

# White matter tract density index predicts post-stroke acute severity

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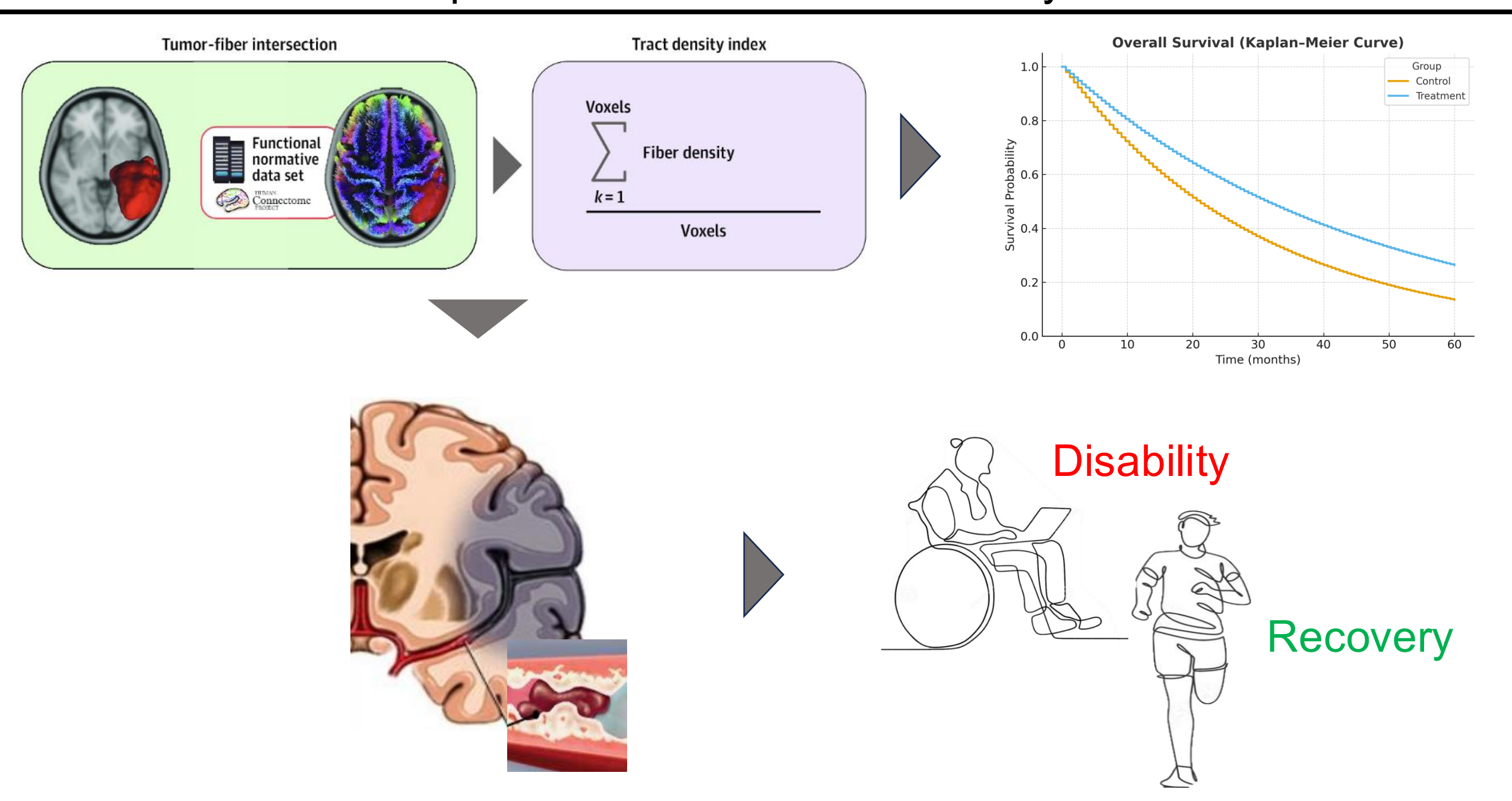


