

EVIDENCE OF EFFICACY: ULTRASOUND SPEECH THERAPY STUDIES

Study	N	Age	Dx	Speech Targets	+ve Result	Mixed Result
<i>Shawker & Sonies (1985)</i>	1	9	DSSD	r	✓	
<i>Bernhardt et al. (2003)</i>	4	16 to 18	HI	s, ʃ, r, l, i, ɪ, u, ʊ	✓	
<i>Bernhardt et al. (2005a)</i>	4	16 to 18	HI	s, ʃ, r, l, i, ɪ, u, ʊ		✓
<i>Adler-Bock et al. (2007)</i>	2	12, 14	DSSD	r	✓	
<i>Bacsfalvi et al. (2007)</i>	3	18	HI	i, u, ʊ, ɪ, ε	✓	
<i>Bernhardt et al. (2008)</i>	13	8 to 15	RSSE	r		✓
<i>Fawcett et al. (2008)</i>	3	21 to 27	DS	r	✓	
<i>Modha et al. (2008)</i>	1	13	DSSD	r	✓	
<i>Bacsfalvi (2010)</i>	3	15 to 18	HI	r	✓	
<i>Bacsfalvi & Bernhardt (2011)</i>	7	14 to 19	HI	N/A		✓
<i>Klein et al. (2013)</i>	2	5, 6	DSSD	r	✓	
<i>Lipetz & Bernhardt (2013)</i>	1	15	DSSD	s, z, ʃ, tʃ	✓	
<i>Preston et al. (2013)</i>	6	9 to 15	CAS	sequences e.g. re, kr		✓
<i>McAllister Byun & Hitchcock (2014)</i>	4	6 to 10	DSSD	r		✓
<i>McAllister Byun & Hitchcock (2014)</i>	4	7 to 15	DSSD	r	✓	
<i>Preston et al. (2014)</i>	8	10 to 20	RSSE	s, z, θ, ʃ, tʃ, r ; Clusters: r, s, l	✓	
<i>Preston et al. (2014)</i>	1	59	AoS	r		✓
<i>Cavin (2015)</i>	1	22	RSSE	r	✓	
<i>Cleland et al. (2015)</i>	7	6 to 10	DSSD	k, g, r, ʃ, t	✓	
<i>Hitchcock & McAllister Byun (2015)</i>	1	11	DSSD	r	✓	
<i>Lee et al. (2015)</i>	1	13	DSSD	r	✓	
<i>Blyth et al. (2016)</i>	2	53, 59	Glossec tomy	s, t Participant 1; s, l, tʃ Participant 2	✓	
<i>Bressmann et al. (2016)</i>	4	7 to 10	DSSD	r	✓	
<i>Heng et al. (2016)</i>	2	4	DSSD	k,g Velar Fronting		✓
<i>Preston et al. (2016)</i>	3	10 to 13	CAS	r		✓
<i>Preston et al. (2016)</i>	12	10 to 16	RSSE	r	✓	
<i>Preston et al. (2016)</i>	3	10 to 14	CAS	r (2 participants), sibilants (1 participant)		✓
<i>Roxburgh et al. (2016)</i>	2	6, 9	CLP	n for one participant; k,g for another	✓	
<i>Sjolie et al. (2016)</i>	4	7 to 9	DSSD	r		✓
<i>Preston et al. (2017)</i>	6	8 to 16	CAS	r (5 participants), r and s (1 participant)		✓
<i>Preston & Leece (2017)</i>	4	13-22	RSSE	r	✓	
<i>Furniss & Wenger (2018)</i>	17	5 to 12	RSSE	r, s, ʃ	✓	
<i>Preston et al. (2018)</i>	12	8 to 16	RSSE	r	✓	
<i>Cleland et al. (2019)</i>	15	6 to 15	DSSD	k,ε,ʃ,s		✓
<i>Preston et al. (2019)</i>	12	9 to 14	RSSE	r		✓

DSSD	Developmental Speech Sound Disorder	HI	Hearing Impairment
RSSE	Residual Speech Sound Error	DS	Down syndrome
CAS	Childhood Apraxia of Speech	CLP	Cleft Lip and Palate

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Narrative/Systematic Reviews

Hitchcock, E. R., Swartz, M. T., & Lopez, M. (2019, March). Speech sound disorder and visual biofeedback intervention: a preliminary investigation of treatment intensity. In *Seminars in speech and language* (Vol. 40, No. 02, pp. 124-137). Thieme Medical Publishers.

Sugden, E., Lloyd, S., Lam, J., & Cleland, J. (2019). Systematic review of ultrasound visual biofeedback in intervention for speech sound disorders. *International journal of language & communication disorders*.

Surveys of Participants/ Qualitative Studies

Preston, J. L., Holliman-Lopez, G., & Leece, M. C. (2018). Do Participants Report Any Undesired Effects in Ultrasound Speech Therapy?. *American journal of speech-language pathology*, 27(2), 813-818.

Selected Articles on Assessment

Cleland, J., Wrench, A., Lloyd, S., & Sugden, E. (2018). ULTRAX2020: Ultrasound technology for optimising the treatment of speech disorders: Clinicians' resource manual.

Cleland, J., Lloyd, S., Campbell, L., Crampin, L., Palo, J. P., Sugden, E., ... & Zharkova, N. (2019). The impact of real-time articulatory information on phonetic transcription: ultrasound-aided transcription in cleft lip and palate speech. *Folia Phoniatria et Logopaedica*, 1-11.

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Bernhardt, B., Bacsfalvi, P., Gick, B., Radanov, B., & Williams, R. (2005). Exploring the Use of Electropalatography and Ultrasound in Speech Habilitation Explorers l' {é}lectropalato-graphie et l' {é}chographie pour l' {é}ducation de la parole. *Revue D'orthophonie et D'audiologie*, 29(4), 169.

Bernhardt, B., Gick, B., Bacsfalvi, P., Adler-Bock, M., & Adler-Bock, M. (2005). Ultrasound in speech therapy with adolescents and adults. *Clinical Linguistics & Phonetics. Special Issue: Ultrasound Imaging of the Tongue*, 19(6–7), 605–617.

Blyth, K. M., McCabe, P., Madill, C., & Ballard, K. J. (2016). Ultrasound visual feedback in articulation therapy following partial glossectomy. *Journal of Communication Disorders*, 61, 1–15.

Bressmann, T., Harper, S., Zhylich, I., & Kulkarni, G. V. (2016). Perceptual, durational and tongue displacement measures following articulation therapy for rhotic sound errors. *Clinical Linguistics & Phonetics*, 30(3), 1–18.

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