

The Association Of The Global Pittsburgh Sleep Quality Index With Diffusion Tensor Imaging Metrics In A Normal Ageing Population

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- Individuals with higher Global PSQI (worse sleep quality) exhibited lower ALPS, lower NDI, and mixed FA, MD, and nodal clustering scores.
- Association between PSQI and DTI metrics varied across regions of interest (ROI).
- In total, 18 studies with 2916 subjects were included in this systematic review.

INTRODUCTION

- Sleep deprivation impacts 33.2% of US adults. Thus, it is pertinent to delineate associations between sleep quality and cognitive decline via microstructure imaging markers.
- Past studies are specific to sleep-related pathologies, making it difficult to draw population-wide conclusions.
- PSQI Global is a subjective measure of sleep quality ranging from 0-21, with >5 defining "poor" sleepers.
- DTI is an MRI water diffusion modality, categorized into MD, FA, and ALPS. This paper also included NODDI NDI and DTI-derived connectomics.
- Thus, we examined existing correlation reports between PSQI and MD, FA, ALPS, and NDI for a population-wide summary on the relationship between sleep quality, glymphatic function, and white matter (WM) integrity.

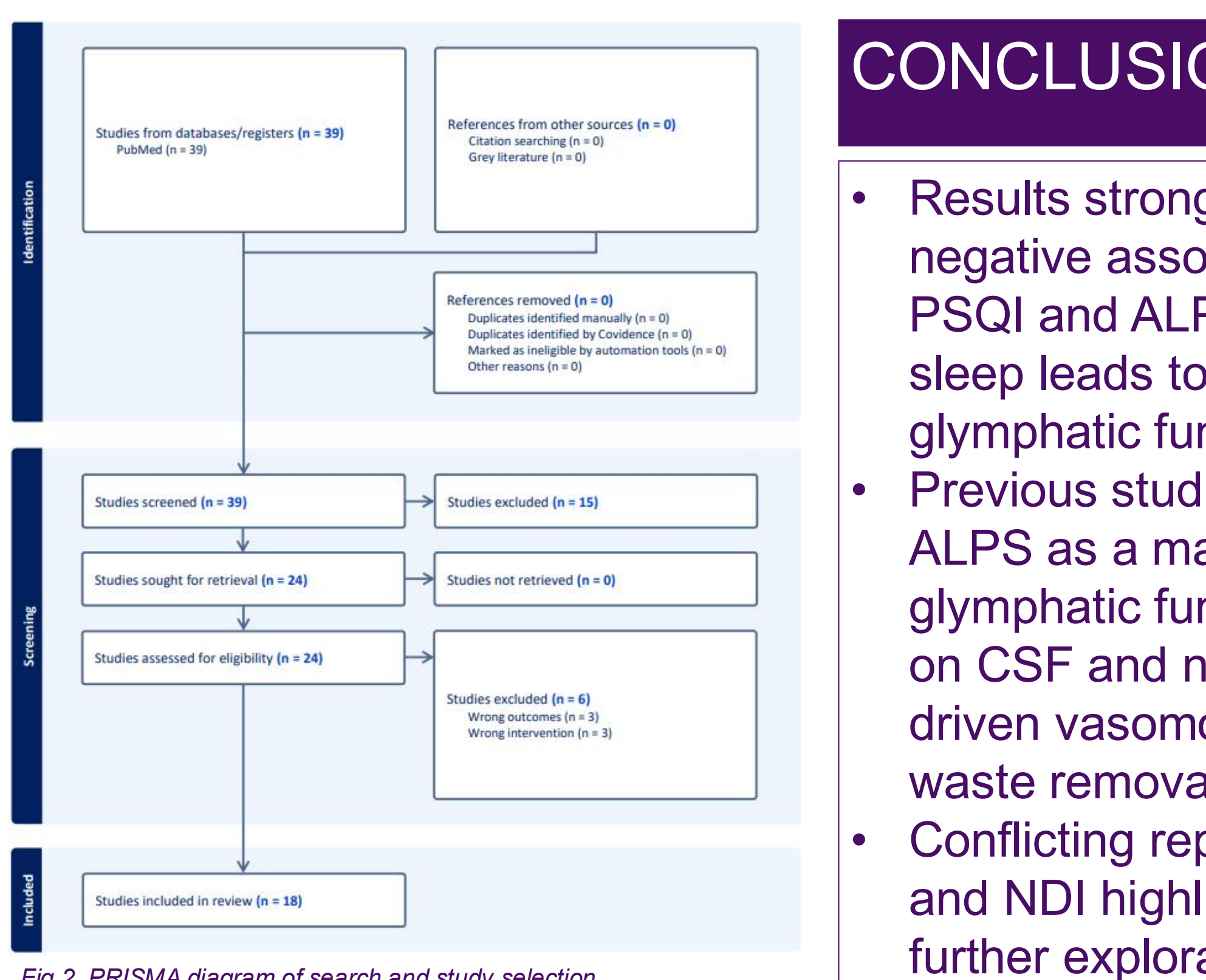
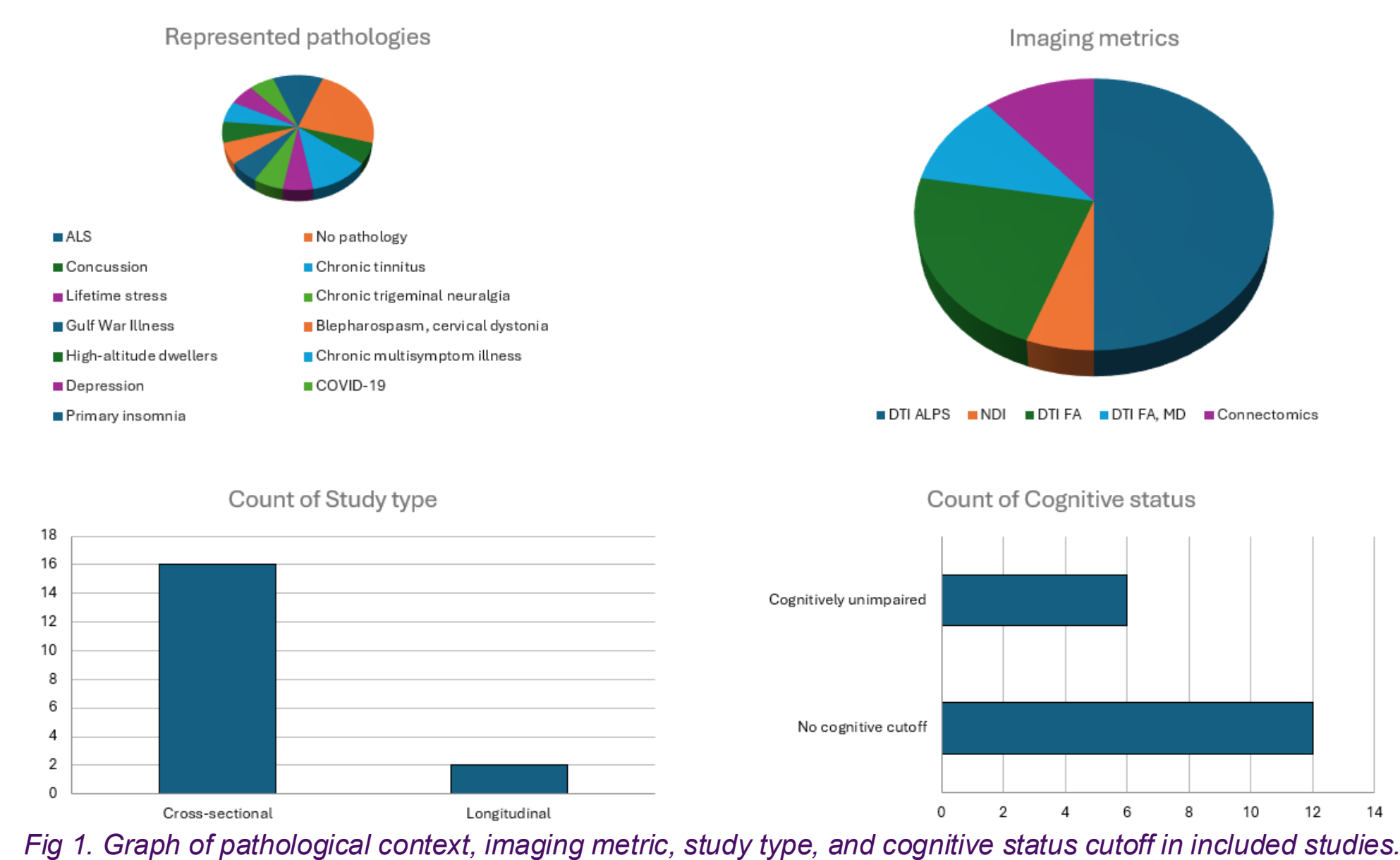
METHODS

