

# Heat management for workers' safety and productivity

Jason KW LEE Ph.D., FACSM  
Yong Loo Lin School of Medicine

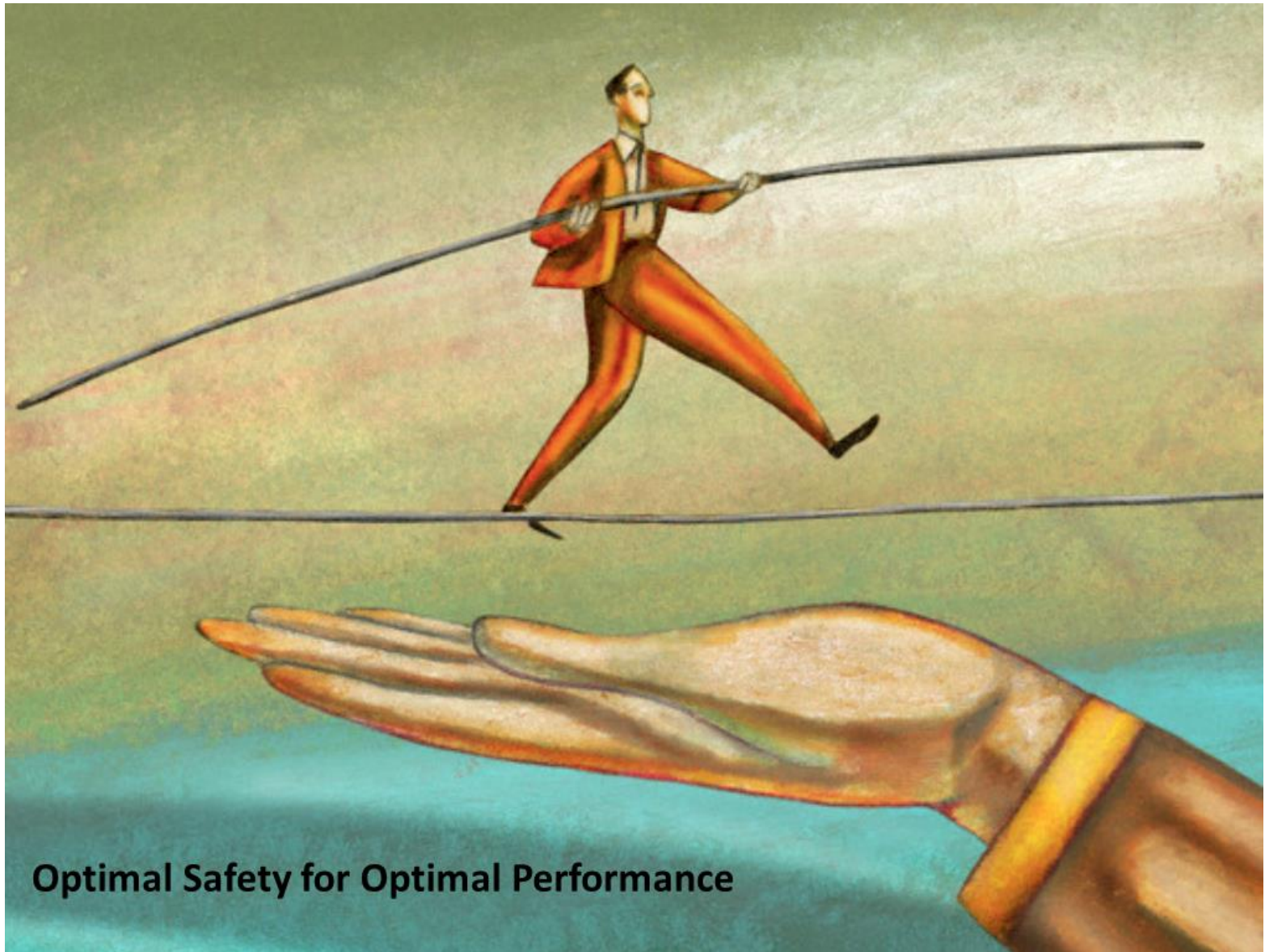


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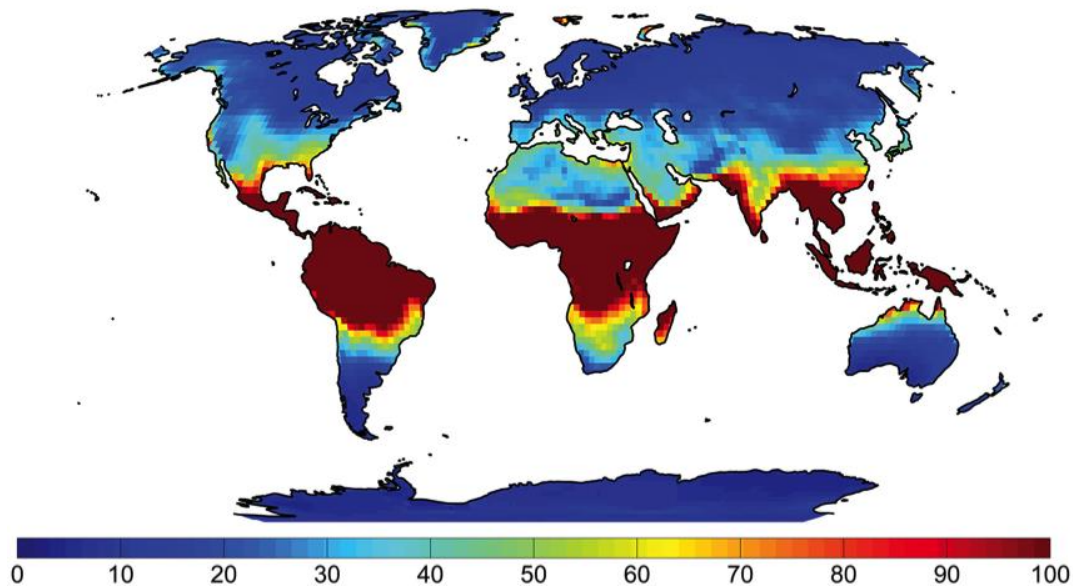




**Optimal Safety for Optimal Performance**

# Summary

1. Optimal safety **does not** compromise but enhances productivity
2. Solutions are there but **use them correctly**
3. Heat stress can **induce more than** just heat injuries and performance degradation



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## IN FOCUS: Feeling the heat? Why it will get even hotter, and what we can do about it

CNA speaks to climate experts and doctors to find out what we can do to stay cool.



