

LONG SHIFTS: ARE THE BREAKS IMPORTANT?

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Introduction

During bushfire suppression, Australian firefighters can be deployed to work long consecutive shifts, obtaining an average of 3-4 hours of sleep per night. While the effects of sleep restriction over multiple days on cognitive function are well established, less is known about the effect on physical performance. If physical performance is compromised, this may lead to impairments to firefighter health and safety, which may in turn adversely impact the collective emergency response. Therefore, the aim of this study was to examine the effects of sleep restriction on firefighters' physical work performance during simulated bushfire suppression.

Methods

Thirty-five firefighters were randomly allocated to either the control group (8-h sleep opportunity, n=18) or the sleep-restricted group (4-h sleep opportunity, n=17) and completed a 3-day simulated bushfire deployment.

Self-paced physical performance was evaluated in six fire agency validated firefighting tasks (Fig. 1), completed in a 55-min physical work circuit followed by a 65-min period without physical work (2-h work block). Five minutes were allocated to each task, with task-specific work-to-rest ratios. Physical performance was evaluated based on the number repetitions completed. On Day 1 (i.e., prior to the sleep intervention), firefighters completed three work blocks: one familiarisation work block, then two subsequent work blocks from which all measures were averaged to provide baseline values. Activity was measured continuously using a wrist located activity monitor.



FIGURE 1. Bushfire tasks performed during simulated bushfire suppression.

Results

There were no significant deleterious effects of sleep restriction on firefighters' physical performance during self-paced simulated firefighting work tasks, compared to the control condition. However, the sleep-restricted group were less active during periods of rest compared to the control group as evidenced by lower activity counts during the physical work circuit and non-physical work period (Fig. 2).

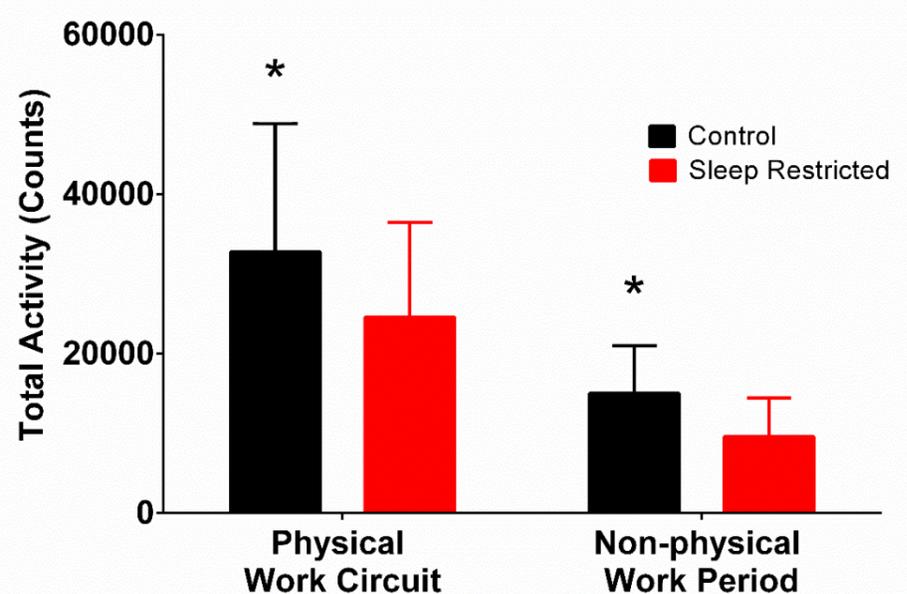


FIGURE 2. Activity Counts during the physical work circuit and rest periods (Days 2 and 3). Data is presented as mean \pm SD. Significance is denoted * ($P < 0.05$).

Discussion

Under self-paced work conditions, 4 h of sleep restriction did not adversely affect firefighters' performance on physical work tasks. However, between-group differences in activity counts were apparent. This may indicate that sleep-restricted individuals conserved effort during periods when movement was inessential to bushfire suppression task completion i.e. during the rest periods within the physical circuit or the non-physical work period. This behavioural adaptation may have enabled sleep-restricted participants to maintain similar physical performance standards to the control participants.

This work should reinforce to fire agencies and crew management staff the importance of encouraging frequent rest breaks during long fire suppression shifts. Further research should be conducted during actual fire suppression to confirm these findings.

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