Examining How Naturalistic Sleep Loss Modulates Performance: Interactions of Brain Networks and Social Networks

S&T Campaign: Human Sciences
Human Behavior
Human Variability

Jean Vettel & Steven Thurman
(410) 278-7431, jean.m.vettel.civ@mail.mil
steven.m.thurman3.civ@mail.mil

Research Objective

To identify the relationship between individual differences and behavioral changes over time and develop quantitative models to predict performance in realistic tasks and environments.

To understand how naturalistic sleep loss across time scales (days/weeks/months) can influence emotion, social decisions, and team performance.

To develop a framework to evaluate and track naturalistic behavior longitudinally with minimally invasive sensors (wearables, phone apps).

Challenges

Developing individualized models to predict performance over various time scales.

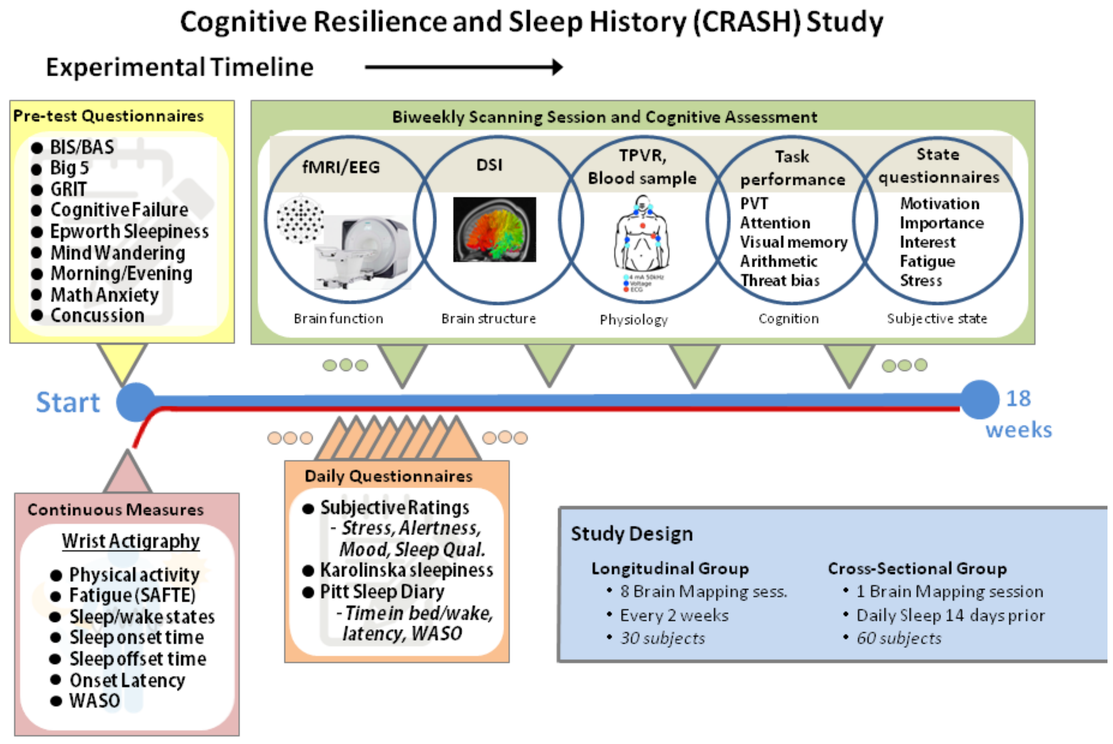
Merging and interpreting data on inherently different timescales from multiple, distinct sources (fMRI/EEG, dMRI, eye tracking, cardiac physiology, blood/saliva, daily sleep, behavior performance).

Actigraphy is a minimally intrusive wrist-worn device that infers sleep/wake states from patterns of activity and inactivity continuously over time.

ARL Facilities and Capabilities Available to Support Collaborative Research

Unique longitudinal data set already collected

- 16 weeks of sleep history with biweekly performance and multimodal brain imaging



Unique expertise in network science methods

- Neural dynamics, social networks, etc.

Unique access to facilities and collaboration

- DoD Supercomputing Resource Center
- Broad network of academic partners

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

Expertise in using sensors to track naturalistic behavior and extracting statistical features for modeling/predicting outcomes.

Background in applied or occupational sleep research with an emphasis on the challenges of measuring sleep outside the laboratory.

Deep understanding of task space to probe social behavior, emotional processes, decision making, and risk assessment.