

Critical Appraisal: Psychosocial Outcomes Associated with Childhood Apraxia of Speech

Introduction

Childhood Apraxia of Speech (CAS) is a neurological pediatric motor speech disorder primarily characterized by inconsistencies and poor precision of movements within speech (ASHA, n.d.). The physical muscle coordination and coordination articulation required for speech are impacted, resulting in errors of speech sound production and prosody (including rhythm, stress, and/or tone). The speech muscles themselves are not weak; instead, they are unable to receive or process signals from the brain that normally coordinate speech (Mayo Clinic, 2025). Unlike aphasia, which is an acquired language disorder, those with CAS do not experience receptive language difficulties as a result of this diagnosis, but can experience co-occurring language or reading disorders (Connected Speech Pathology, 2025). Symptoms of CAS can appear in a variety of ways, including unclear production of vowels and consonants, difficulty smoothly transitioning between sounds or words, incorrect use of stress patterns, and inconsistent errors of consonants and vowels when repeating syllables or words (Mayo Clinic 2025; ASHA, n.d.). CAS is also characterized by articulatory “groping”, during which someone may produce off-target movements of the jaw, lips, or tongue as they search for the correct movements for speech sounds (ASHA, n.d.). Unlike speech delay, the characteristics of CAS are likely to persist past the developmental period, and a child with CAS will not “outgrow” these speech-sound difficulties (Kaskavage, 2018).

CAS is relatively rare, with estimates suggesting it affects about 1-2 out of every 1,000 children, and it is most often diagnosed after the age of three (ASHA, n.d.; Kaskavage, 2018). Additionally, the causes of the disorder differ in origin, as some reasonings are much more clearly understood than others. Symptoms of CAS have been known to result from a neurological event (stroke, infection, trauma, etc.), genetic conditions and/or complex

neurobehavioral disorders (autism, epilepsy, etc.), or simply idiopathic beginnings with no clear explanation (ASHA, n.d.). Typically, children who are suspected to have CAS based on preliminary screening will receive a comprehensive oral mechanism examination from a speech-language pathologist, which includes a motor speech assessment across multiple contexts of speech production.

Many treatment approaches can be taken to address deficits in planning and coordination of speech muscles. Motor programming approaches use motor learning principles to provide frequent and intensive practice of speech targets (repetition), with a focus on accurate speech movement and often include external sensory input for speech production (cueing) (ASHA, n.d.). CAS impairs planning of speech movement, so repetition of accurate movement patterns can strengthen motor planning through practice, and clinician cueing ensures that clients are practicing correct movements to avoid error. Linguistic approaches, on the other hand, focus on speech function and frame CAS as a language learning disorder. These types of treatments teach children how to make speech sounds and the rules for when speech sounds and sound sequences are used in a language (ASHA, n.d.). These interventions are most commonly used for milder cases of CAS, or in addition to other speech-language therapies. There additionally exist “combination” approaches that merge elements of both types, or even rhythmic treatment approaches like Melodic Intonation Therapy (MIT) that primarily utilize intonation patterns (melody, rhythm, and stress) to improve speech production (ASHA, n.d.).

While interventions for CAS may improve speech outcomes, it is possible that they are not addressing the full range of challenges individuals experience. A growing body of research reveals that living with communication difficulties can have wide-ranging psychosocial impacts, including negative psychological outcomes, increased social withdrawal, and challenges with

peer relationships and academic participation in populations as young as school-aged children (Hitchcock et al., 2015; Palmer et al., 2019). Those with a communication disorder diagnosis often experience frustration, anxiety, and negative perceptions from others, which can compound over time and affect overall quality of life through a lens of internalized stigma (ASHA, 2024). If individuals lack confidence with how they outwardly express themselves, it is important to consider how this may influence their academic trajectories and future life goals.

Yet, much of the literature on the psychosocial effects of a speech and/or language diagnosis has focused on "communication impairments" broadly or heterogeneous groups of disorder areas (speech sound disorders, language impairment, stuttering, etc.). This makes it incredibly difficult to disentangle a unique psychosocial profile associated with CAS, or any specific speech and/or language disorder for that matter. Additionally, due to the lifelong nature of a disorder like CAS, there could be deeper psychosocial impact over other pediatric speech disorders that typically resolve over development. Therefore, targeted investigation of CAS in comparison to general speech sound disorders and/or typical-developing populations is necessary to better understand its specific psychosocial impacts and to inform more tailored, effective interventions.

