

A review on physiological monitoring systems for firefighters



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1 Background

Firefighters are safety-sensitive professionals exposed to high ambient temperatures, extreme physical exertion, toxic air pollutants, and psychological stress, and, therefore, with high risks to their health. Wearable physiological monitoring systems might be helpful to track their activities and prevent potential health impairments, and research perspectives should explore this applicability.

2 Objective

This study presents the preliminary results of a systematic review regarding the occupational applicability of physiological monitoring systems, focusing on the findings among firefighting personnel.

3 Methods

Systematic approach

The PRISMA methodology was used to systematise and filter the results.

Databases

Five databases were accessed: Scopus, Science Direct, PubMed, Academic Search Complete and Web of Science.

Applied restrictions

- 🕒 Date (articles published between 2014-2021).
- 📄 Source type (journal articles).
- 📄 Document type (research articles published or in press).
- 🇬🇧 Language (search was limited to English written publications).

4 Main results

General findings

A total of 322 items were first retrieved, and 10 articles were selected¹⁻¹⁰.

Publications evidenced the physiological cost of firefighting activities and addressed cardiac and thermal metrics.

Results helped to obtain an overall perspective on the up-to-date progress on physiological monitoring among firefighting personnel and established potential directions for further research.

Current research trends

- 🔍 Heart rate related metrics assessment
- 🔍 Physiological demands and workload of firefighting activity
- 🔍 Physiological variables and perceived stress levels associations

5 Conclusions

With this work, the usefulness of real-time monitoring to understand the physiological demands of firefighters was demonstrated. Current research confirms the feasibility of devices using physiological signals to examine the impact of firefighting practices and improve the management of health-related consequences.

6 Future work

Future investigations should focus on developing classification models to process physiological recordings optimising work-rest cycles, and preventing further health impairments. This review contributed by providing possible departure points in this regard.

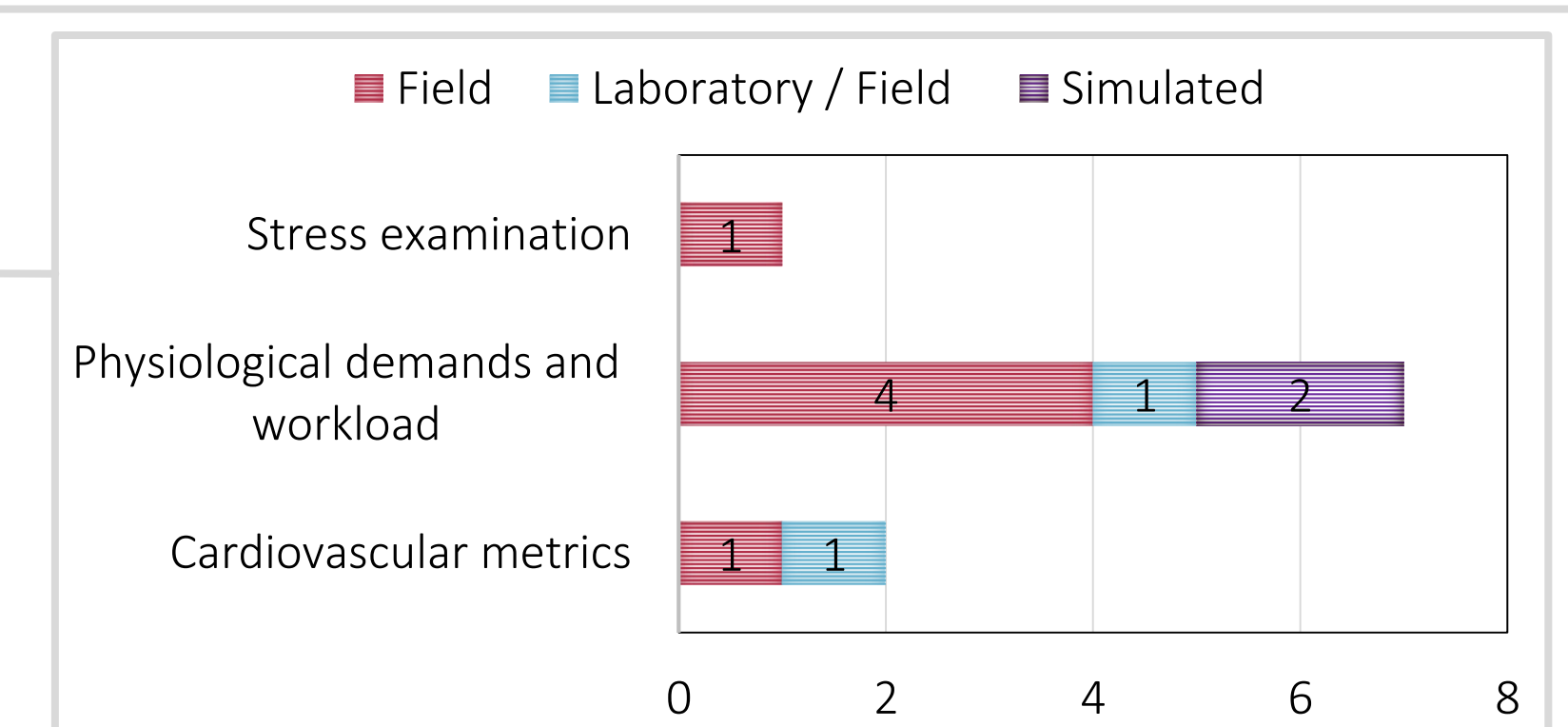
Keywords combinations

Major keywords ("physiological monitoring", "noninvasive monitoring", "occupational" and "worker") and their related derivatives, and the term "firefight*" were used for the search.

Studies selection

- 📄 Prognostic health-related goals.
- 📄 Experimental protocols included actual or simulated working activities.
- 📄 Physiological monitoring systems were used.

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