

Dra per, K. (2016). Music and Stroke Rehabilitation: A Narrative Synthesis of the Music-Based Treatments used to Rehabilitate Disorders of Speech and Language following Left-Hemispheric Stroke. *Voices: A World Forum For Music Therapy*, 16(1). doi:10.15845/voices.v16i1.789

Appendix B Synthesis of Included Studies

Reference	Study Design	Participants (female)	Mean Age (years)	Focus of Study	Time since onset (years)	Summary of Interventions	Main Outcome Measures	Duration of Treatment and No. of Sessions	Data Collection	Outcomes
1.Conklyn et al. (2012) USA	RCT	30	N/A	Non-fluent aphasia	N/A	MMIT	- Speech repetition - Speech responsiveness	1 session	Pre and post MT speech assessment	Significant difference between control and treatment groups. -Treatment group showed improved test scores after one session
2.Hartley et al. (2010) USA	Case study	1	50	Global aphasia - apraxia of speech	N/A	Singing	- Producing non-verbal sounds - Pitch control	9 years of weekly sessions	Qualitative descriptive analysis	- After 5 years of treatment patient could read words and sound them out - Learned conversational phrases
3.Hough (2010) USA	Case study	1	69	Non-fluent aphasia	4	Adapted MIT	Increased verbal output	8 weeks - 3 1-hour long sessions per week	- Baseline phrase production - Follow up 2 and 4 weeks post treatment	Reached 75% accuracy on the phrase production - Improved performance on standardized tests
4.Jungblut (2005) Germany	RCT	17 (8)	N/A	Non- fluent aphasia	11.5	SIPARI®	Expressive linguistic skills	- 20 group session - 10 individual sessions - 1-hour sessions	- AAT - Pre and design	Significant improvement of expressive linguistic skills and specific expressive language abilities (p=0.05)
5.Jungblut et al. (2009)	Case Study	1	60	Global aphasia	3	SIPARI®	- Spontaneous	3 years	- AAT	Significant speech performance

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Germany							speech - Repetition - Naming	- 360 individual sessions	- Baseline 9 months post onset of treatment - Twenty months post onset of treatment - Followup 2 and 3 years	improvements in spontaneous speech, the AAT, repetition and naming
6.Kim and Tomaino (2008) USA	Multiple case study	7 (5)	73.1	- Evaluating a treatment protocol - Non-fluent aphasia - Apraxia of speech - Dysarthria	9.76	- Singing familiar songs - Breathing single-syllable sounds - Musically-assisted speech - Dynamically-cued singing - Rhythmic speech cueing - Oral motor exercises - Vocal intonation	- Increasing speech tempo - Rhythmic prosody - Articulation - Fluency	-8-12 individual sessions - 3 times a week - 30 minute sessions	Qualitative descriptive analysis	- Provides evaluations for treatments - Guidelines for clinicians
7.Lim et al. (2012) Korea	RCT	21 (6)	59.5	Non-fluent aphasia	0.59	MIT Therapeutic singing: - Respiratory training	- Spontaneous speech - Understanding	1 month	- Aphasia quotient - Before and after each session	NMT chronic group showed significant improvements in AQ p=0.05 - Improvement in naming and

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						- Voice training - Singing familiar songs - Speech training	- Repetition - Naming objects			repetition
8.Racette et al. (2006) Canada	Multiple-case study	8	51.6	Non-fluent aphasia, dysarthria and apraxia of speech	12	Production of familiar songs - Repeating and recalling from unfamiliar songs - Singing and speaking along to auditory models	- Repetition - Recall - Singing vs speaking	4 sessions	- Analysis of word production post experiment	- Singing alone does not help aphasics improve speech - Singing to an auditory model has more potential than speaking to improve intelligibility
9.Schlaug et al. (2008) USA	Exploratory RCT	2	52.5	Non-fluent aphasia	1	MIT	- Conversational speech descriptions of complex pictures - Naming - Speech intelligibility	75 sessions	- Baseline collected from language and singing/speaking assessment - Follow-up post 40 and 75 sessions	- Treatment patient showed significant improvements in speech output and confrontational naming after 40 sessions and further enhancement after 75 sessions - No significant changes in control patient
10.Schlaug et al. (2009) USA	Multiple-case study	6		Non-fluent aphasia	1 year min	MIT	Changes in white matter tracts	75 individual sessions	Pre and post assessment of white matter tracts	- Significant increase in the number of AF fibres and AF volume (p=0.04)
11.Straube et al. (2008)	Exploratory	5 (2)	56 test	- Investigated the dissociation	N/A	Familiar song	- Singing vs	3 sessions	Post session evaluations of speech	- A pronounced dissociation between singing and speaking

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Germany	RCT			between singing and speaking - Non-fluent aphasia and mild dysarthria		singing - Speaking songs - Phrase production with novel, prelearned melody	speaking - Phrase production		and singing production	familiar songs - Superior performance during singing cannot be explained by the effect of singing
12. Tomaino (2010) USA	Case study	1	80	Non-fluent aphasia	<1	Use of prelearned songs - Singing familiar lyrics - Singing accompanied with tapping rhythm - Lyrics cued with gaps - Spoken lyrics to a rhythm - Word retrieval and speech	- Singing ability - Melodic contour - Pitch - Recall of melodies	4 months - daily sessions - 5 times a week	- Initial assessment of musical ability - Qualitative descriptions	- Post 4 weeks showed improved singing - Post 4 months singing more freely, complete recall and flow, improved speech, improved retrieval and fluency
13. Wilson et al. (2006) Australia	Case study	1	52	Global aphasia	4	MIT	- Repetition - Word production	3 experimental conditions	- Baseline - Follow-up 1 week and 5 weeks	- Initial improvements on repetition and word production

14. Vines et al. (2011) USA	Multiple-case study	6	56.2	Investigate the potential for tDCS to augment the benefits of MIT - Non-fluent aphasia	4.5	Trans-cranial direct current stimulation MIT	- Fluency of speech - Automatic production of verbal sequences - Describing flash cards - Naming pictures	3 experimental conditions - 3 consecutive days	- Before and after tests of verbal fluency	Results showed significant improvements in fluency of speech when areas of the right hemisphere were aroused
15. Zipse et al. (2012) USA	Case study	1 (1)	12	Non-fluent aphasia	1.25	Adapted MIT	- Production of fluent speech in conversation - Describing pictures	16 weeks - 80 sessions	- Multiple baseline design - Performance on communication tasks - Follow-up post 40, 80, and 1 year sessions	Improved performance on trained and untrained phrase production

Abbreviations

AAT Aachen Aphasia Test

MMIT Modified Melodic Intonation Therapy

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AF	Arcuate Fasciculus	AQ	Aphasia Quotient
NMT	Neurologic Music Therapy	RCT	Randomised Controlled Trial
MIT	Melodic Intonation Therapy	N/A	Not Available
SIPARI®	Singing, Intonation, Prosody, Atmung (breathing), Rhythm, Improvisation		
TDCS	Trans-cranial Direct Current Stimulation		