Chew Hui Min

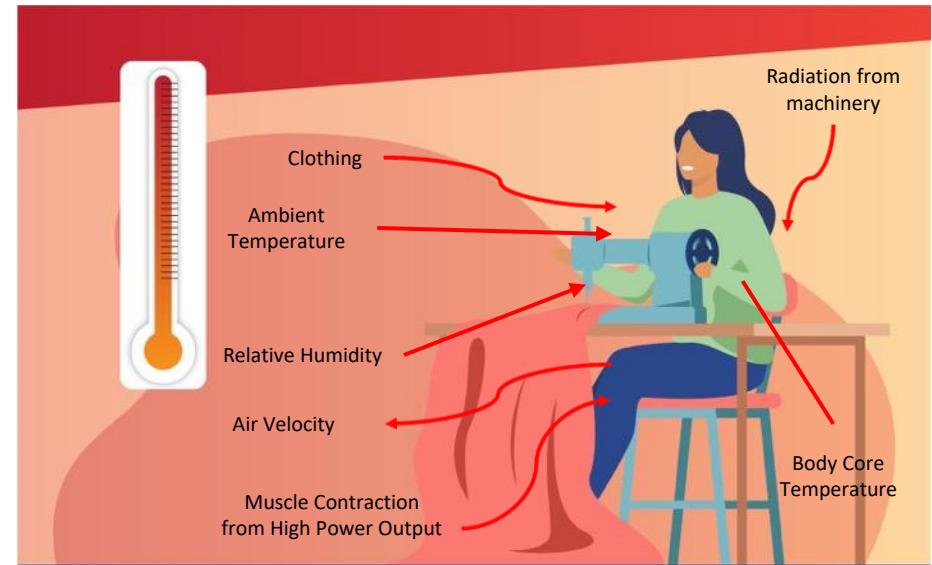
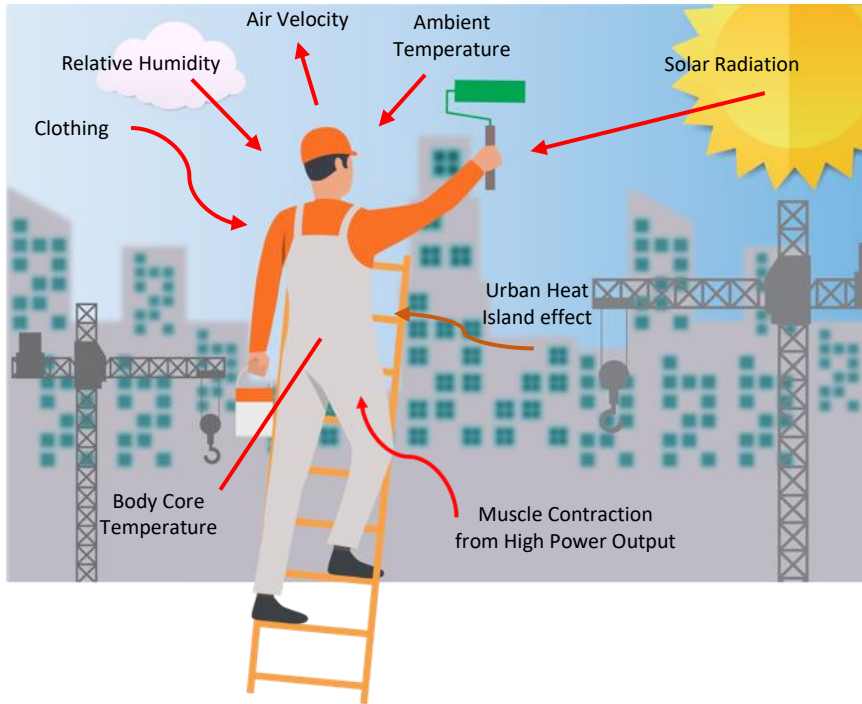
@ChewHuiMinCNA

04 Jun 2022 06:00AM

(Updated: 06 Jun 2022 03:13PM)



