

The Impact of Recovery Sleep Opportunity on Neurobehavioral Measures Following Chronic Sleep Restriction

Olga Tkachenko¹, Christopher W. Jones², Jeremy Allen², Siobhan Banks^{3,4}, Mathias Basner², David F. Dinges²

¹Department of Psychology, University of Pennsylvania, Philadelphia, PA, USA, ²Division of Sleep and Chronobiology, Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA, ³Centre for Sleep Research, University of South Australia, Adelaide, Australia, ⁴Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA



Introduction: Using a large cohort of experimentally sleep-restricted healthy adults, we examined whether recovery from chronic partial sleep restriction (SR) differed among neurobehavioral measures given varying doses of recovery sleep opportunity.

Methods: N=306 adults (21-50y, 46% female) had 2 baseline laboratory sleeps (BL1-2; 10h TIB), then randomization to either a control condition (10h TIB on all nights; n=28) or to 5 SR nights (SR1-5; 4h TIB) followed by randomization to 1 of 7 single-night recovery sleep opportunity conditions (R1; 0, 2, 4, 6, 8, 10, or 12h TIB; n=278). Performance outcomes included the Psychomotor Vigilance Test (PVT), the Digit Symbol Substitution Task (DSST), and subjective outcomes included the Karolinska Sleepiness Scale (KSS) and the fatigue subscale of the Profile of Mood States (POMS-F). Sleep physiology was recorded. Mixed model repeated measures analyses were used to compare changes in outcomes from baseline to post-recovery sleep dose (R1-BL2) between the sleep-restricted and control cohorts.

Results: After recovery sleep of less than 6h, SR subjects differed statistically from controls on all outcomes as measured by change from baseline to post-recovery sleep. With 6h TIB, SR subjects no longer differed from controls on the DSST and KSS. After 8h TIB, SR subjects did not differ from controls on the POMS-F. On the PVT, only subjects given 10 or 12h TIB on the recovery night were able to match performance with the control group.

Conclusion: There appears to be a premature perception of full recovery from sleep restriction evident in subjective ratings and cognitive throughput measures, despite continued deficits of attention.

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