At the Intersection of PTSD, Sleep Disturbance, and Neurocognitive Risk: A Scoping Review

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INTRODUCTION

Posttraumatic stress disorder (PTSD) is associated with cognitive decline and neurological changes, yet literature linking PTSD to later-life neurocognitive risk (NCR) remain fragmented across disciplines (Desmarais et al., 2020). Sleep disturbance is a core feature of PTSD and is also independently associated with NCR (Mohlenhoff et al., 2018). Collectively, existing findings suggest that sleep disturbance may be relevant to NCR among individuals with PTSD; however, these associations have not been examined within an integrated framework to inform research or clinical practice. **Thus, the purpose of this scoping review is to examine how PTSD, sleep disturbance, and NCR are defined, measured, and analyzed in published literature.** This work aims to synthesize current findings and offer recommendations for future research and clinical practice.

RESEARCH QUESTIONS

This scoping review aimed to address the following questions:

1. How are PTSD, sleep disturbances, and NCR defined?
2. How are these constructs measured across studies?
3. What relationships are being investigated?
4. What do studies report about those relationships?

METHODS

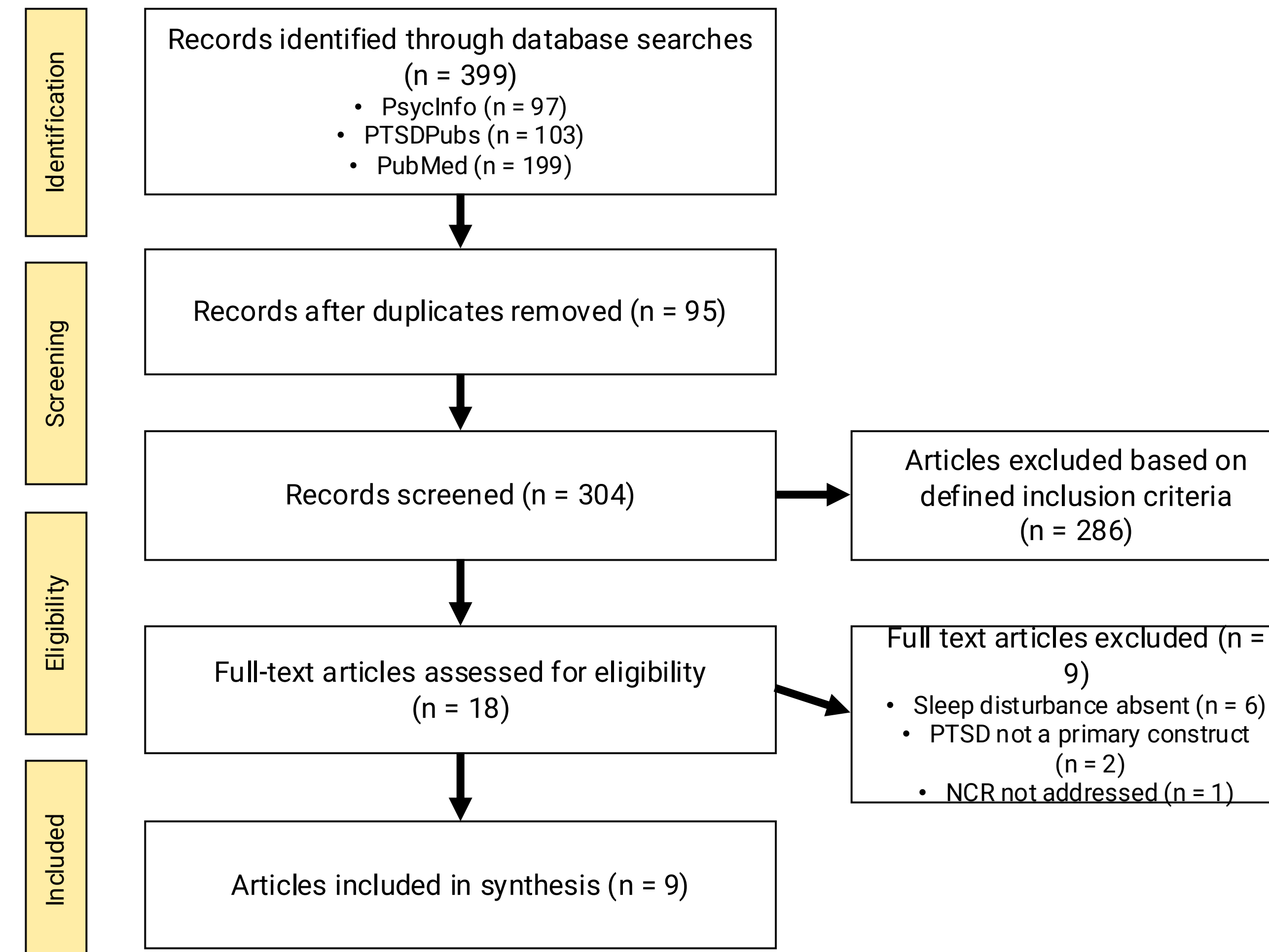
DESIGN

- Followed PRISMA-ScR guidelines (Tricco et al., 2018)
- Used a deductive narrative approach