# Heat Stress and Heat Strain



**Climate + Clothing + Exercise  
(Heat Stress)**



**Heat Strain** 

# The Problem





# The Problem

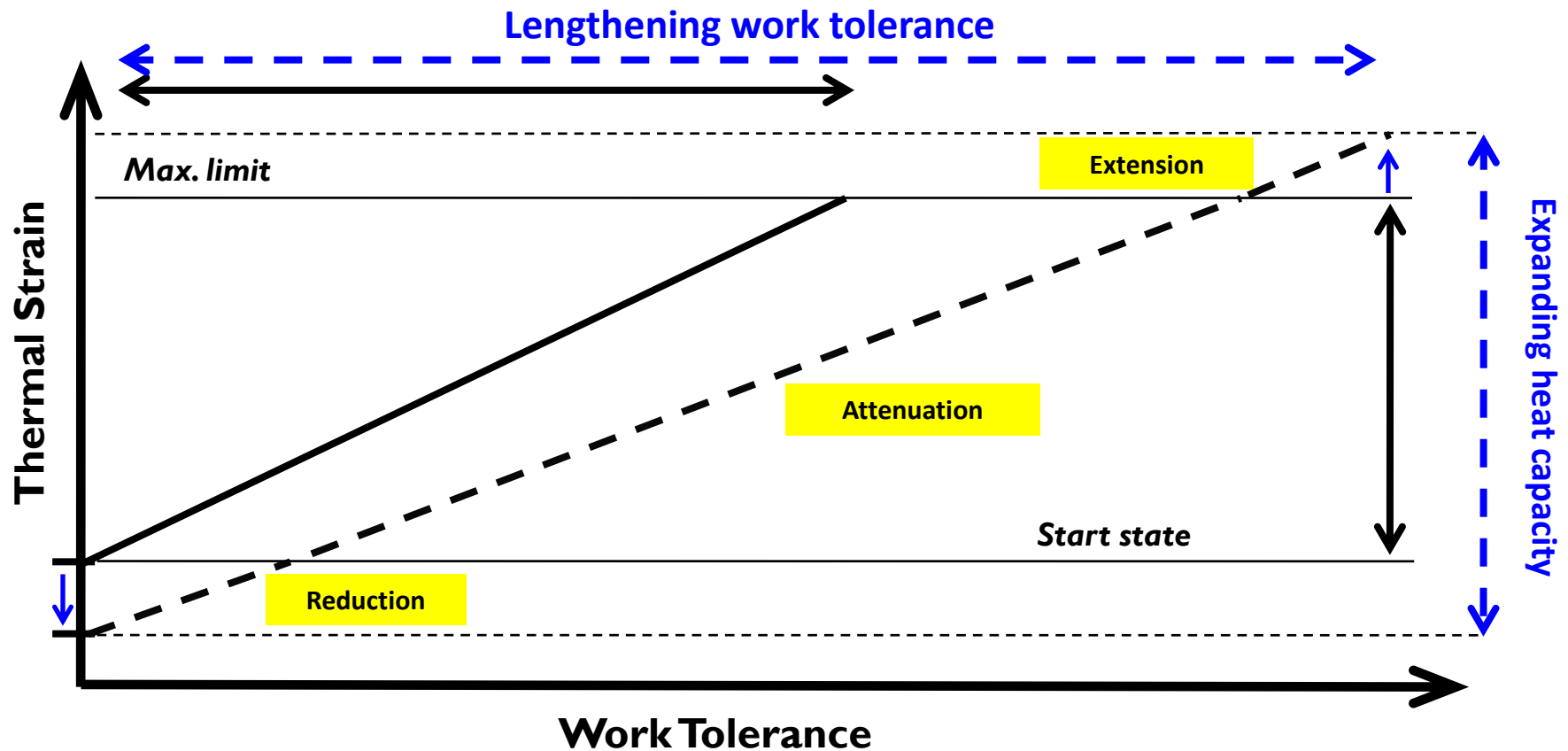




# The Problem



# Solutions (Physiological)