PICO Question

This critical appraisal is led by the following PICO question: In individuals with childhood apraxia of speech (CAS) (Population), does having a CAS diagnosis (Intervention/Exposure), compared to those with general speech sound disorders or typically-developing speech (Comparison), increase the risk of negative psychosocial outcomes (including mental, emotional, social, or spiritual effects) (Outcome)?

The population of interest for this appraisal includes those of all ages with a confirmed or self-reported diagnosis of childhood apraxia of speech. The intervention/exposure of interest is the existence of the CAS diagnosis itself. The comparison group are those with a general speech sound disorder (a nonspecific diagnosis) or no diagnosis at all (typically developing peers, which may manifest as a control group or comparison of normative data depending on the study design). The outcome of interest is an increased risk of any negative psychosocial outcomes for those diagnosed with CAS, which encompasses mental, emotional, social, and spiritual effects on their lives. This question addresses the gap in literature that exists surrounding psychosocial effects of specific speech and/or language diagnoses over generalized disorder areas.

Methods

Search Terms

PubMed:

((childhood apraxia of speech) OR (developmental apraxia)) OR (verbal dyspraxia) AND (attitudes)- *26 results*

((childhood apraxia of speech) OR (developmental apraxia)) OR (verbal dyspraxia) AND (mental health)- *52 results*

((childhood apraxia of speech) OR (developmental apraxia)) OR (verbal dyspraxia) AND (psychosocial outcomes)- *12 results*

PsychInfo:

((childhood apraxia of speech) OR (verbal dyspraxia)) OR (developmental apraxia) AND (mental health or mental illness or mental disorder or psychiatric illness) AND (psychosocial factors or psychosocial impacts or psychosocial effects)- *189 results*

Study Screening

A total of 280 sources were screened for this systematic review from two databases, including PubMed and PsychInfo. 279 of the sources appeared through database searches, while one was discovered through a cited paper that did not appear in any of the searches themselves. Ten of the sources were duplicates that the review software (Covidence) ultimately removed. Out of the remaining 270 studies, 241 were considered irrelevant, which led to 29 full-text assessments. Childhood apraxia of speech (CAS) is also known by labels such as “verbal dyspraxia” and “developmental apraxia”, which is why they were both included in the search terms. Populations of all ages were involved in the search since the literature on this specific topic is so limited to begin with, although most populations within included papers are three years of age and older. Resources were also not discriminated against based on study design for the same reason. However, research had to be published between the year 2000 and the current year (2026), peer-reviewed, available in full-text, and translated into English if not already published in the language.

Populations that had a diagnosis of acquired apraxia of speech, general coordination disorders, or general apraxias without any specified relation or mention of childhood apraxia of speech were not included. Additionally, studies that did not involve a comparison group of those with a general speech sound disorder and/or typically-developing speech were not included in the final review. Overall, 24 studies were excluded based on these criteria (ten wrong outcomes, nine wrong patient population, four wrong study design, and one wrong intervention). After screening, a total of five studies were included in the final systematic review.

Results

The highest level of evidence found within the search was a longitudinal cohort study employed by Lewis et al. (2021) to examine psychosocial outcomes in adolescents with histories

of childhood apraxia of speech, compared to peers with speech sound disorders (SSD), SSD with language impairment (LI), and typically developing controls. Participants were recruited from the Cleveland Family Speech and Reading Study in early childhood and were followed into adolescence, with psychosocial functioning assessed through standardized parent- and self-report measures (related to ADHD, anxiety, depression, behavioral issues, etc.). During the adolescent follow-up, participants were separated into groups based on earlier study assessments that categorized their childhood speech and language diagnoses. A total of 32 participants did not have any diagnosis, 42 were diagnosed with SSD only, 26 were diagnosed with SSD + LI, and 17 participants received a sole CAS diagnosis (Lewis et al., 2021). Researchers found that adolescents with CAS had significantly higher levels of social difficulties compared to those with SSD only, based on both self- and parent-reports (Lewis et al., 2021). Parents also rated adolescents with CAS as having more hyperactivity and thought-related issues than the SSD-only group. In fact, higher rates of ADHD and reading disability were observed in the CAS group, and having co-occurring LI appeared to increase psychosocial risk (Lewis et al., 2021). However, most participants with CAS did not fall in the clinical range for anxiety, depression, or behavioral disorders.