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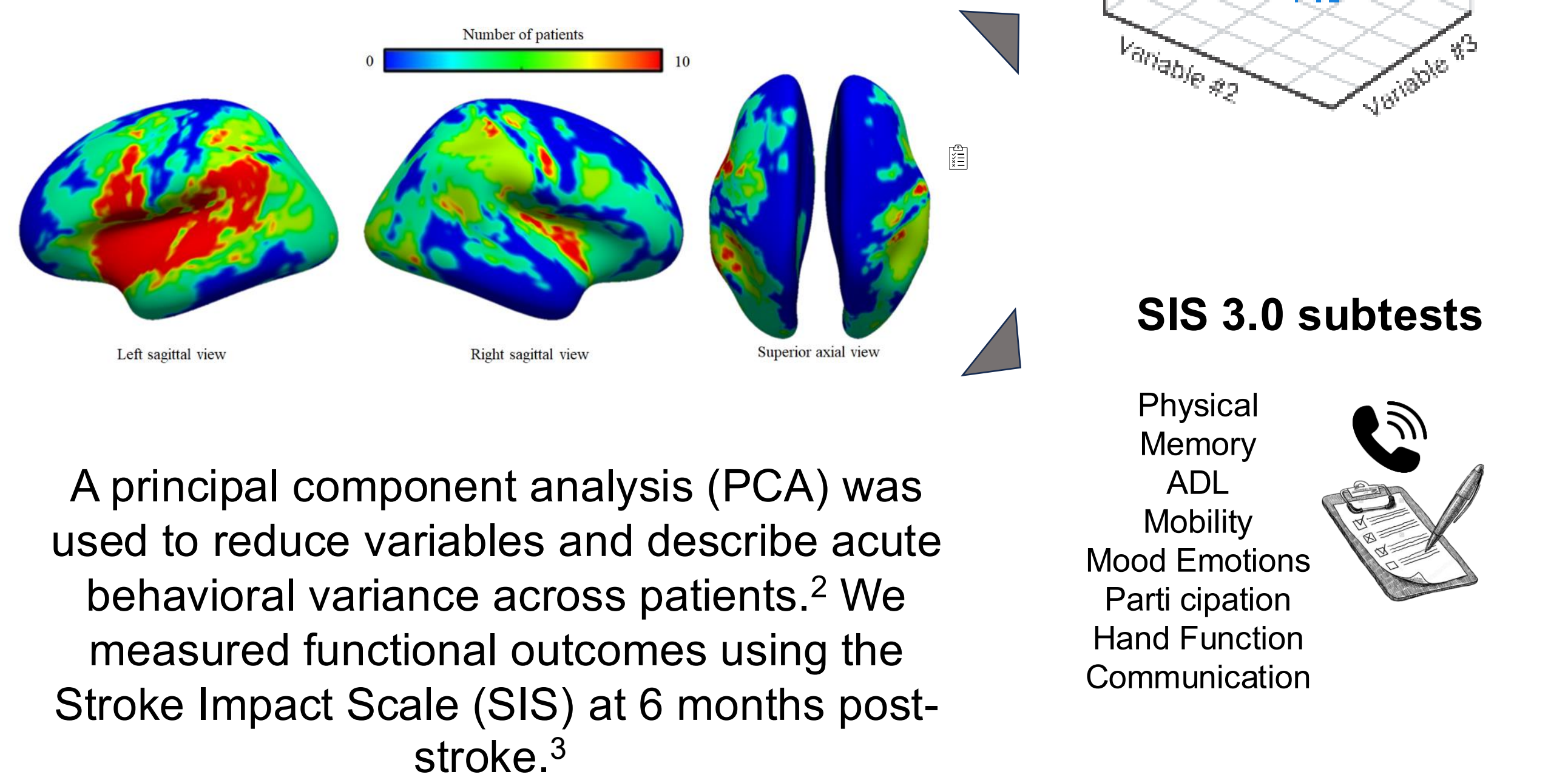
## INTRODUCTION

**Post-stroke disability** is observed in around 40% of survivors. The prediction of recovery trajectories remains an open clinical challenge. A new metric, namely the **tract density index (TDI)**, has been explored as a prognostic marker in glioblastoma, demonstrating strong associations with patients' survival.<sup>1</sup> TDI represents a local measure of white matter damage. We investigated whether TDI could serve as a predictive biomarker following acute stroke by assessing its relationship with acute severity, behavioral profiles and functional recovery.