- Followed PRISMA guidelines
- J.H. systematically screened PubMed up to August 2025 for studies reporting PSQI vs ALPS, FA, MD, NDI, ODI, ISOVF, or DTI-derived networks.
- E.M. provided second review.
- Search results screened twice via Covidence.
- In longitudinal studies, only cross-sectional or baseline data were extracted.

("Pittsburgh Sleep Quality Index"[Title/Abstract] OR PSQI) AND (DTI OR "diffusion tensor imaging" OR FA OR "fractional anisotropy" OR "mean diffusivity" OR NODDI OR ISOVF OR NDI OR ODI OR "DTI-ALPS") AND (sex OR gender OR "male and female") NOT ("case reports"[pt] OR review[pt]) AND ("2014/01/01"[Date - Publication]: "2025/08/06"[Date - Publication]).

RESULTS

- 16 cross-sectional and 2 longitudinal studies were included (Fig 2).
- Studies were conducted in various pathological and non-pathological contexts (Fig 1).



CONCLUSION

- Results strongly support negative association between PSQI and ALPS (worsening sleep leads to decreased glymphatic function).
- Previous studies highlight the ALPS as a marker for glymphatic function, which relies on CSF and norepinephrine-driven vasomotion for metabolic waste removal during NREM.
- Conflicting reports on MD, FA, and NDI highlight the need for further exploration of

region-specific PSQI vs WM integrity relationship. Limitations include:

- PSQI does not correlate to objective sleep measures such as PSG or actigraphy
- Recent reviews show it is difficult to link ALPS with glymphatic function.
- Various contexts and cognitive cutoffs of included studies increase difficulty of comparing data.

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