SEARCH STRATEGY

- **Databases:** PsycINFO, PubMed, PTSDpubs
- **Search terms:** (PTSD OR "posttraumatic stress disorder") AND (sleep OR "sleep disturbance*" OR insomnia OR "slow-wave sleep" OR "sleep fragmentation" OR "REM sleep" OR RBD OR "trauma-associated sleep disorder") AND (dementia OR neurodegenerat* OR "Alzheimer's disease" OR "neurocognitive disorder*" OR "cognitive impairment").
- **Inclusion Criteria:**
  - Study must meaningfully address all three constructs (PTSD, sleep disturbance, and NCR)
  - PTSD must be diagnosed or clearly defined as a primary construct; subthreshold PTSD excluded
  - English-language, peer-reviewed articles
- **Exclusion Criteria:**
  - PTSD as incidental/not primary construct
  - TBI without explicit PTSD focus

PRISMA-ScR DIAGRAM



RESULTS

STUDY CHARACTERISTICS

- N = 9 articles (6 empirical, 3 conceptual)
- Most empirical studies were cross-sectional (n = 5)
- Among studies that reported demographic data, samples were predominantly Veterans (86.6%), male (86.6%), and White (87.8%)
- Small sample sizes; limited reporting of race/ethnicity

RQ1: HOW ARE PTSD, SLEEP DISTURBANCE, AND NCR DEFINED?

Construct	Empirical studies:	Conceptual papers:
PTSD	• Meets threshold on validated diagnostic screeners DSM-5 (n = 5) • Clinician interview, DSM-5 (n = 1)	• DSM-IV/5 criteria (n = 3)
Sleep disturbance	• Poor sleep (n = 3) • Sleep disorder (n = 3)	• Deprivation/fragmentation (n = 2) • Decreased slow-wave sleep (n = 1)
NCR	• All inferred via proxy indicators: autonomic (n = 2), cognitive (n = 2), structural (n = 2), parasomnia phenotypes (n = 2)	• Vulnerability to Alzheimer's disease (n = 1) • All-cause dementia (n = 1) • Neuroprogression (n = 1)

RESULTS (cont.)

RQ2: HOW ARE THESE CONSTRUCTS BEING MEASURED?

- **PTSD:** PCL-5 (n = 5); CAPS (n = 1)
- **Sleep disturbance:** Polysomnography (PSG; n = 4), autonomic measures (HRV, BP regulation; n = 2), self-report sleep measures (n = 2) (supplemental, not primary measures)
- **Neurocognitive risk:** Physiological/biological markers alone (n = 2). neuroimaging (n = 2), cognitive + motor performance batteries (n = 2), multiple-indicator NCR composites (n = 2)

RQ3: WHAT RELATIONSHIPS ARE BEING INVESTIGATED?

- **Stepwise Models** (n = 5 empirical):
  - Analyses were fragmented (e.g., PTSD → sleep problems, then sleep problems → NCR).
  - Temporal ordering was assumed but not tested.
- **Triadic Models** (n = 1 empirical, 3 conceptual): Integrated empirical or conceptual models examining all three variables together; all position sleep as a mediator linking PTSD to NCR.

RQ4: WHAT DO STUDIES REPORT ABOUT THOSE RELATIONSHIPS?

- **PTSD linked with more severe sleep disturbances** (RBD, RSWA, fragmented SWS).
- **PTSD and sleep disturbance are independently associated with higher NCR** (autonomic dysregulation, poorer cognitive/motor performance, and structural brain changes).
- **One triadic study found sleep partially mediates** association between PTSD and NCR.

DISCUSSION

- **PTSD, sleep disturbances, and NCR consistently co-occur,** but most empirical studies use pairwise or inferred relationships leaving mechanisms and directionality; conceptual consistently propose sleep as intermediary.
- **Definitions and measures vary widely across studies,** limiting comparability and coherence.
- **Samples lack demographic diversity** (mostly White, male Veterans).
- **Implications for practice:** Routine, structured sleep assessment in PTSD care (e.g., for insomnia, RBD/RSWA, and fragmented sleep) may help clinicians identify early cognitive or physiological vulnerabilities even though causal pathways remain untested.
- **Implications for research:** Future work needs longitudinal, diverse, multimodal designs to test integrated pathways and clarify how specific PTSD-related sleep disturbances relate to specific NCR indicators.

REFERENCES & CONTACT

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