

Speech Characteristics of Adolescent with Down Syndrome Before and After Intervention

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Down syndrome (DS) is a developmental disorder which results from trisomy of the 21st chromosome. The nature of speech disorders in this population is complex and multi-causal due to an array of structural anomalies, generalized hypotonia, cognitive delay, deficits in auditory processing, frequent occurrence of otitis media, and deficits in oral motor skills (Kent & Vorperian, 2013). Despite prevalent issues in speech motor planning and programming, individuals with Down syndrome are not frequently given a diagnosis of CAS due to the concomitant hypotonia, typically associated with dysarthria. However, symptoms of CAS often co-occur in the speech of individuals with DS (Cleland et al., 2010). This study was designed to investigate whether an individual who has concomitant Down syndrome and CAS would show improvements in speech intelligibility in response to a treatment program designed for CAS. A young male aged 15;06 with Down syndrome and CAS, who had not previously received intervention targeting speech accuracy participated in this study. A single subject randomized alternation design with block randomization was used. Three interventions were randomly assigned to sessions within weeks, each intervention assigned at random to unique targets, specifically: (1) auditory motor integration intervention (high intensity practice with attention to auditory knowledge of the target and self monitoring) targeting accurate syllable marking with suppression of consonant and vowel harmony in disyllables; (2) phonological planning intervention (high intensity practice with visual cues for each phoneme) targeting productive use of a glide or liquid and a stop in the same utterance (3) control intervention (high intensity practice) targeting correct articulation of /f/ in onset and coda syllable positions. Six 45 minute treatment sessions, administered once per week, were provided for each treatment condition /goal pairing. Treatment targets were taught using nonsense words in meaningful contexts. Outcomes were assessed using imitative probes involving real words and phrases that contained the targeted phonological structures. Probes were administered at the end of the session to test learning of the goal during that session and at the beginning of the next session to assess maintenance of learning over a short interval. Furthermore a follow-up assessment occurred 8 weeks after the cessation of the intervention program. Same day and next day probes revealed gains for all three goals but greater gains in the auditory motor integration condition with this difference across treatment conditions being statistically significant. Administration of the Diagnostic Evaluation of Articulation and Phonology prior to and 8 weeks after intervention revealed an improvement in Percent Consonants Correct (in single words) from 22 to 38 and an improvement in Percent Vowels Correct from 75 to 86. Improvements in speech accuracy after only six weeks given the participant's age and severity of speech disorder are remarkable. The superiority of the intervention designed specifically for apraxia of speech is encouraging and provides guidance for the design of interventions for other children with DS.

Cleland, J., Wood, S., Hardcastle, W., Wishart, J., & Timmins, C. (2010). Relationship between speech, oromotor, language, and cognitive abilities in children with Down's syndrome. *International Journal of Language and Communication Disorders*, 83-95.

Kent, R. D., & Vorperian, H. K. (2013). Speech Impairment in Down Syndrome: a Review. *Journal of Speech, Language, and Hearing Research*, 178-210.