# STRATEGIES

# Behavioural

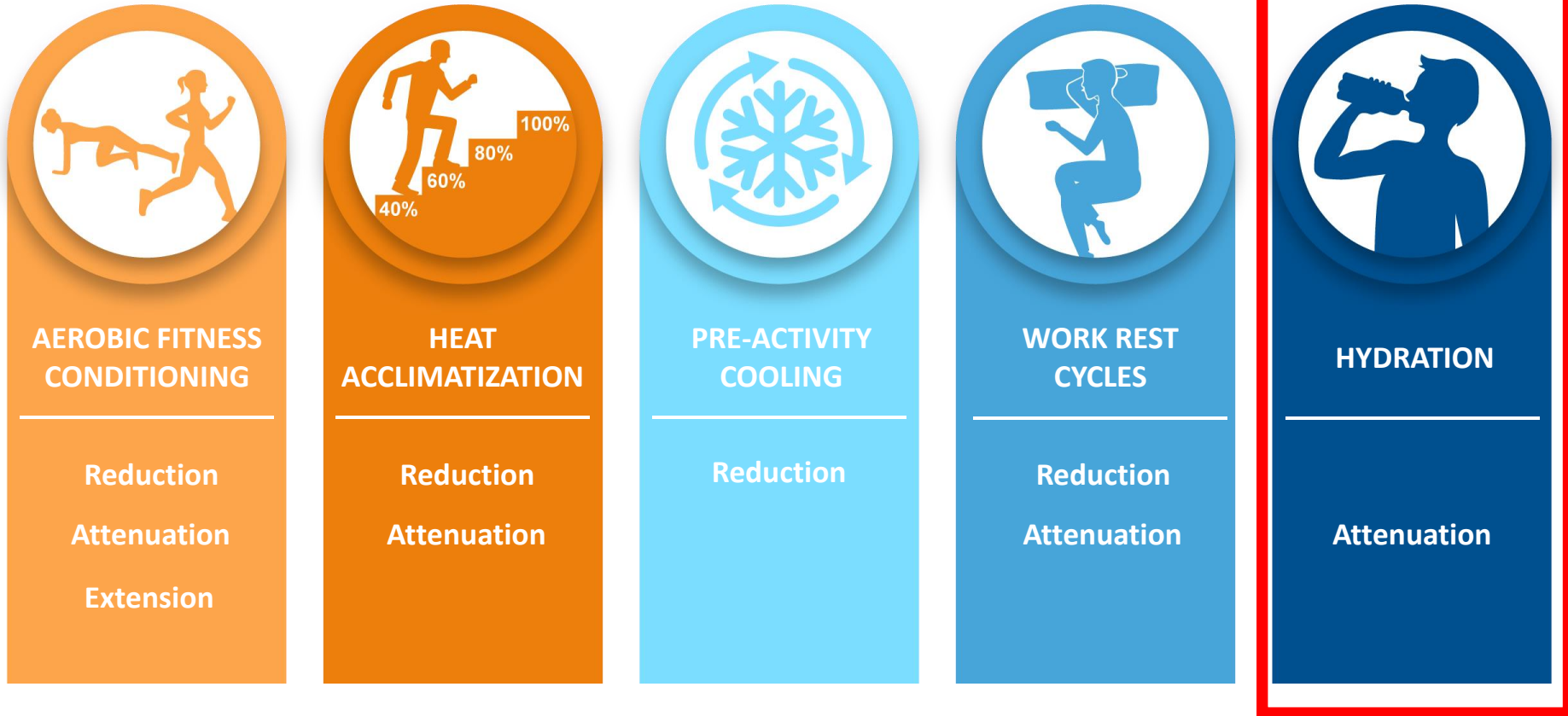
## Aerobic fitness

## Heat acclimatisation

## Pre event cooling

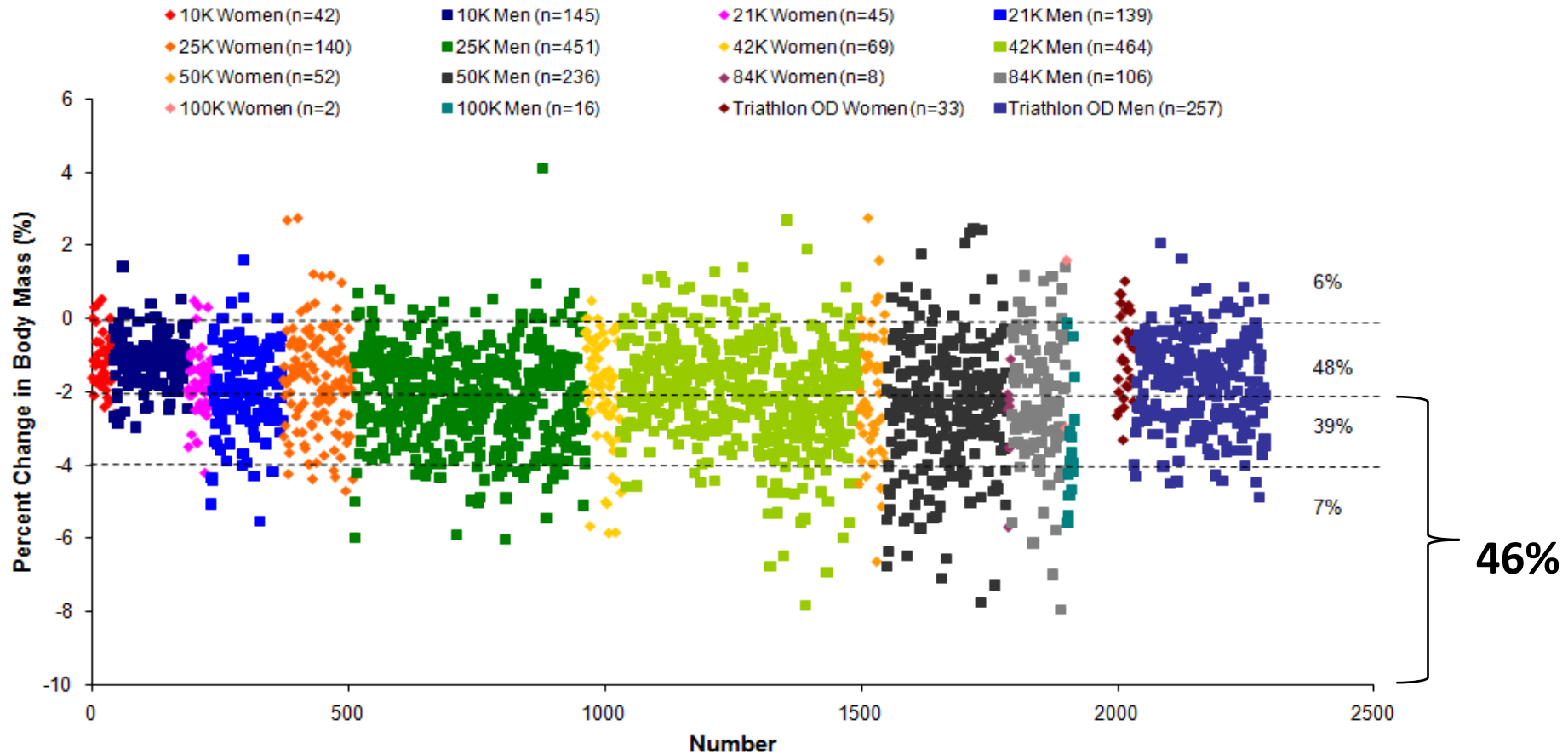
## Fluid intake

# Solutions (Physiological)



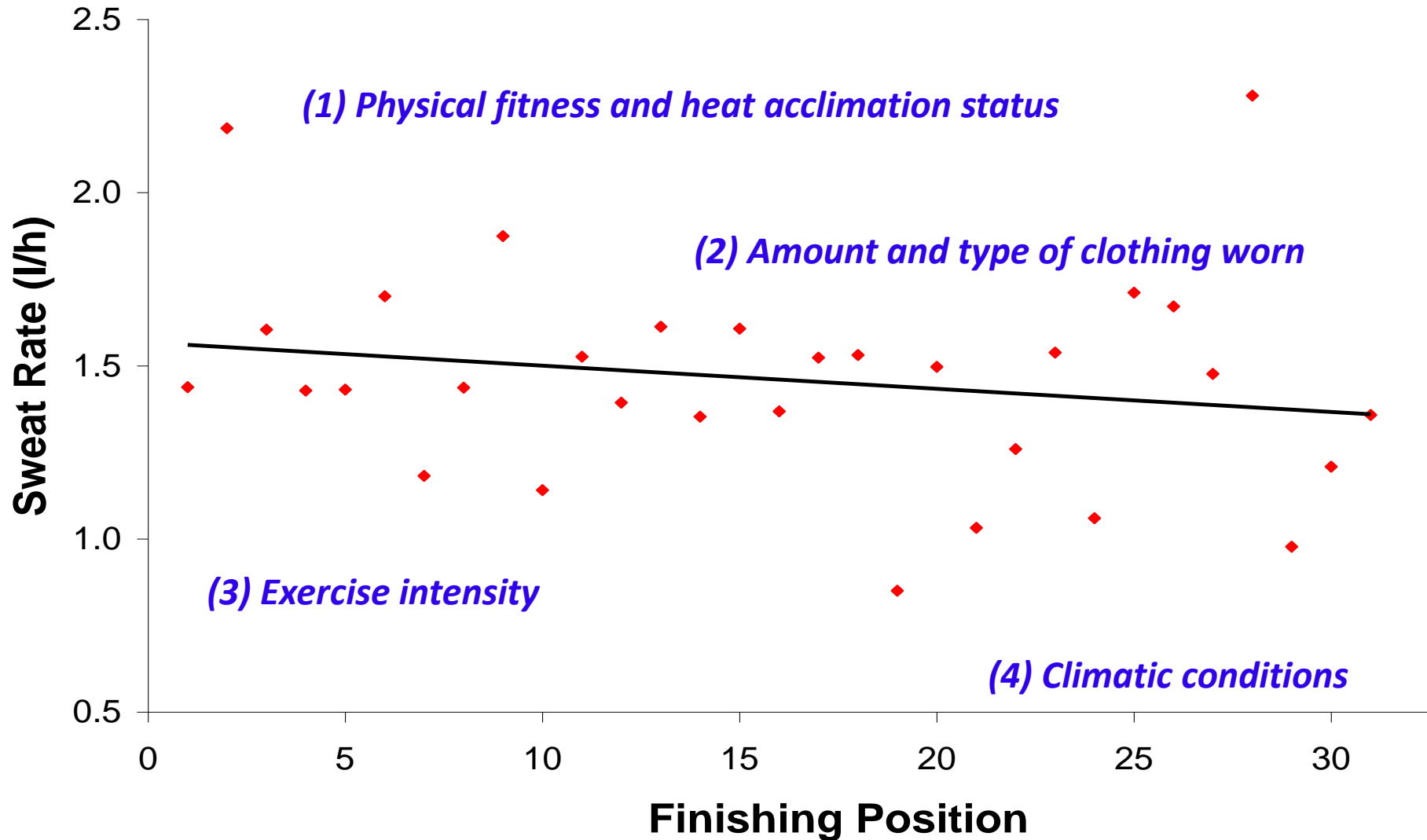


# Dehydration following races in the tropics (n=2206)



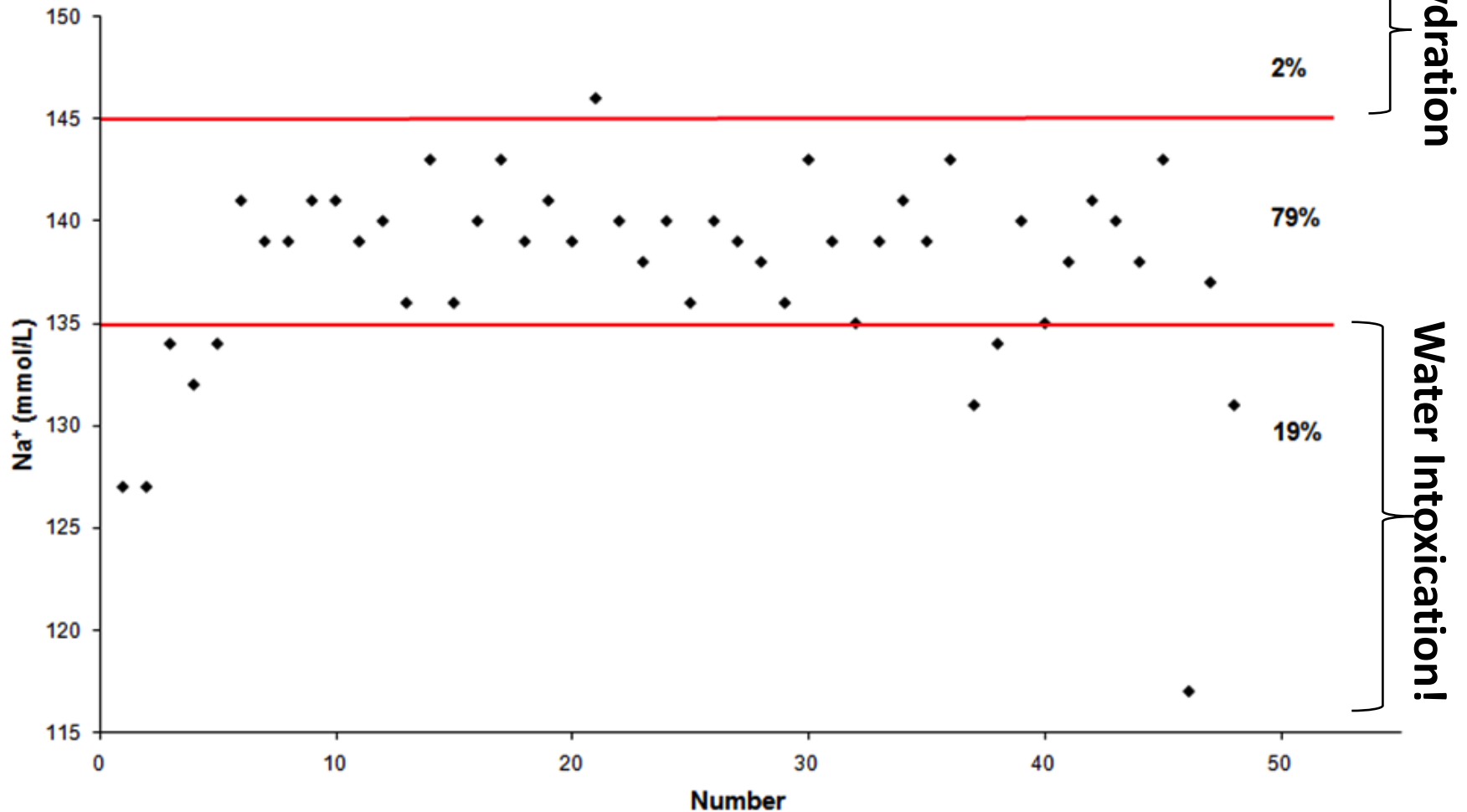
- Acute dehydration (>2% body mass loss) does not compromise health

