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Exercise,
Leisure,
and Sport

THE EFFECTS OF 53 HOURS OF SLEEP DEPRIVATION ON THE
THERMOREGULATORY, HORMONAL, METABOLIC AND COGNITIVE
RESPONSES OF YOUNG ADULT MALES TO MULTIPLE BOUTS OF ACUTE
COLD EXPOSURE (177 pp)

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INTRODUCTION: It is well established that acute cold exposure elicits a multitude of physiological responses (i.e., altered mean skin and rectal temperatures, oxygen consumption, etc.). Furthermore, it is well established that sleep deprivation decreases cognitive function. However, the relationship between sleep deprivation and the ability to thermoregulate during acute cold exposure remain relatively uncertain. Additionally, little research is available regarding the potential relationship between acute cold exposure, cognitive function and sleep deprivation thus rendering further investigation.

PURPOSE: To determine the effects of 53-hours of sleep deprivation on the thermoregulatory, hormonal, metabolic and cognitive responses of apparently healthy Caucasian males to multiple bouts of acute cold exposure.

METHODS: Eight males (22.8 ± 1.7 y) underwent 2 trials [control (CON) or sleep deprivation SDEP)] in which they were exposed to a cold air (10°C) for 120 min (or until $T_{re} < 35^{\circ}\text{C}$) on three consecutive days. Blood samples were taken at 0 and 120-min during cold exposure and analyzed for epinephrine (EPI) and

norepinephrine (NE). Cognitive function of the volunteers was also assessed with the use of the psychomotor vigilance task (PVT).

RESULTS: Repeated measures ANOVA revealed significant condition (CON, SDEP) x time interactions for rectal temperature (T_{re}) ($p=0.02$), mean skin temperature (T_{sk}) ($p=0.02$), thermal sensation (TS) ($p=0.05$), and modified thermal sensation (TSM) ($p=0.03$). ANOVA also revealed significant stage (ACE 1, 2, or 3) x time interactions for oxygen consumption (VO_2) ($p=0.05$) and TS ($p=0.02$). Furthermore, a significant difference in physical activity (PA) was observed between conditions ($p=0.00$). Random regression analysis revealed a significant relationship ($p=0.00$) between PA and T_{re} .

CONCLUSION: From these data, it may be suggested that SDEP increased baseline T_{re} . This response may be a result of either the physical activity or the increased state of alertness that occurred over the night hours when individuals typically sleep. Furthermore, it may be suggested that sleep deprivation alters the individual's perception of their environment, as volunteers demonstrated a higher T_{re} but reported feeling colder. Finally, it can be concluded that sleep deprivation decreases cognitive function, evident by the decreased performance of the volunteers on the PVT.