## METHODS

We recruited a cohort of **first-time stroke** patients. We collected structural scans for acute lesions that were manually segmented. TDI values were computed as the number of fibers encompassing the lesions registered to a normative template.

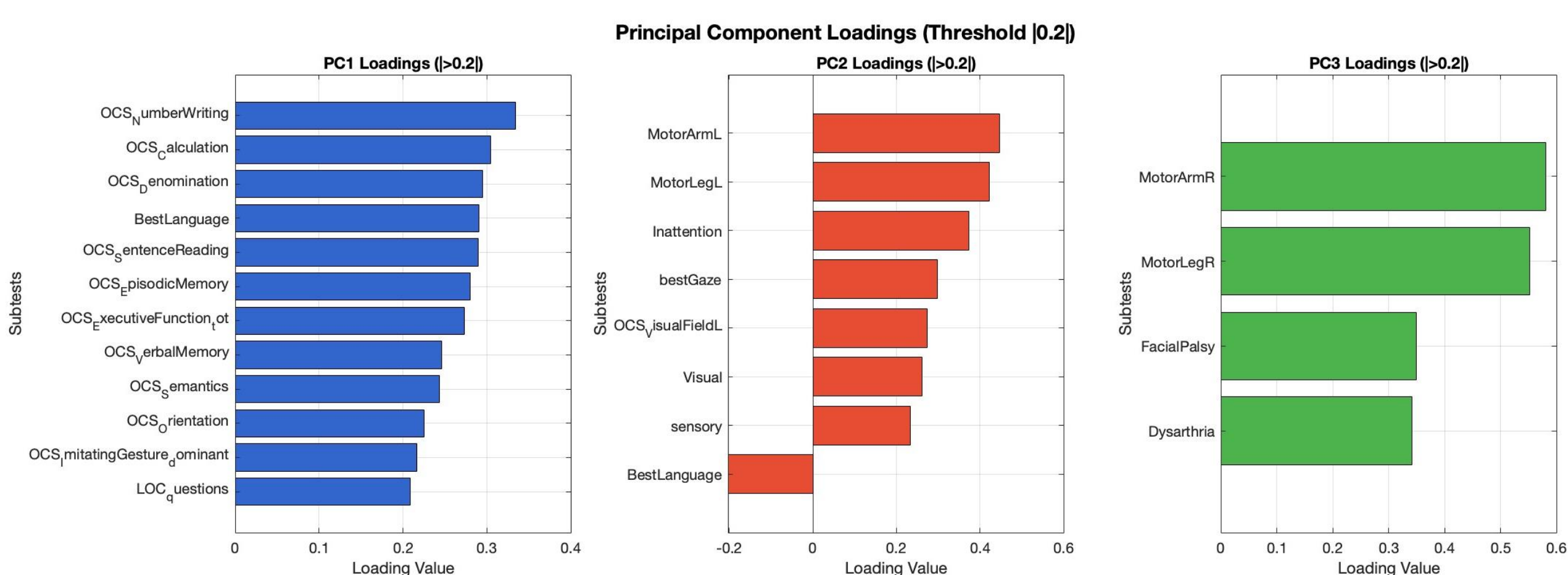


A principal component analysis (PCA) was used to reduce variables and describe acute behavioral variance across patients.<sup>2</sup> We measured functional outcomes using the Stroke Impact Scale (SIS) at 6 months post-stroke.<sup>3</sup>