# Half marathon individual sweat rates (n=31)



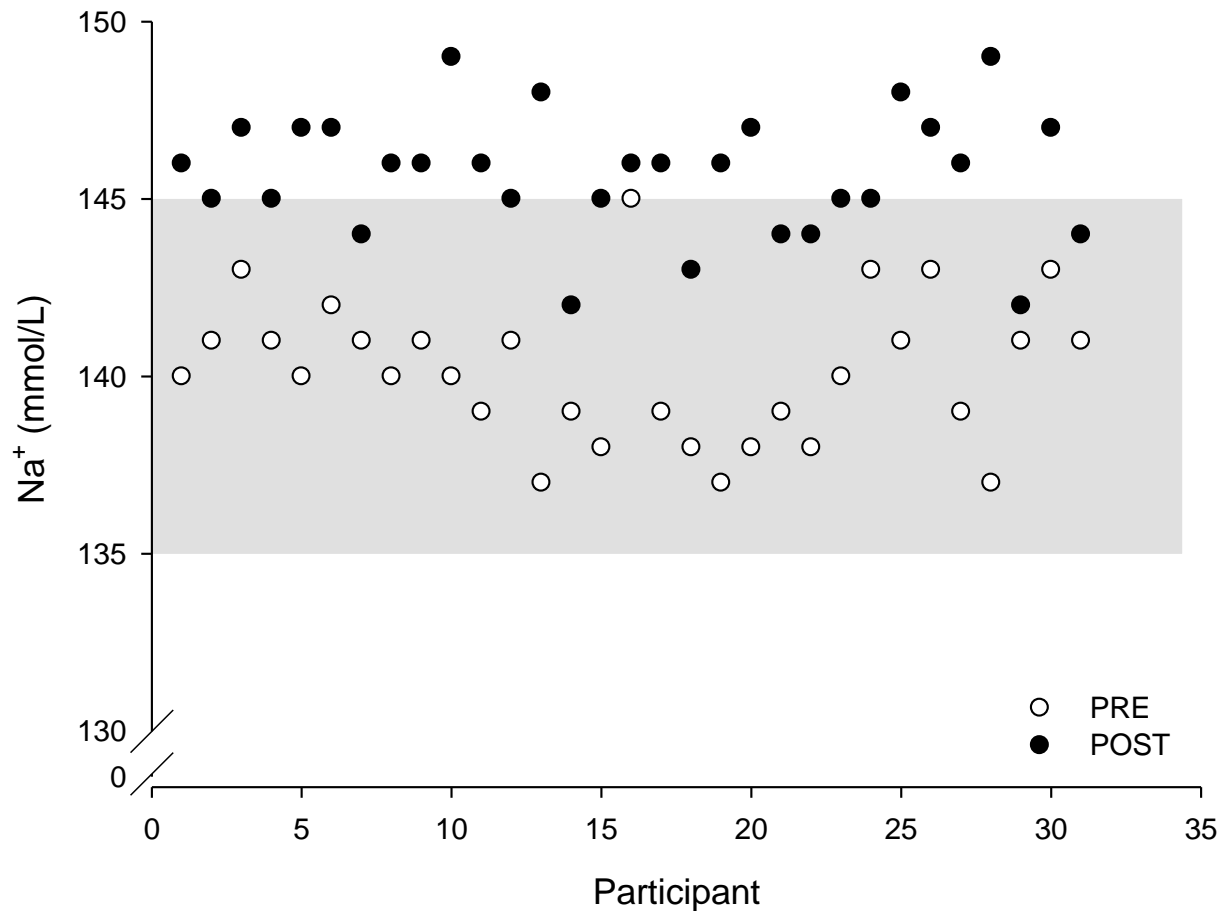
Lee et al. (2010). EJAP

# Prevalence of Exercise Associated Hyponatremia at Onsite Endurance Medical Tents: 2009 to 2011 (n=48)



# Individual plasma sodium concentration Pre and Post AHM Race (n=31)

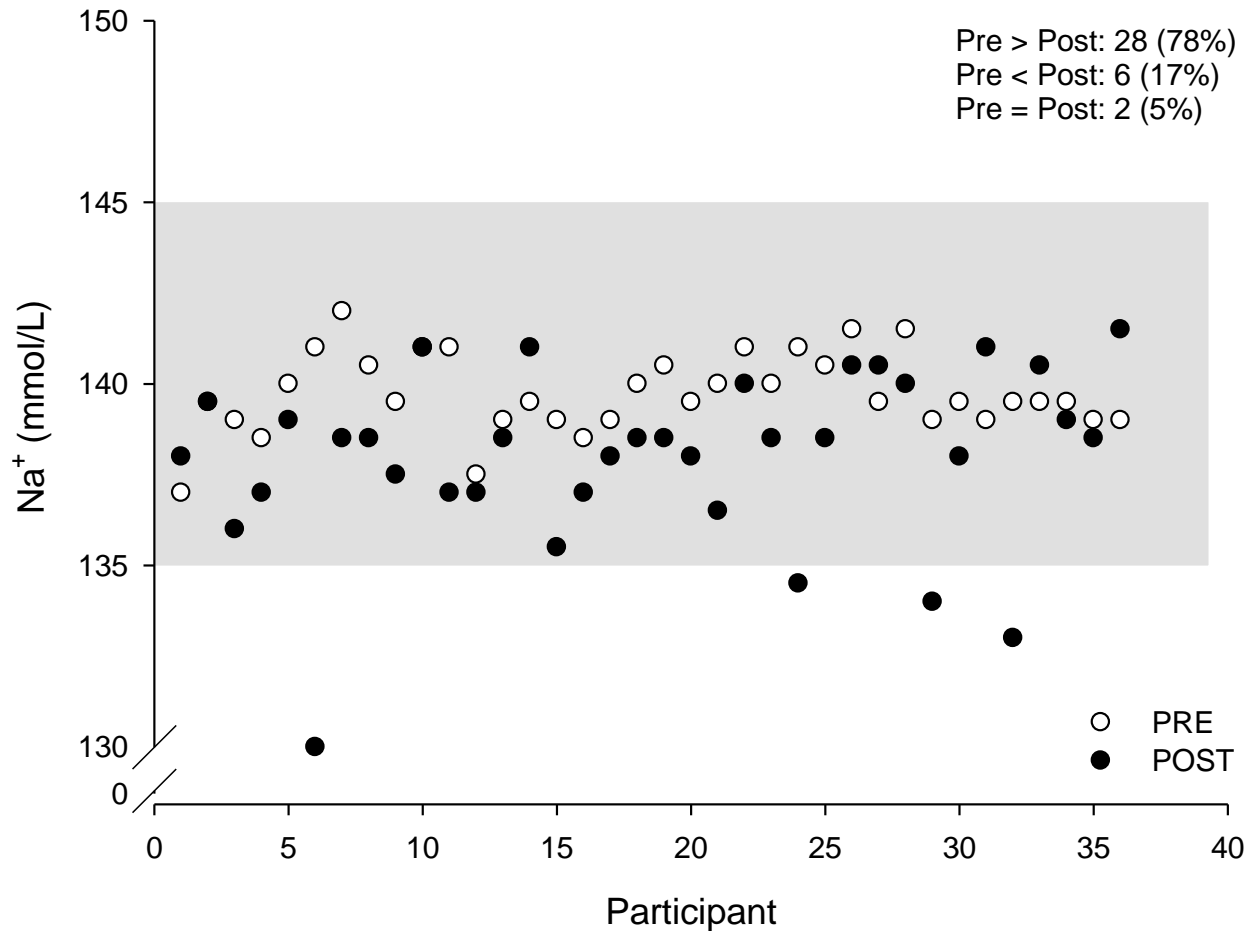
Pre < Post: 31 (100%)



