

Global Neurocognitive Outcomes and Daily Living Skills after Pediatric Hemispherectomy

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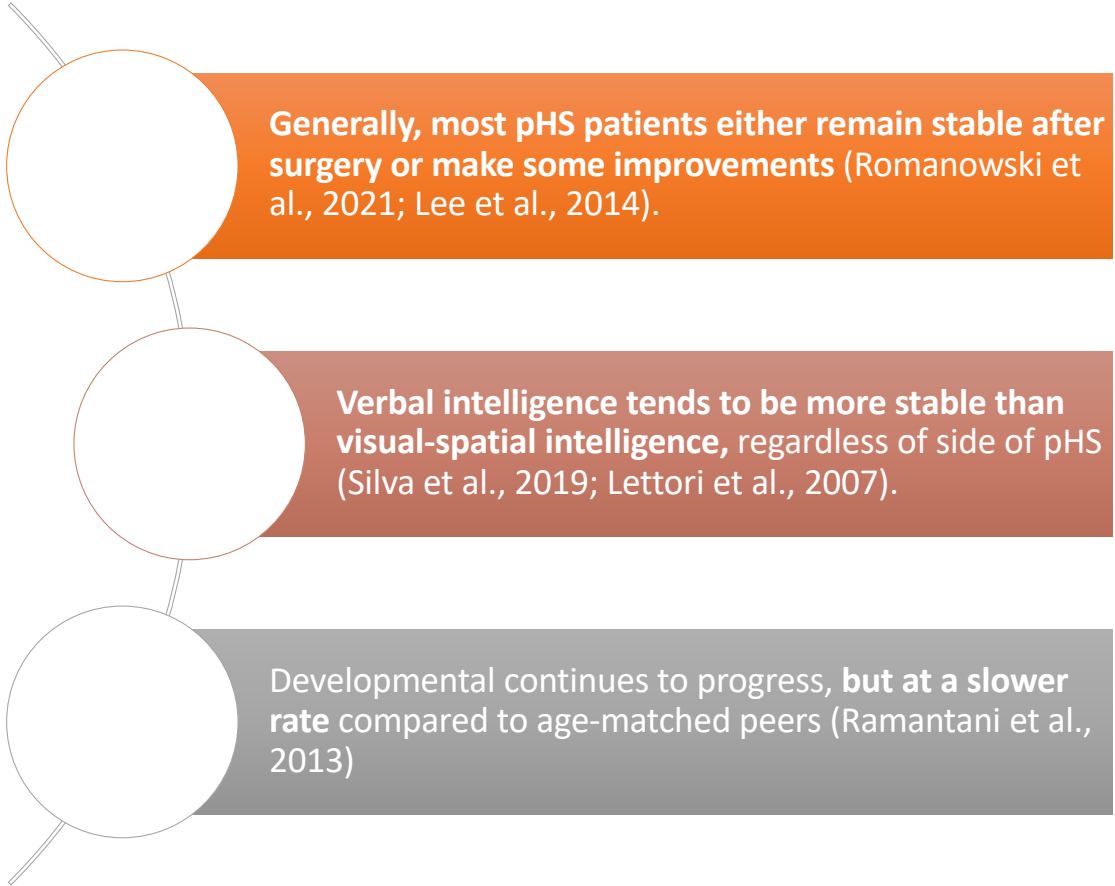
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What is known about cognitive functioning after pediatric hemispherectomy surgery (pHS)?



Generally, most pHS patients either remain stable after surgery or make some improvements (Romanowski et al., 2021; Lee et al., 2014).

Verbal intelligence tends to be more stable than visual-spatial intelligence, regardless of side of pHS (Silva et al., 2019; Lettori et al., 2007).

Developmental continues to progress, **but at a slower rate** compared to age-matched peers (Ramantani et al., 2013)

Our Questions

- What are the commonalities and the differences in cognitive abilities after pediatric hemispherectomy surgery?
- Do any features distinguish the people who do the best? Side of surgery? Cause of epilepsy? Age at surgery?
- How does pediatric hemispherectomy impact daily functioning in teens and adults?



