

Combined Stressors: A continued challenge for performing in extreme environments

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Introduction

- Individuals within occupational employment (e.g. military / emergency services, outdoor/adventure industry) are exposed to various stressors concurrently including psychological, cognitive, physical and environmental (Fig 1 & 2).

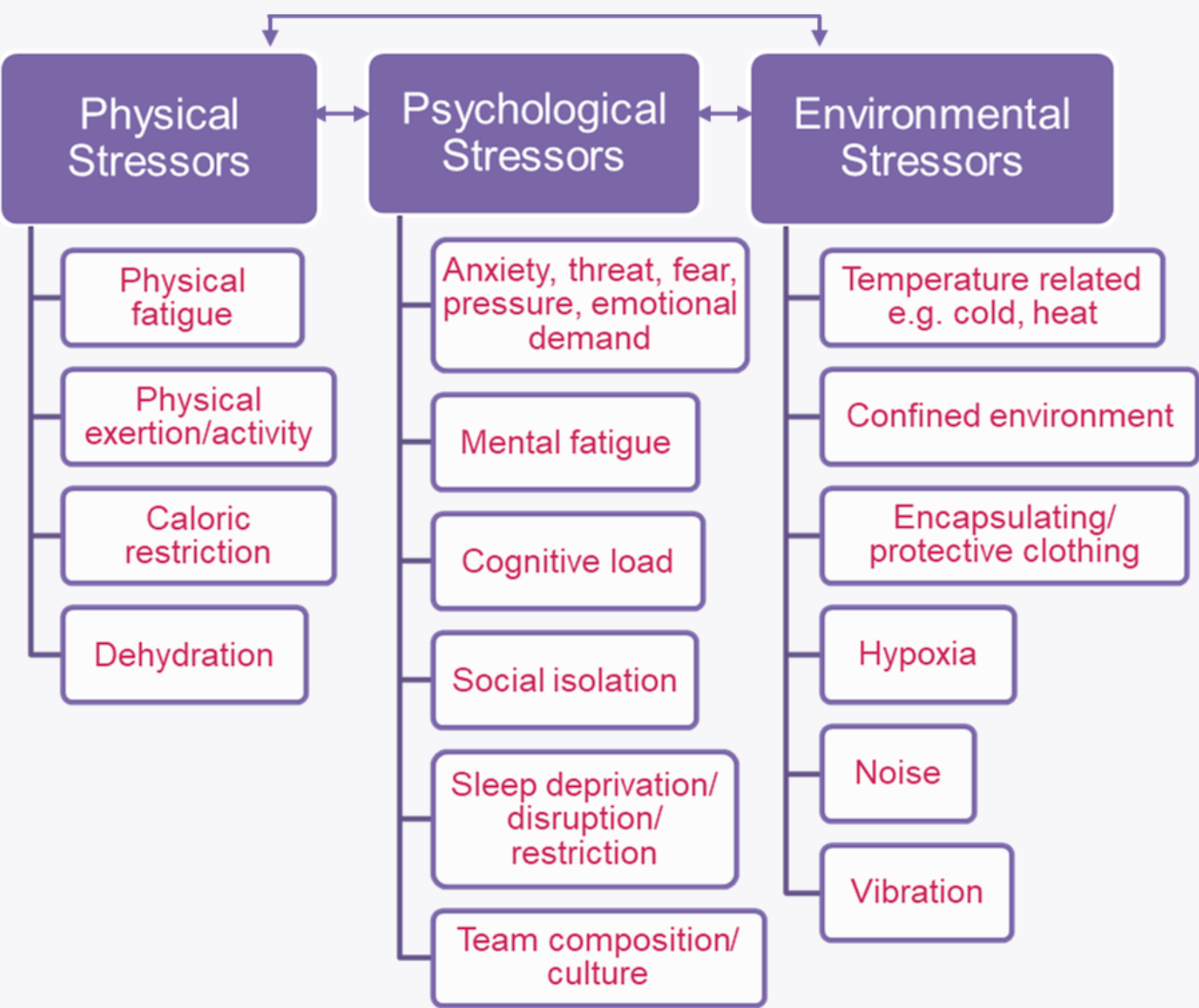


Figure 1: Examples of physical, psychological and environmental stressors

- Historically, stressors have been considered and studied in isolation which is not often representative of reality.
- Whilst there sometimes is a need to explore stressors independently, to understand the mechanisms behind each stressor, there is also a requirement to see what the interactions are, if any, when multiple stressors are experienced together.
- Is the effect additive, or does one stressor dominate the response?

What did we do?

- Dstl conducted a scoping review to evaluate the current evidence related to ~ 30 different combinations of stressors, and their effect on human performance (cognitive, physical and military task performance).
- We also wanted to identify whether there were any gaps in knowledge or understanding.

Did you know?

Combined cold exposure + physical activity =

- Exercise during cold exposure improved manual dexterity, marksmanship performance (accuracy) and information processing speed, which were reduced following exposure to cold alone (with no exercise) (Ji et al., 2017; Salmon et al., 2023; Yang et al., 2021).
- It is suggested individuals take regular rewarming breaks, and job rotations are implemented to ensure physical and psychological performance can be maintained in cold environments.

Combined sleep deprivation + exposure to high altitude + physical activity =

- The combination of total sleep deprivation and hypoxia reduced cognitive performance to a greater extent when compared to total sleep deprivation at sea level (Williams et al., 2024).
- Exercise improved or restored performance regardless of hypoxic status.



Figure 2: Expeditions to high altitude, not only experience the effect of hypoxia, but also cold exposure, dynamic team cohesion, sleep disruption and others. Image taken of Royal Marines in a Himalayan mountain range © Crown Copyright.

Did you also know?

Combined psychological/mental stress + dynamic team composition/morale + physical activity + cold exposure =

- During an all-female British Army ski across Antarctic (covering 1700 km, totalling 61 days), having a diverse group of individuals was found to maintain positive affect and camaraderie among the team (Blackadder-Weinstein et al., 2019).
- Team effectiveness was attributed to honesty in communication.
- It was acknowledged that individual goals may change over the duration of an expedition and this could cause tension within a team.

Conclusions

- Although complex and challenging, future research should seek to push the boundaries and develop research methodologies that enable combinations of stressors to be studied and identify any interactions between stressors.
- Due to a much of the existing research predominately using male participants (in the full review, 81 % of participants were male, 19 % female), future research should strive to include males and females.

References

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