of Speech Language and Hearing Research*. https://doi.org/10.1044/2018_jslhr-l-18-0055

Wallace, I., Berkman, N. D., Watson, L. R., Coyne-Beasley, T., Wood, C. T., Cullen, K., & Lohr, K. N. (2015). Screening for Speech and Language Delay in Children 5 Years Old and Younger: A Systematic Review. *Pediatrics*. https://doi.org/10.1542/peds.2014-3889

Weismer, G. (2006). Philosophy of Research in Motor Speech Disorders. *Clinical Linguistics & Phonetics*. https://doi.org/10.1080/02699200400024806

Worthey, E. A., Raca, G., Laffin, J., Wilk, B., Harris, J. M., Jakielski, K. J., Dimmock, D., Strand, E. A., & Shriberg, L. D. (2013). Whole-Exome Sequencing Supports Genetic Heterogeneity in Childhood Apraxia of Speech. *Journal of Neurodevelopmental Disorders*. https://doi.org/10.1186/1866-1955-5-29

Yaruss, J. S. (2007). Application of the ICF in Fluency Disorders. *Seminars in Speech and Language*. https://doi.org/10.1055/s-2007-986528

Yosunkaya, M. T. (2021). Are Anxiety and Stress the Main Cause of Vocal Cord Nodules in Women? *Scholarly Journal of Otolaryngology*. https://doi.org/10.32474/sjo.2021.07.000271