Our Studies



**GLOBAL NEUROCOGNITIVE
OUTCOMES**



**EVERYDAY ORGANIZATION
& SELF-REGULATION**



DAILY LIVING SKILLS

Global Neurocognitive Outcome (GNO) Classification



Global Neurocognitive Outcome: Design

Pediatric Hemispherectomy Surgery (pHS) Samples

PESA $n=5$ Assessment records

Fuller $n=9$ Direct assessment

UCLA $n=21$ Archived assessment records 1986 – 2024

Exclusionary Criteria

- Major surgery complications
- Major brain malformation in residual hemisphere
- Developmental delays *before* seizures started

(Wilson et al 2012)

Global Neurocognitive Outcome: Participant Characteristics

35

Participants
(15 M / 20 F)

9.6–41

Age at
evaluation (yrs)

42–98

Full-Scale IQ

3–18

Education (yrs)

8D / 27PA

Etiology:
Dev (CD & Hemimeg)
Progress (RE, SW, CVA)

0–11

Age of seizure onset
(yrs)

0–9.8 yrs

Presurgical duration
M = 3.25 (± 2.77) yrs

6m – 15yrs

Age at pHS
M = 6.56 (± 4.14) yrs

2.5–40.5 yrs

Time since pHS
M = 12.6 (± 7.4) yrs

15R / 20L

Side of
hemispherectomy



Right vs. Left pHS

FSIQ right > left pHS (R: 80.86 $\pm$ 14.80;
L: 63.13 $\pm$ 15.98)

*No significant R vs. L difference in
education, time since surgery, or age
at evaluation.*

NOTE: Sample Bias

Study does not include non-verbal
patients.

Global Neurocognitive Outcome (GNO) from the International Classification of Cognitive Disorders in Epilepsy (IC-CoDE)

A consensus-based classification for cognitive outcome in epilepsy (ILAE / INS; Herman et al., 2024)

Five Cognitive Domains Assessed

Language

Memory

Executive

Visuospatial

Attention / Processing Speed

A domain counts as impaired when 2 or more tests within it fall below the cutoff.

0

Intact

No impaired domains



1

Single-Domain

One domain impaired



2

Bi-Domain

Two domains impaired



3

Generalized

Three or more domains impaired

GNO Conclusions

- Over time - global cognitive outcomes and fluid reasoning stay steady; crystallized skills keep developing
- Right-hemispherectomy - better outcome overall and in language and processing speed
- Greater impairment is associated with earlier seizure onset, but not with etiology or pre-surgical duration
- Significant association between FSIQ and global impairment is found in people with left pHS and people with lower FSIQ (<56)

Preliminary analysis · First application of the IC-CoDE framework in a pediatric/young-adult pHS sample.

Everyday Functioning



Everyday Functioning Conclusions

Adaptive Behavior

- Self-report - above average overall, conceptual & social
- Informant – impaired overall & practical
- Blind spots about limitations in self-care, home living, and work
- No R vs L difference
- Reduced self-awareness of practical deficits may compound physical limits like hemiplegia or hemianopsia

Kowalski, Brown, Nolty, Panos, Jones & Paul (2025).
Epilepsy Research

Executive Function

- Overall – typical range
- Self-rating is high on self-monitoring (especially for R pHS)
- Initiation is blind-spot
- Higher FSIQ self-reported more impairment, lower reported less
- Suggests strong, genuine long-term functional compensation — not just optimistic self-report

Panos, Brown, Kowalski, Nolty, Jones & Paul (in prep)

Summary

Cognitive outcome after pediatric hemispherectomy looks stable over time — and the side of surgery matters.

A single brain hemisphere can support average everyday executive functioning in adulthood.

Gap between self- and informant-perception is most notable in everyday practical living.

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