Overall, the design strengthens internal validity by establishing a temporal relationship between early speech diagnosis and later outcomes, and by using validated assessment tools for all diagnoses and multiple informants. However, validity is limited by some factors, such as the small sample size of the CAS group ($n = 17$), especially in comparison to other participant groups, and reliance on rating scales rather than clinical psychiatric diagnoses. Additionally, significant comorbidity (e.g., LI, ADHD, reading disability) introduces confounding variables, making it difficult to isolate the specific impact of CAS on psychosocial outcomes. Attrition bias

is a minimal concern, as a couple of CAS participants completed only partial assessments, yet the authors report no major demographic differences between retained and non-retained participants. External validity is also somewhat limited since the sample was taken from a single clinical cohort and may overrepresent more severe cases, reducing generalizability to broader populations. Despite these limitations, the findings are moderately applicable in showing that adolescents with CAS may experience elevated social and behavioral difficulties, underscoring the importance of monitoring psychosocial functioning and considering interdisciplinary support in this population.

Contrastingly, Cassar et al. (2023) used a cross-sectional, descriptive mixed-methods design to explore the long-term speech and psychosocial effects of childhood apraxia of speech in adults (n=17). Passive snowball sampling was employed to recruit participants through advertising on various Internet platforms (Cassar et al., 2023). In other words, participants helped recruit each other and were able to send study information within their networks. Data were gathered through a four-part online survey. The first section collected demographic information and participants' self-reports of their speech, language, and literacy abilities. The second and third sections assessed psychosocial impacts using standardized tools measuring fear of negative evaluation and anxiety (Brief Fear of Negative Evaluation Scale- Revised (BFNE- R) and The State-Trait Anxiety Inventory (STAI)). The final section involved audio recordings of participants' speech that were transcribed and analyzed using established protocols and specialized software (Connected Speech Transcription Protocol).

Researchers found that adults with a self-reported history of CAS continued to experience both persistent speech difficulties and significant psychosocial impacts. Participants demonstrated elevated levels of anxiety compared to normative data, with many also reporting

fear of negative evaluation, reduced confidence, and social avoidance that affected relationships, education, and employment (Cassar et al., 2023). Researchers also found a negative relationship between speech accuracy and anxiety, suggesting that greater speech impairment is associated with higher psychosocial distress. All in all, the findings indicate that the effects of CAS frequently persist into adulthood, which can impact both communication and emotional well-being.

In terms of validity, the study is strengthened through the use of normed psychosocial measures, structured speech analysis, and a mixed-methods approach that provides both objective and subjective data. However, internal validity is limited by the small sample size, lack of diagnostic confirmation (reliance on self-reported CAS), and possible selection bias due to voluntary participation. Additionally, the cross-sectional design prevents conclusions about causality. Generalizability is low because the sample was small, non-random, and likely not representative of the broader CAS population (self-selection and requiring Internet access). The study also had a high attrition rate, as seventeen participants began the first section of the survey, and only six remained by the speech analysis portion (part four). Despite these limitations, the study has moderate clinical applicability, as it highlights that speech difficulties and psychosocial issues, particularly anxiety and social avoidance, may persist into adulthood for those with a CAS diagnosis.

Another cross-sectional study from Sylvestre et al. (2013) examined social participation in children ages five to thirteen with Developmental Coordination Disorder (DCD) compared to typically developing (TD) peers, and further explored differences between subgroups with developmental dyspraxia (DD) and mixed dyspraxia (CAS-DD). A total of 27 Quebec French-speaking children with DCD were matched with 27 TD peers based on age and sex. Participation

was measured using the LIFE-H, a validated questionnaire assessing functioning across home, school, and community contexts (Sylvestre et al., 2013). Data collection interviews with the parents lasted around an hour with two experienced LIFE-H evaluators. Study results demonstrated that children with DCD had significantly lower levels of social participation across all domains compared to their typically developing peers. Additionally, children with CAS-DD showed significantly poorer outcomes than those with DD alone, particularly in communication (e.g., initiation of conversations) and education, suggesting that co-occurring speech impairments further exacerbate participation challenges (Sylvestre et al., 2013).

