

**Conclusion:** In this sample of young adults, sleep dosages ending in the morning (at 11:30) appear to provide considerable protection against cumulative performance deficits from sleep restricted to 4h-6h/day over 10 days, suggesting that the afternoon circadian promotion of wakefulness can sustain behavioral alertness even over multiple days of repeated sleep restriction.

**Support:** NIH grants R01-NR04281 and M01-RR00040

### 0301

#### DIFFERENT INDICES OF VIGILANT ATTENTION DURING SLEEP DEPRIVATION: EVIDENCE OF MULTIPLE VIGILANCE CONSTRUCTS?

Lawrence-Sidebottom, D.<sup>1,2,3</sup> Hinson, J. M.<sup>1,4</sup> Whitney, P.<sup>1,4</sup> Honn, K. A.<sup>1,2</sup> Van Dongen, H.<sup>1,2</sup>

<sup>1</sup>Sleep and Performance Research Center, Washington State University, Spokane, WA, <sup>2</sup>Elson S. Floyd College of Medicine, Washington State University, Spokane, WA, <sup>3</sup>Neuroscience graduate program, Washington State University, Pullman, WA, <sup>4</sup>Department of Psychology, Washington State University, Pullman, WA.

**Introduction:** Total sleep deprivation (TSD) causes profound vigilant attention deficits, with large, trait-like individual differences, as evidenced convincingly by response lapses on the psychomotor vigilance test (PVT). There is debate, however, about the role of vigilant attention deficits in the effects of TSD on other speeded performance tasks besides the PVT. We addressed this issue by testing whether PVT response lapses are related to delays in responding to stimuli under strict deadlines in two decision making tasks.

**Methods:** N=54 healthy adults (aged 21-38y; 31 females) completed an in-laboratory TSD study. Following a 10h baseline sleep opportunity, cognitive testing occurred after 25h and 29h of TSD (09:00 and 13:00). Testing included an AX continuous performance task with switch (AX-CPTs), which is a dynamic decision making task requiring subjects to respond to a frequently occurring cue-probe combination; an identical pairs continuous performance task (CPT-IP), which is a 1-back go/no-go task; and a 10min PVT. Lapses (RTs>500ms) on the PVT and target accuracy on the AX-CPTs and CPT-IP were calculated as indices of vigilant attention. Intraclass correlation coefficients (ICCs) were used to quantify the stability of individual differences, and absolute rank-order correlation ( $|\rho|$ ) was used to compare the three indices.

**Results:** The stability of individual differences ranged from fair to substantial (PVT: ICC=0.44; AX-CPTs: ICC=0.73; CPT-IP: ICC=0.31). The rank-order correlation between the AX-CPTs and CPT-IP vigilant attention indices was relatively high ( $|\rho|=0.44$ ), whereas correlations with PVT lapses were much lower (AX-CPTs:  $|\rho|=0.14$ ; CPT-IP:  $|\rho|=0.04$ ).

**Conclusion:** Individual differences during TSD were moderately stable for each index of vigilant attention, but the relationships between PVT lapses and the other indices were weak. This suggests that any or all of the indices considered here are not pure measures of vigilant attention, or that vigilant attention may constitute multiple, distinct constructs.

**Support:** CDMRP grant W81XWH-16-1-0319

### 0302

#### ONE WEEK OF RECOVERY SLEEP IS INSUFFICIENT TO RESTORE SUSTAINED ATTENTION PERFORMANCE FOLLOWING THREE WEEKS OF CHRONIC SLEEP RESTRICTION

Yuan, R. K.<sup>1,2</sup> Zitting, K.<sup>1,2</sup> Vujovic, N.<sup>1,2</sup> Wang, W.<sup>1,2</sup> Buxton, O.<sup>1,2,3</sup> Williams, J. S.<sup>1,2</sup> Czeisler, C. A.<sup>1,2</sup> Duffy, J. F.<sup>1,2</sup>

SLEEP, Volume 43, Abstract Supplement, 2020

<sup>1</sup>Brigham and Women's Hospital, Boston, MA, <sup>2</sup>Harvard Medical School, Boston, MA, <sup>3</sup>Pennsylvania State University, University Park, PA.

**Introduction:** Sleep loss negatively impacts many aspects of neurobehavioral performance, including sustained attention and reaction times. However, the time course of recovery from chronic sleep restriction (CSR) is not well understood. To explore this, we assessed the effects of 3 weeks of CSR followed by 1 week of recovery on psychomotor vigilance task (PVT) performance in healthy adults.

**Methods:** 8 healthy adults (27-71; 4f) participated in a 37-day inpatient study. The study consisted of 6 baseline (BL) days with 8-16 h time-in-bed, followed by 3 weeks of CSR (5-5.6h time-in-bed at night), and 1 week of recovery (RC; 8-10h time-in-bed). Sustained attention was assessed by 10-minute visual PVTs administered every 2h starting ~5h after wake (~4/day). Linear and generalized linear mixed models were used to compare average reaction times (RT) and number of lapses, respectively, from the last 3 days of baseline, CSR, and recovery.

**Results:** Average RT was almost twice as long at the end of CSR compared to baseline ( $p<0.0001$ ). Moreover, it remained significantly slower than baseline by roughly 173ms, even after 1 week of recovery ( $p<0.0001$ ). Similarly, there was a threefold increase in the number of lapses at the end of CSR compared to baseline ( $p<0.0001$ ) which remained elevated after one week of recovery ( $p<0.0001$ ).

**Conclusion:** One week of recovery sleep of 8-10 h/night following 3 weeks of chronic sleep restriction was insufficient for full recovery of sustained attention as assessed by PVT reaction time and number of lapses. This suggests that chronic sleep restriction has consequences on neurobehavioral performance that do not fully dissipate within one week.

**Support:** Study supported by P01AG009975 and conducted in the Brigham and Women's Hospital Center for Clinical Investigation, part of Harvard Clinical and Translational Science Center supported by UL1TR001102. KMZ supported by a fellowship from the Finnish Cultural Foundation. RKY supported by T32HL007901 and F32HL143893. NV supported by T32HL007901 and F32AG051325.

### 0303

#### HEART RATE AND SYSTOLIC BLOOD PRESSURE INCREASE DURING EXPERIMENTAL SLEEP RESTRICTION

Reichenberger, D. A. Strayer, S. M. Mathew, G. M. Buxton, O. M. Chang, A.

Pennsylvania State University, State College, PA.

**Introduction:** Experimental sleep restriction is associated with elevated daytime cardiac activity, including heart rate (HR) and blood pressure (BP). However, some studies have found changes in systolic (SBP) but not diastolic blood pressure (DBP) or found changes in neither. Although findings are mixed, there may be a dose-response effect of cumulative sleep loss on daytime cardiac activity, such that HR and BP increase above basal levels with additional nights of insufficient sleep. This study examined changes in cardiac activity during experimental sleep restriction.

**Methods:** We used multilevel models with random effects for individuals to analyze data from 15 healthy males (M=22.3 years old, SD=2.8) in an 11-day inpatient protocol consisting of three nights of 10-hour/night baseline sleep opportunity, five nights of sleep restriction (5-hour/night sleep opportunity), and then two recovery nights (10-hour/night sleep opportunity). HR and BP were measured approximately every two hours during wake.