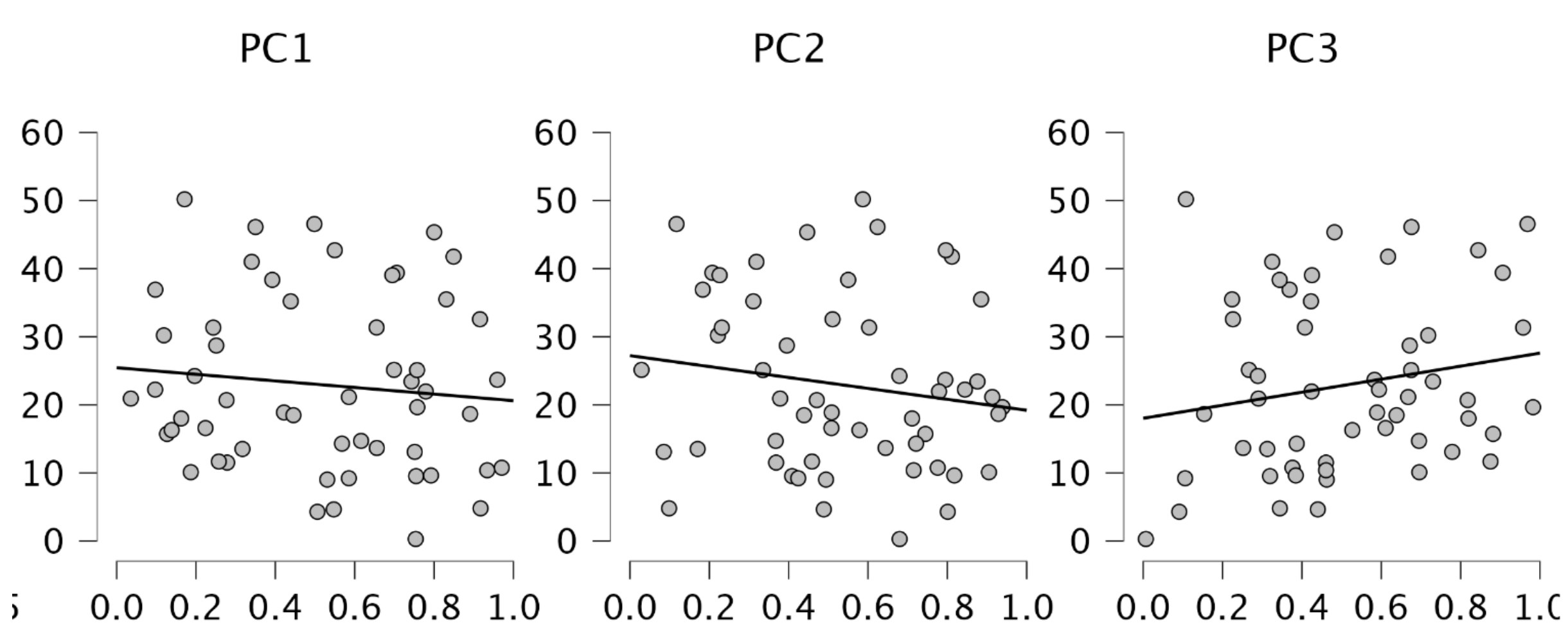
## RESULTS

We included **n=74** stroke patients.