In terms of validity, the study demonstrates moderate internal strength. The use of a standardized and psychometrically sound measure (LIFE-H), along with matching comparison participants with similar demographics, supports the reliability of the findings. However, the cross-sectional study design limits the ability to draw causal conclusions, and reliance on parent-reported data introduces potential reporting or measurement bias since outside perspectives may not fully capture children's real-world participation. Additionally, participants were recruited from clinical programs, which may result in selection bias toward children with more severe diagnoses. Generalizability is also limited due to the relatively small sample size and the use of a convenience sample drawn from a specific Quebec French-speaking population, restricting the applicability of findings to broader or more diverse populations.

Contrasting other studies in this review, attrition bias is not a major concern in this study because no longitudinal follow-up was conducted. However, the lack of information regarding recruitment rates and non-participation raises the possibility of sampling bias. Although age and sex were controlled, other potential confounding variables such as socioeconomic status, severity of impairment, and comorbid conditions were not fully accounted for. Generally, the study

provides meaningful clinical insights into the participation challenges faced by children with DCD (and within the diagnosis, CAS-DD), but its methodological limitations should be considered when interpreting and generalizing the findings, especially to those with CAS.

An exploratory study by Keller and Maas (2023) examined self-reported communication attitudes in children with CAS, shifting focus from speech impairment to psychosocial impact within the International Classification of Functioning, Disability and Health (ICF) framework. Data for this study were collected in the landscape of a bigger study involving a randomized controlled trial of ASSIST (Apraxia of Speech Systematic Integral Stimulation Treatment) at Temple University (Keller & Maas, 2023). Twelve children ages four to ten were administered communication attitude questionnaires (CAT/KiddyCAT), with scores compared to normative data and explored in relation to severity, participation, and therapy frustration. Results showed a clear age-related trend: younger children generally reported positive communication attitudes, while older children were more likely to report negative attitudes compared to peers (Keller & Maas, 2023). Relationships with other variables were limited. In other words, there was no consistent link with communicative participation, a small association with increased frustration during therapy, and a severity relationship only in younger children. Communication attitudes were largely stable over a short period. Overall, findings suggest that negative attitudes may develop with age in children with CAS and support the importance of child self-report in assessment.

Methodologically, the study has moderate internal validity. Strengths include the use of standardized, validated tools and strong interrater reliability, but the very small sample size ($n = 12$) and reliance on descriptive analyses limit statistical power and the strength of conclusions. Generalizability is restricted due to the homogeneous sample (e.g., no comorbidities, typical

cognition) and the intensive treatment setting, which may not reflect typical clinical populations. Measurement validity is somewhat limited, as the CAT/KiddyCAT measures were designed for stuttering rather than CAS, and clinician-rated frustration introduced potential subjectivity. This study provides valuable preliminary insight into psychosocial aspects of CAS but should be interpreted cautiously, with further research needed to confirm and extend these low-moderate findings.

Finally, Tarshis et al. (2020) presented a clinical focus article examining how childhood apraxia of speech may impact social development by contrasting the developmental trajectory of children with CAS against that of typically developing peers. Drawing on literature in social cognition, joint attention, and early communication, the authors argue that neurotypical children acquire social competence through frequent, reciprocal interactions with caregivers, which can be characterized by robust vocalizations, imitation, and responsive feedback loops (Tarshis et al., 2020). In contrast, children with CAS often produce fewer and less consistent vocalizations, possibly reducing the responsiveness of caretakers and limiting opportunities for social engagement. Authors propose that this divergence disrupts the development of foundational social processes like social attention, interpretation, and problem-solving, as outlined in the Social Thinking–Social Competency Model (Tarshis et al., 2020). As a result, children with CAS may experience a cascading effect in which early communication breakdowns contribute to later difficulties in peer interaction, play, and social-emotional development, relative to typically developing individuals.

In terms of validity, the article is grounded in established theoretical frameworks and comparative developmental literature. However, its conclusions remain inferential due to the absence of direct empirical data. Generalizability is limited by the lack of a defined sample and

insufficient consideration of variability within the CAS population, particularly given common comorbidities. Overall, the paper offers a clinically meaningful, comparative perspective on social development in CAS, though its claims should be interpreted with caution until supported by empirical evidence.

