

Better interventions to support speech and swallowing in individuals with Down syndrome

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Individuals with Down syndrome have vocational, educational, social and personal goals, all of which can be realized with targeted services, according to a Penn State research team. The researchers recently

investigated how to establish specific support interventions related to speaking and swallowing in this population.

Individuals with Down [syndrome are at increased risk of choking](#) on food or drink, which can lead to pneumonia, hospitalization and other complications. Additionally, parents report that up to 95% of [individuals](#) with Down syndrome have difficulty making their speech understood to people outside their immediate social circle. This has implications for individuals' ability to self-advocate and participate in work, education and relationships, according to the research team.

The researchers developed a [theoretical framework](#) that addresses the impact that both structural and sensory differences may have on speech and swallowing in individuals with Down syndrome. They published the work in the journal [Frontiers in Psychology](#).

Current interventions for swallowing and speech therapy were largely developed for individuals who do not have Down syndrome, according to co-author Krista Wilkinson, distinguished professor of communication sciences and disorders.

Because individuals with Down syndrome may have specific characteristics related to their facial and neck structure, and differences in other [physical features](#) and abilities, like sensory processing, existing interventions may not be as effective for this population. Reviewing the existing research literature allowed the researchers to understand which differences among people with Down syndrome are well understood and which require further investigation.

The team's novel framework hinges on inclusivity, according to Aarthi Madhavan, assistant professor of communication sciences and disorders and first author on the paper. Madhavan said the idea is to examine how different variables that may individually contribute to problems with

swallowing and speech work collectively. Addressing just one variable may result in an intervention that fails when it comes to another contributing variable, according to the researchers.

"This paper presents the theoretical basis for the first portion of our work to improve speech and swallowing interventions for people with Down syndrome," Madhavan said. "Looking at past research is the first step in defining the relationships between speech, swallowing, language and literacy outcomes. This work is the foundation of taking a [holistic approach](#) in developing interventions to support individuals with Down syndrome."

Functional swallowing depends on quick transfer of food or liquids from the mouth to the stomach. This requires coordinated movement of the lips, tongue and jaw. Distinctive features of Down syndrome include reduced mouth width, prominent lips, a smaller hard palate, an enlarged tongue and a variety of dental abnormalities that may make swallowing harder for individuals.

As many as three of every four individuals with Down syndrome may also experience hearing loss. Hearing loss can have implications for an individual's [speech perception](#) and the ability to use sounds to process both spoken and written language. According to Wilkinson, this can lead to difficulties developing language and literacy skills.

According to co-author Nicole Etter, associate professor of communication sciences and disorders, the somatosensory system produces the perception of touch, temperature, pain and body position.

The researchers said they believe that, given their anatomical differences and other sensory deficits like hearing, individuals with Down syndrome may experience deficits in oral somatosensation, the ability to sense touch, texture, and relative position of the tongue in the mouth. Oral

somatosensory deficits can contribute to an inability to learn and maintain the motor skills necessary for productive speech and swallowing.

Other studies have shown significant differences in the ways children with Down syndrome identify, process and respond to sensory information. These complications arise in childhood but may continue and, potentially become more prominent, with age, according to the researchers.

There are many other factors that can impact functional behaviors including cognition, dietary requirements for both nutrition and medical needs, food preferences, parental anxiety and grief surrounding a Down syndrome diagnosis, cultural expectations and limited access to care. All of these factors can impact [speech](#), swallowing and language outcomes.

"We tend to address these difficulties in silos, which is not always the most effective," Madhavan said. "Our goal is to address these behaviors holistically and use our framework and findings to improve functional outcomes not just for individuals with Down syndrome, but in other populations as well."

More information: Aarthi Madhavan et al, A biophysiological framework exploring factors affecting speech and swallowing in clinical populations: focus on individuals with Down syndrome, *Frontiers in Psychology* (2023). [DOI: 10.3389/fpsyg.2023.1085779](https://doi.org/10.3389/fpsyg.2023.1085779)

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