

# THE EFFECT OF EXTREME HEAT ON THE PERFORMANCE OF A SIMULATED FIREFIGHTING TASK

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## BACKGROUND

The world is getting warmer, and the number of 'extreme' heat events occurring worldwide is increasing. This past summer was the hottest on record in Australia, with almost all states and territories experiencing days in excess of 45°C. This increase in the number of extreme heat days has led to the subsequent lengthening of the annual bushfire 'season'. This has severe implications for our firefighting population.

Performing physical work under such environmental conditions has been shown to be dangerous, and potentially even fatal, for firefighting personnel. If, as predicted, fire seasons are going to be prolonged and even more severe, Australia's firefighters will be exposed to such hazardous conditions on a more regular basis.

To date, there is very little research investigating the effect of such extreme temperatures on firefighters' physical health and wellbeing. Further, no previous research has quantified the effect that performing fire suppression work in such temperatures has on firefighters' work output.

Understanding the impact of extreme heat on work performance is vital for fire agencies in managing their resources and ensuring a fire is controlled as efficiently and safely as possible. Further, understanding the level of physiological stress experienced by firefighters in this situation would allow the fire industry to implement strategies to minimize the risk of heat-illness on the fireground.



## METHODOLOGY

In order to most accurately assess the effect of extreme temperature on firefighters' work performance and physiology, this research will be conducted in a climate chamber (at Deakin University). Firefighters will be asked to participate in two x three-hour sessions, one at 33°C and one at 45°C.

- Firefighters will perform a simulated rakehoe task, interspersed with a low-intensity stepping task, to simulate the varied-intensity work profile of bushfire suppression
- Core temperature, skin temperature, and heart rate will be recorded continuously throughout testing
- Pre- and post- testing body weight will be recorded (and adjusted for ingested and expelled liquids) to determine sweat loss. Any urine will be analysed to determine hydration status.
- Participants will also provide ratings of perceived exertion and thermal sensation during the physical work periods

## FINDINGS?

This research will build upon the 'Awake, Smoky, Hot' project, which assesses the differences in firefighter performance and physiology between 18°C and 33°C.

## HOW WILL THIS HELP AGENCIES?

- Work output: will allow agencies to better understand the way firefighters pace themselves during extreme heat conditions
- Core & skin temperature: will provide the industry with an understanding of the level of thermal stress experienced by firefighters under extreme heat conditions. This knowledge may help agencies reduce the risk of heat-related illness on the fireground through the implementation of preventative work practices
- Heart rate: will quantify just how hard firefighters are having to work in order to perform their fire suppression duties in the heat
- Body weight, urine analysis & fluid intake: will provide a comprehensive view of firefighter hydration. This information could be used to help reduce the risk of dehydration on the fireground
- Ratings of perceived exertion and thermal sensation: will tell agencies how hard firefighters feel as though they are working, and how hot they feel. This knowledge is important as it may dictate the effort given to the work



## INTERESTED IN THIS RESEARCH?

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