Synthesis

Overall, the literature consistently suggests that CAS diagnosis is associated with elevated psychosocial risk across the lifespan, especially in the areas of social participation, anxiety, communication attitudes, and behavioral functioning. Across both pediatric and adult populations, individuals with CAS were more likely to experience social difficulties, reduced confidence, fear of negative evaluation, and challenges in educational and interpersonal settings compared to typically developing peers and individuals with general speech sound disorders. Longitudinal evidence from Lewis et al. (2021) provided the strongest support for these associations, as researchers highlighted more social and behavioral difficulties in adolescents with histories of CAS, while cross-sectional studies further suggested that psychosocial impacts may persist into adulthood. Findings also indicated that co-occurring conditions like language impairment, ADHD, or broader motor coordination difficulties may intensify psychosocial burden, although these comorbidities make it difficult to isolate the specific contribution of CAS itself.

Despite generally consistent trends, the overall strength of the evidence base remains moderate-low because of small sample sizes, reliance on self- or parent-report measures, cross-sectional designs, selection bias, and limited population diversity. Consequently, while available literature supports a relationship between CAS and negative psychosocial outcomes, further large-scale research and higher levels of evidence are needed to better define the unique

psychosocial profile of CAS and clarify the long-term impact of the disorder separate from related developmental conditions.

Discussion

Even among differences in study design, the general findings of this critical appraisal suggest that individuals with a CAS diagnosis are at risk of experiencing heightened negative psychosocial outcomes as compared to those with general SSD and their typically-developing peers. This is essential to understand as a clinician that works with this specific population. Intervention for CAS may benefit by extending past speech intelligibility goals alone and incorporating consideration of emotional well-being, social participation, self-esteem, and quality of life. Clinicians may increase their impact by routinely monitoring psychosocial functioning throughout treatment, particularly as children age and communication demands increase in school and eventually, the workforce. Interdisciplinary collaboration involving speech-language pathologists, psychologists, educators, and families may also be beneficial in supporting both communication and psychosocial outcomes. Additionally, incorporating self-report measures into assessment might provide valuable insight into how individuals with CAS perceive their communication experiences and participation restrictions.

However, interpretation of current findings should be approached carefully due to several methodological limitations within the evidence base. Most studies relied on small sample sizes, self-report or parent-report measures, convenience sampling, and cross-sectional designs, which limits statistical power and the ability to establish causality. CAS is also a relatively low-incidence disorder, contributing to difficulties recruiting large and representative samples. Also, comorbidities like language impairment, ADHD, reading disability, and developmental coordination disorder were common across studies and may independently contribute to

psychosocial difficulties. As a result, isolating the distinctive impact of CAS remains challenging. Many studies also sampled participants from clinical or treatment populations, potentially overrepresenting individuals with more severe symptoms and limiting generalizability to broader CAS populations.

Despite the evidence demonstrated by these papers, it's important to note the ways that CAS research can improve to better understand the inner workings of those with the diagnosis. For instance, only one out of the five resources utilized a longitudinal study design, even though one important finding across studies was the potential cumulative effect of CAS over time. While younger children in Keller and Maas (2023) generally reported more positive communication attitudes, older children demonstrated increasingly negative perceptions of their communication abilities. Similarly, adults in Cassar et al. (2023) continued to report elevated anxiety and psychosocial distress long after childhood diagnosis. These findings suggest that the psychosocial impact of CAS becomes more apparent as social, academic, and occupational communication demands increase with age. This pattern highlights the importance of long-term psychosocial support, as the effects of CAS may persist well beyond childhood and continue to influence adult social, educational, and occupational functioning. The current literature also emphasizes the need for further research involving adult populations to challenge the misconception that CAS is solely a childhood disorder and to better understand its lifelong psychosocial impact.

Generally, future directions should prioritize larger longitudinal studies with more diverse and representative samples to better clarify the relationship between CAS and psychosocial functioning over time. Compounding impacts of race/ethnicity, SES, geographical location, etc. are rarely, if ever, mentioned in current CAS literature surrounding psychosocial outcomes,

which must change in order to be inclusive of all backgrounds and aware of all variables. Greater attention should also be given to controlling for comorbidities and identifying protective factors that may reduce psychosocial risk. Overall, while the current evidence base remains limited, findings consistently suggest that CAS may have meaningful psychosocial consequences that extend well beyond speech production difficulties alone.

AI Disclosure Statement: This paper was written without the help of AI applications.

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