

THE INTERACTIONS OF PHYSICAL WORK, SLEEP DEPRIVATION AND STRESS RESPONSES

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Overview:

- Firefighters are exposed to various work demands, including:
 - Physical work ¹
 - Sleep deprivation ¹,
- Work demands can elicit physiological and psychological stress responses ²
- Individually, physical work and sleep deprivation can induce adverse stress responses, including:
 - ✓ Depressed mood ³
 - ✓ Sickness behaviours ⁴
 - ✓ Weakened immune system ^{2, 4, 5}
- No research has investigated the combined effect physical work and sleep deprivation has on firefighters' stress responses
- Understanding the combined effect of work demands on firefighters' stress is a priority for fire agencies world wide



Proposed Methods:

- Firefighters will participate in:
 - Control condition (i.e. no work and 'normal' sleep opportunity)
 - 4-day firefighting work simulation (i.e. 'normal' sleep opportunities between shifts)
 - Extended wakefulness condition (i.e. 4-day work simulation with shortened sleep opportunities between shifts)
- Stress responses will be measured during each condition using:
 - Biological markers (e.g. Cortisol and Cytokines)
 - Questionnaires



Participant wired up with electrodes that monitor sleep



Obtaining sample for assessment of stress markers in blood



Simulated firefighting work task

Specific Research Questions:

- What are firefighters stress responses (e.g. changes in mood, behaviour and immune function) during and following simulated firefighting work compared to control conditions?
- Do firefighters stress responses to repeated bouts of physical firefighting work performed over a single shift differ significantly to their stress responses following consecutive shifts?
- Do shortened sleep opportunities between work shifts affect firefighters stress responses across consecutive shifts of firefighting work?

Industry Implications:

- Previous research in other services have reported greater immune, behavioural and mood disturbances in response to demanding work ^{2, 4, 6}
- This research will;
 - Provide fire agencies with their first insight into the possible effects extended fire ground deployment has on firefighters' stress responses
 - Determine if agencies need to take further action to protect firefighters from adverse physiological and psychological stress responses

1. Aisbett B et al. "Awake, smoky, and hot": Providing an evidence-base for managing the risks associated with occupational stressors encountered by wildland firefighters. 2012.

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3. Kajtna T, et al. Effect of acute sleep deprivation on concentration and mood states with a controlled effect of experienced stress.2011.

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