

# Neural Mechanisms Driving Speech and Language Recovery Following Childhood Stroke: A Scoping Review

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### Speech:

- Articulation difficulties<sup>6</sup>, dysarthria, slowed speech<sup>7</sup>

### Language:

- Expressive < Receptive language<sup>8,9</sup>,
- limited vocabulary, short and simple sentences, poor grammar and syntax, word finding difficulties, decreased verbal fluency, reduced narrative discourse, reading comprehension difficulties<sup>6,7</sup>

### Functional Imaging:

- **Vowel Detection:** Many participants displayed left hemisphere language dominance following a left or right hemisphere stroke.<sup>10</sup>
- **Verb Generation & Picture Matching:** Left MCA participants displayed more bilateral or right-sided activation.<sup>11</sup>
- Activation patterns following stroke may be impacted by the age of stroke onset.<sup>9,12</sup>

### Stroke Lesions:

- Right hemisphere, left hemisphere, bilateral, basal ganglia, posterior fossa<sup>6-12</sup>

Article	Speech Measures	Language Measures	Structural Neuroimaging	Functional Neuroimaging
Lansing et al., (2004)	X	✓	✓	X
Everts et al., (2010)	X	✓	✓	✓
Kossorotoff et al., (2010)	X	✓	✓	X
Kolk et al., (2011)	X	✓	✓	X
Ilves et al., (2014)	X	✓	✓	✓
Lidzba et al., (2017)	X	✓	✓	✓
Murphy et al., (2017)	X	✓	✓	X
Westmacott et al., (2017)	X	✓	✓	✓
de Montferrand et al., (2019)	X	✓	✓	X
Peterson et al., (2019)	X	✓	✓	X



## Conclusions

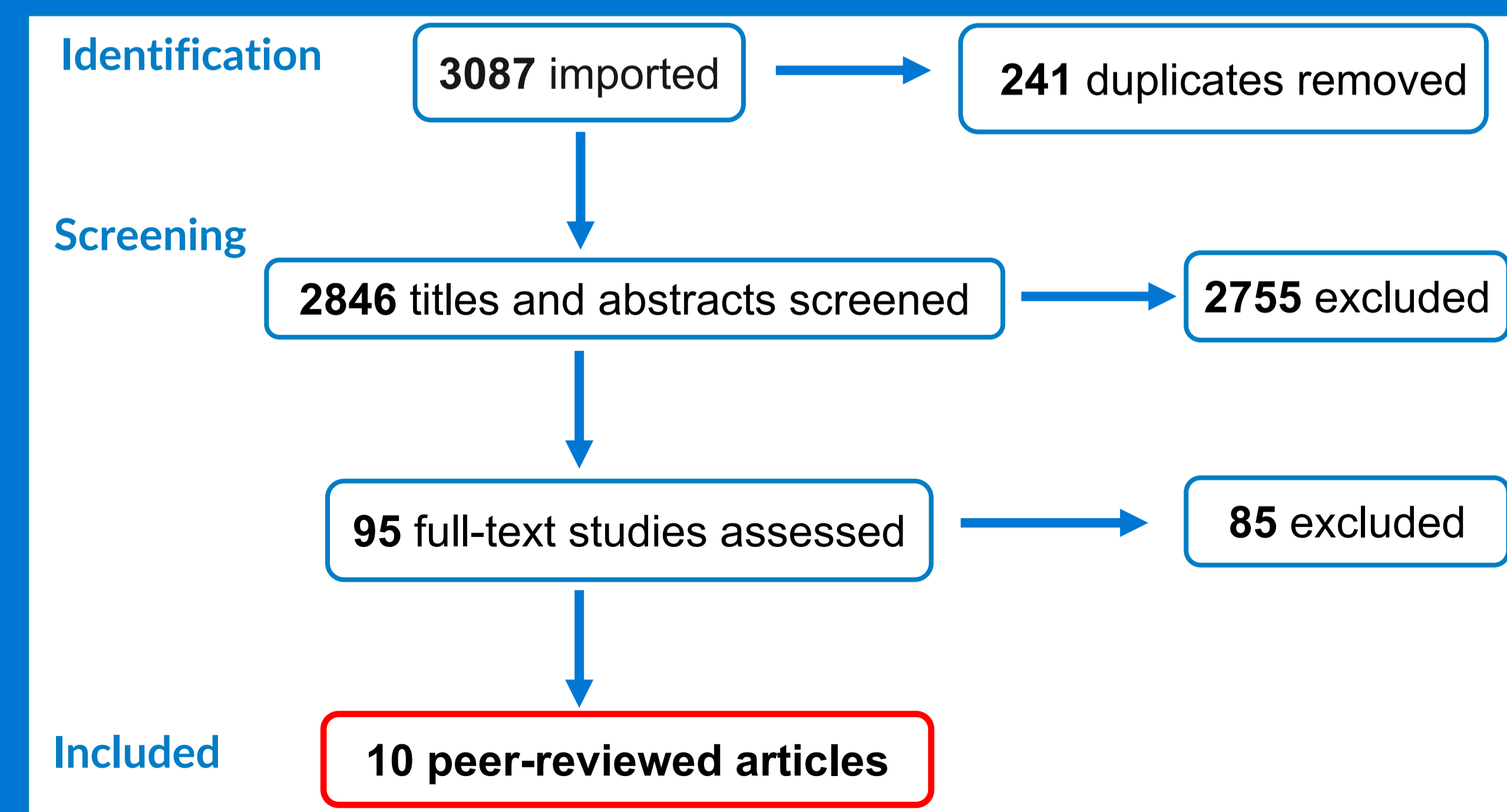
- **Research of the neural correlates of speech and language profile** of children post-stroke rehabilitative recovery **is limited.**
- **A lack of consistency in standardized assessment protocols** have been used to evaluate speech and language outcomes following stroke in children.
- **Future research** should investigate the changes of neural mechanisms across the sub-acute rehabilitative journey, a period when the brain is most plastic and receptive to therapy.



## References

Please scan the QR code for a list of references.

# Understanding speech and language functions and their neural correlates is paramount for evidence-informed care.



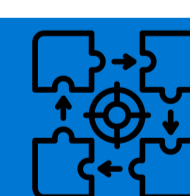
## Background

- Stroke is a neurological injury caused by the occlusion or rupture of cerebral blood vessels.<sup>1,2</sup>
- Childhood stroke → 28 days to age 18.<sup>2</sup>
- Impairments in speech and language function are observed in ~50 to 75% of children following stroke.<sup>3</sup>
- Long-term difficulties in cognitive, educational and employment outcomes often result.<sup>3</sup>
- Literature has primarily focused on the brain-behaviour relation of speech and language outcomes following adult stroke<sup>4,5</sup> with limited research investigating speech and language neural outcomes following childhood stroke.<sup>1</sup>

## Objectives & Research Question

1. To synthesize the peer-reviewed literature on the neural correlates of speech and language function following childhood stroke.
2. To identify gaps in the literature regarding the neural correlates of speech and language function following childhood stroke for future study consideration.

## What are the neural correlates that drive speech and language recovery following childhood stroke?



## Methods

### Inclusion criteria:

1. Published in English in 2022 or earlier
2. Childhood stroke diagnosis
3. Data for speech and/or language + neuroimaging outcomes (structural and/or functional)
4. Focus on **subacute phase** (3-11 weeks post-stroke)
5. Observational design

Medline

EMBASE

PsycINFO

CINAHL