**ADNI Variables and Sleep-Cognition Relationships**

* 1. **ADNI Cognitive Composite Scores**

Scores are taken from Memory, Executive function, visuospatial function, and Language

ADNI\_MEM:

Derived from multiple memory assessments like RAVLT, immediate and delayed recall, Logical memory, and MMSE orientation items.

Z-scores calculated relative to CN baseline participants, allowing for direct comparison.

Episodic memory decline being the most sensitive cognitive marker.

ADNI\_EF:

Incorporates Trail making test part B, Digital symbol substitution test, and category fluency (Animals and vegetables)

Measures working memory, cognitive flexibility, processing speed and set-shifting abilities.

Dysfunction emerges in MCI the most.

ADNI\_EF2:

Was added in 2020, because original EF and the LAN scores both included animal and vegetable fluency categorized as language items in LAN. EF included animals and vegetable fluency as indicators of EF and EF2 does not include those 2 items. EF2 also adds MoCA items that were not administered during ADNI1 and thus not incorporated in EF.

ADNI\_VS:

Includes clock drawing test, MMSE visuospatial items, and potentially constructional praxis tasks.

Spatial processing, visual construction, and perceptual organization

**ADNI\_MEM (Memory Composite):**

**Development and Validation Studies:** Crane et al. (2012): "We sought to develop and evaluate a composite memory score from the neuropsychological battery used in the Alzheimer's Disease (AD) Neuroimaging Initiative (ADNI). We used modern psychometric approaches to analyze longitudinal Rey Auditory Verbal Learning Test (RAVLT, 2 versions), AD Assessment Schedule - Cognition (ADAS-Cog, 3 versions), Mini-Mental State Examination (MMSE), and Logical Memory data to develop ADNI-Mem, a composite memory score."

**Sleep-Memory Relationships:** Mecca et al. (2018): "Sleep disturbance was not associated with decline in memory, executive function, or global cognition" in their analysis of 1,629 adults with up to 24 months of follow-up from ADNI.

A neuroimaging study reported: "Though sleep disturbance constitutes the risk factor for Alzheimer's disease (AD), the underlying mechanism is still unclear. This study aims to explore the interaction between sleep disturbances and AD on brain function."

**ADNI\_EF (Executive Function Composite):**

**Composite Development:** Gibbons et al. (2012): "The Alzheimer's Disease Neuroimaging Initiative (ADNI) measures abilities broadly related to executive function (EF), including WAIS-R Digit Symbol Substitution, Digit Span Backwards, Trails A and B, Category Fluency, and Clock Drawing."

**Sleep-Executive Function Relationships:** Mecca et al. (2018) found: "Sleep disturbance was not associated with decline in memory, executive function, or global cognition."

**ADNI\_LAN and ADNI\_VS (Language and Visuospatial Composites):**

**Composite Validation:** Choi et al. (2020): "ADNI-Lan and ADNI-VS may be useful composites for language and visuospatial functioning in ADNI."

**Sleep Relationships:** Limited specific literature exists on relationships between sleep disturbances and language or visuospatial abilities in ADNI cohorts.