- **Several were dehydrated but everyone was well**

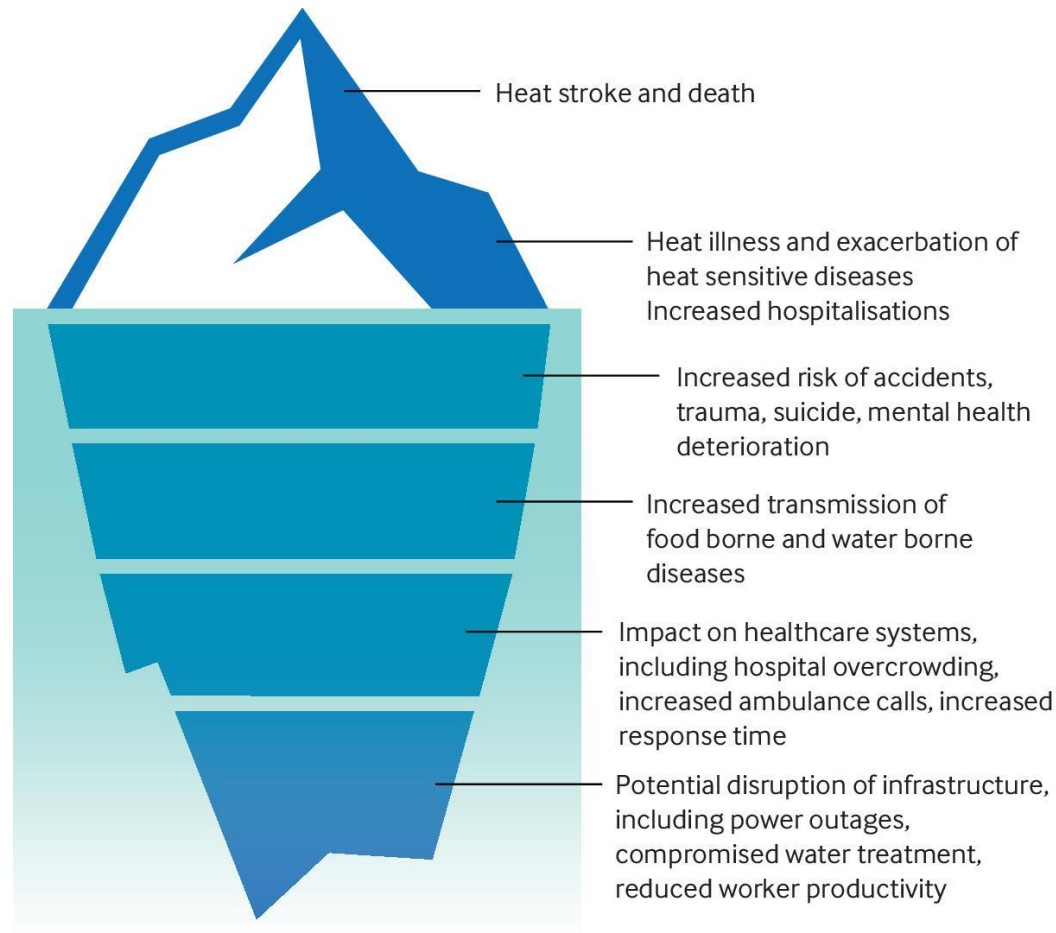


## Individual plasma sodium concentration Pre and Post RM (n=36)



- **No dehydration post RM ( $\text{Na}^+ \geq 145 \text{ mmol/L}$ ) but several were hyponatremic**

# Excessive heat stress can result in many less visible impacts



C Sorensen et al. BMJ 2022;378:bmj-2022-070762

# Heat increases risk taking

*Appl Ergon.* 2017 Jul;62:150-157. doi: 10.1016/j.apergo.2017.02.018. Epub 2017 Apr 6.

## Effects of heat stress on risk perceptions and risk taking.

Chang CH<sup>1</sup>, Bernard TE<sup>2</sup>, Logan J<sup>2</sup>.

### Author information

#### Abstract

Exposure to extreme heat at work is a serious occupational hazard, as exposure can result in heat-related illnesses, and it has been linked to increased risk of accidents and injuries. The current study aimed to examine whether heat exposure is related to changes in individuals' psychological process of risk evaluation, and whether acclimatization can mitigate the effect of heat exposure. A study with quasi-experiment research design was used to compare participants' risk perceptions and risk-taking behaviors at baseline, initial exposure to heat, and exposure after acclimatization across male participants who were exposed to heat (N = 6), and males (N = 5) and females (N = 6) who were in the control group who were exposed to ambient temperature. Results show that participants perceived the same risky behaviors to be less risky ( $p = 0.003$ ) and demonstrated increased risk-taking behaviors ( $p = 0.001$ ) after initial heat exposure. While their risk perceptions returned to baseline level after acclimatization, their risk-taking behaviors remained heightened ( $p = 0.031$ ). Participants who were not exposed to heat showed no significant fluctuation in their risk perceptions and risk-taking. Our findings support that risk-related processes may explain the effects of heat exposure on increased accidents and injuries beyond its direct impact on heat-related illnesses.

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36 lives lost: Workplace fatalities in S'pore in 2022

