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THE EFFECTS OF 53 HOURS OF SLEEP DEPRIVATION ON THE THERMOREGULATORY, HORMONAL, METABOLIC AND COGNITIVE RESPONSES OF YOUNG ADULT MALES TO RECOVERY FROM ACUTE COLD EXPOSURE (191 pp.)

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INTRODUCTION: While the physiological responses to acute cold exposure (ACE) have been examined, little research has been conducted examining the recovery aspect of acute cold exposure (ACE-REC) during the presence of additional physiological stressors such as sleep deprivation (SDEP). Examination of ACE-REC during SDEP warrants investigation to examine the afterdrop associated with ACE as this is the critical period when core temperature decreases and hypothermia may ensue. **PURPOSE:** To examine the effects of 53-hours of SDEP on the thermoregulatory, metabolic, hormonal and cognitive responses during ACE-REC from multiple bouts of ACE. **METHODS:** Eight healthy, Caucasian males (22.8 ± 1.7 y) completed a control trial (CON) during a normal night's sleep and an experimental trial during 53 hours of SDEP in which they were exposure to cold air (10°C) for 120-min, once per day for three consecutive days followed by 120min of ACE-REC in 25°C air. Blood samples were collected at baseline (BASE) and following 120min of ACE-REC to analyze epinephrine (EPI) and norepinephrine (NE). Cognitive function of the participants was assessed through a performance vigilance task (PVT). During ACE-REC, rectal temperature (Tre), mean

skin temperature (Tsk), thermal sensation (TS) and modified thermal sensation (TSM) were examined at BASE, 5min, 15min and every 15min thereafter for the duration of the ACE-REC. Aerobic metabolic rate (VO2) was measured at BASE, 15-min, 25-min and every 30-min thereafter for the duration of the ACE-REC. **RESULTS:** Condition by time repeated measures ANOVAs demonstrated a main effect for time ($p \leq 0.001$) for Tre, Tsk, VO2, TS and TSM for all stages of ACE-REC whereby Tre, VO2, and TSM decreased across time while Tsk, and TS increased across time. ACE-REC stage 3 demonstrated a condition by time interaction ($p \leq 0.001$) whereby Tre increased during SDEP. A random regression analysis indicated a significant relationship ($p \leq 0.001$) between EPI and Tre demonstrating that as EPI concentrations increased, Tre increased.

CONCLUSION: Based on the results of the investigation during ACE-REC, Tre was increased during SDEP conditions as compared to CON conditions after 53 hours of sleep deprivation. Alterations of the sleep-wake cycle through SDEP may have altered core temperature.