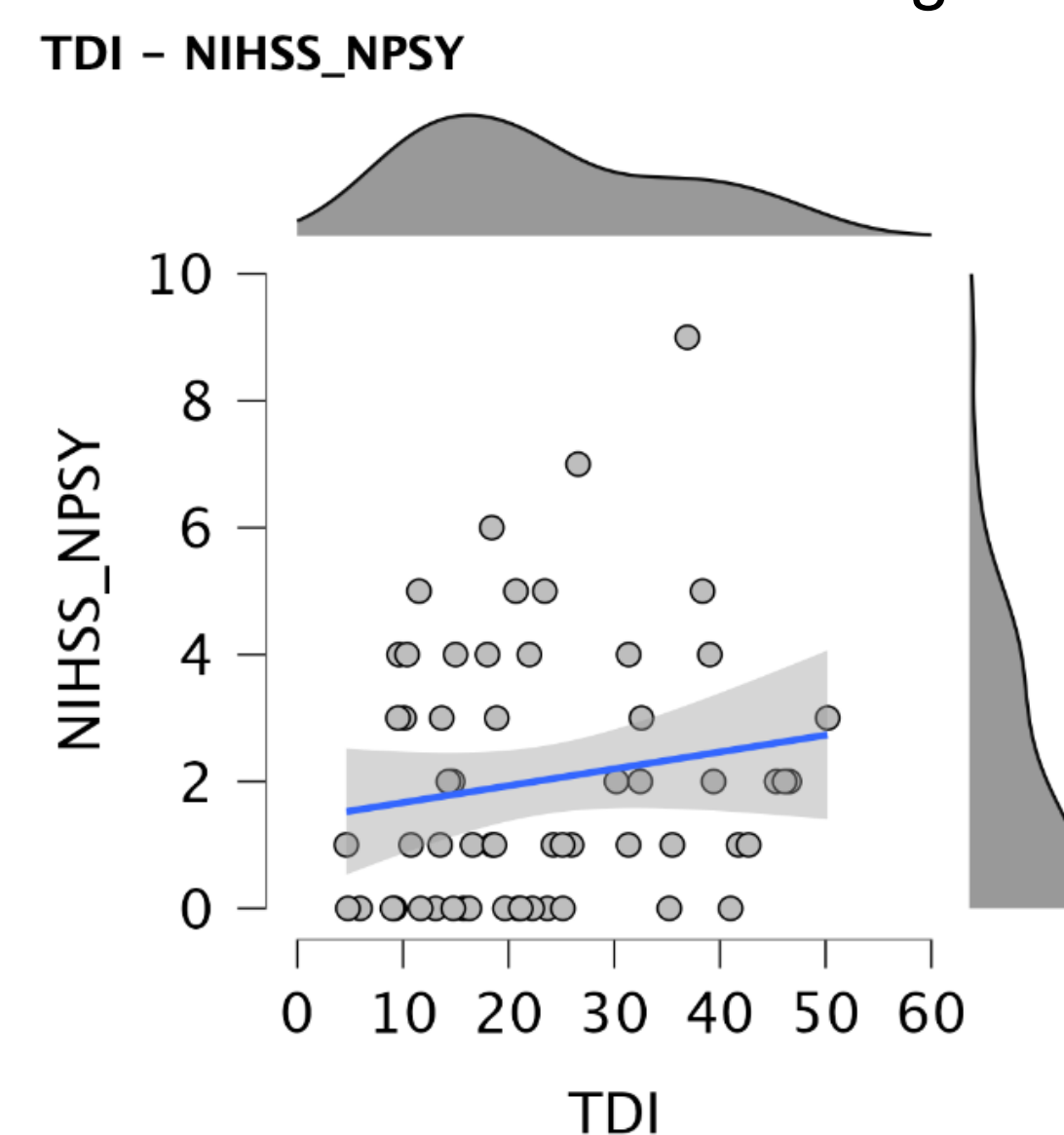
Three PCs explained around 50% of the sample variance. PC1 loaded on language, calculation, praxis and memory deficits; PC2 loaded on left motor, visual and spatial neglect deficits; PC3 loaded on right motor and neglect deficits.