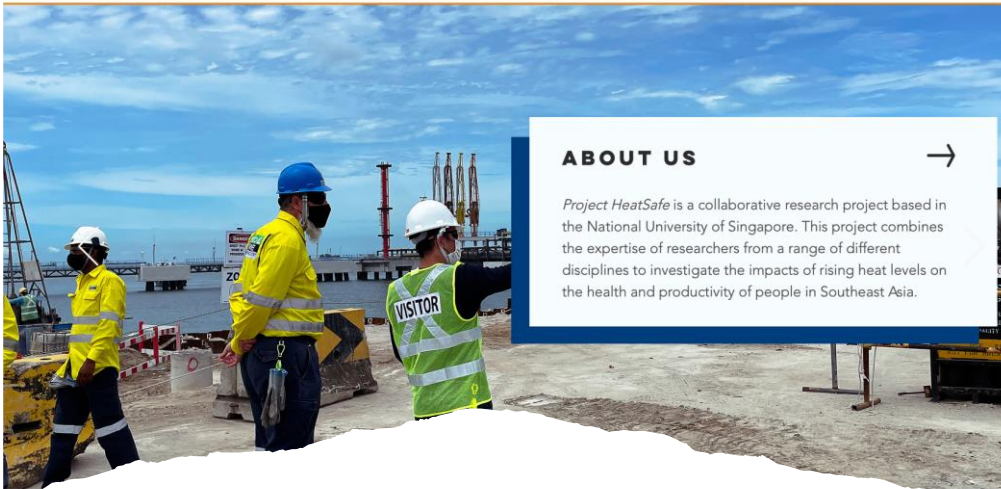


***Participants perceived the same risky behaviours to be less risky after heat exposure***

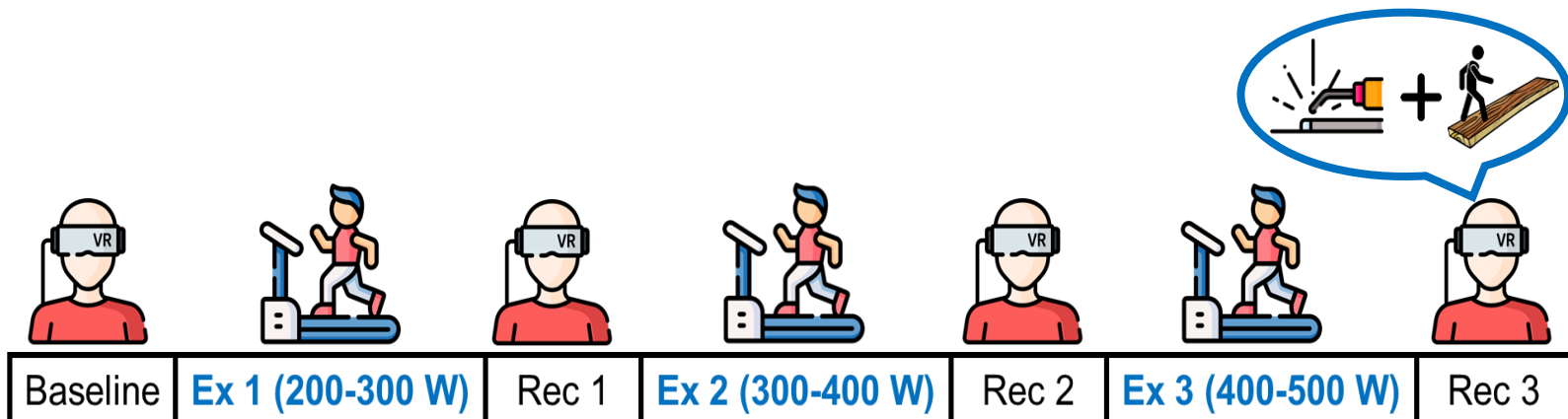
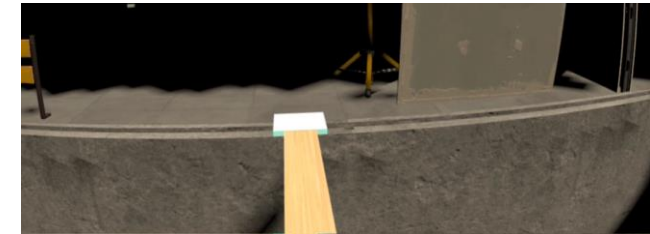
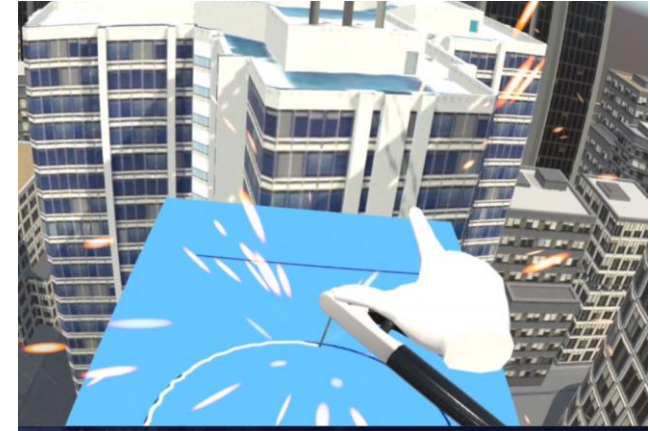
***Beyond its direct impact on heat-related illnesses, heat exposure can increase accidents and injuries***



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<https://www.heatsafe.org>

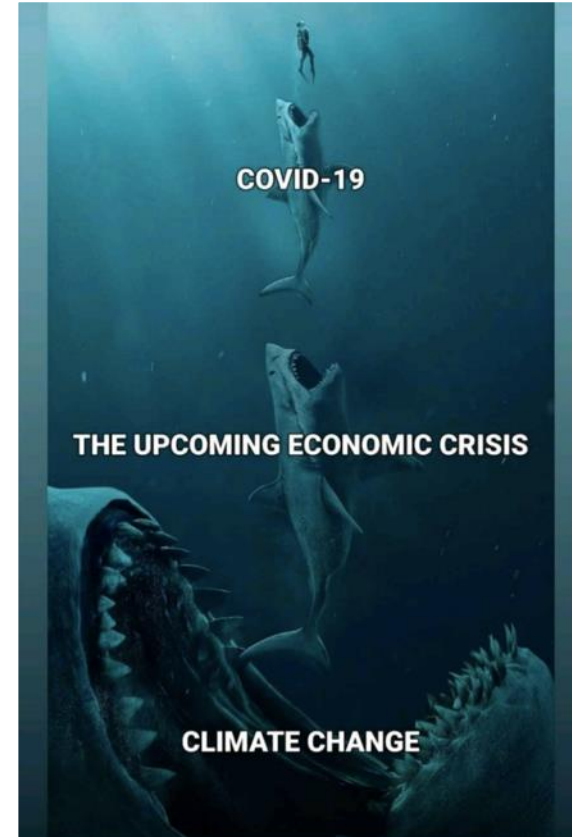




# WARNING!

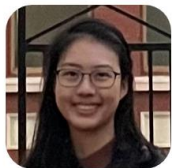


*Global Climate Report 2020, NOAA*



# Summary

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Human Potential Translational  
Research Programme  
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# Thank You