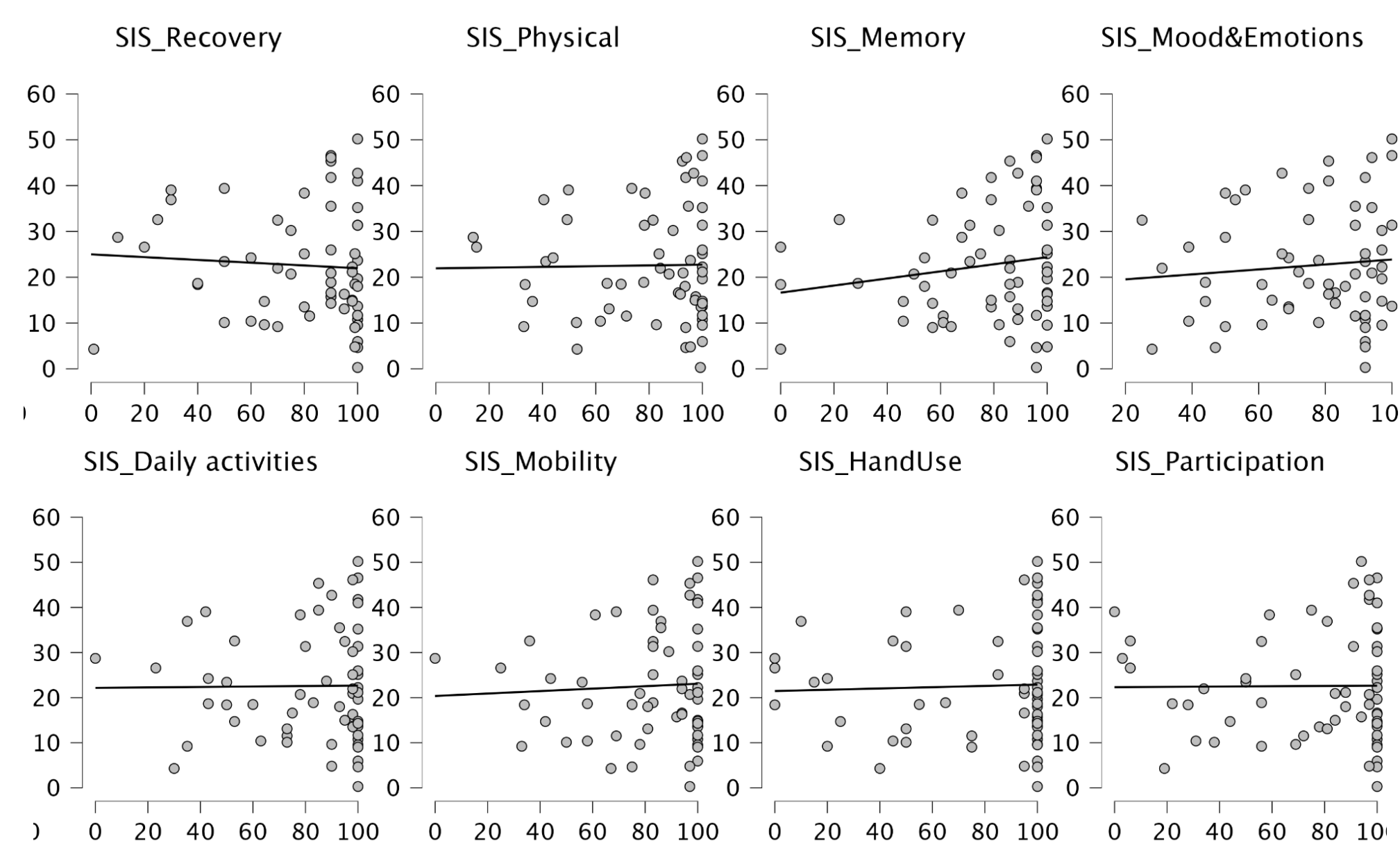
**No significant correlation of TDI with PCA-derived scores** emerged. After correction for lesion volume and age.



**TDI showed a significant partial correlation with acute stroke severity** measured using the NIHSS ( $r=0.355$ ,  $p=0.007$ ). The analysis was corrected for lesion volume and age.



**No significant correlation of TDI with SIS subtests** emerged. After correction for lesion volume and age.



## DISCUSSION

- Our findings indicate that TDI was associated with post-stroke severity.
- No significant associations were found with specific behavioral deficits and/or recovery.
- These results suggest that this metric may reflect a reliable measure of structural damage acutely, while recovery does not seem to relate with the degree of fibers affected by the lesion.

## REFERENCES

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2. Bisogno, A. L. *et al.* A low-dimensional structure of neurological impairment in stroke. *Brain Commun* 3, (2021).
3. Vellone, E. *et al.* Quality of life in stroke survivors: first results from the reliability and validity of the Italian version of the Stroke Impact Scale 3.0. *Ann Ig* 22, 469–79.