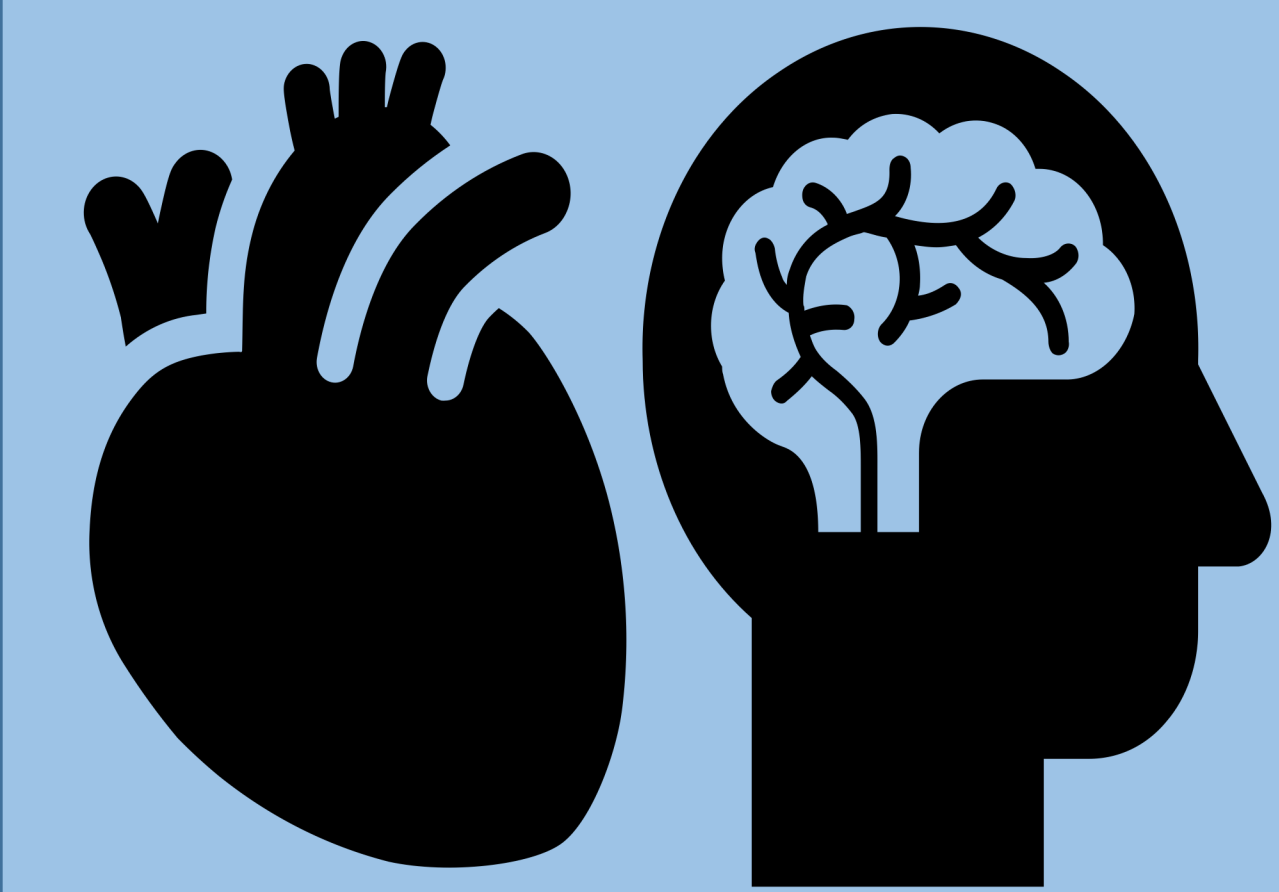




The Relationships Between Working Conditions and Indices of Stress and Cognitive Function in Wildland Firefighters

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Rationale

Wildland firefighters are exposed to various types of strenuous activities and working conditions during their long shifts [1]. These factors may affect autonomic nervous system balance, perceived stress, and cognitive function [2].

Objective

This study examined the relationship between various working conditions of wildland firefighters and variables related to stress and cognitive function.

Methods

→ A within-subject, observation study was conducted on **24 Wildland firefighters** (9 F) across British Columbia between July to September of 2021 and 2022.

→ **Heart rate variability** was measured using a chest worn heart monitor and **perceived stress** was measured on a 4-point scale.

→ **Cognitive function** was also measured subjectively via 7-point scales and objectively via a psychomotor vigilance task.

→ Various **working conditions** were measured post-shift, including whether they conducted wildfire suppression that day (Y/N), were exposed to smoke (Y/N), and fire stage of control (i.e., out of control; being held; under control; other).

→ Pearson correlation was performed to identify the **largest associates** between variables.



Note. Photo taken by Simon Burmudez

Results

→ Stage of control had the greatest number of significant correlations to cognitive function, including subjective fatigue ($r = 0.28, p < 0.001$) and mean reaction time (RT) ($r = 0.34, p < 0.001$), while also significantly correlated to perceived stress ($r=0.30, p < 0.001$).

→ The largest associates of smoke exposure were subjective fatigue ($r = -0.29, p < 0.001$), median RT ($r=-0.25, p < 0.001$), and perceived stress ($r=-0.17, p < 0.01$).

→ Similarly, the largest correlations to wildfire suppression were subjective fatigue ($r=-0.30, p < 0.001$), median RT ($r=-0.23, p < 0.01$), and one of the HRV measures, HF power (n.u) ($r = 0.32, p < 0.01$).



Note. Photo taken by Ben Westerik [3]

Table 1.

Significant Correlations Between Working Conditions, Stress, and Cognitive function

Stage of Control		Smoke Exposure (Y/N)		Wildfire Suppression (Y/N)	
	Pearson R	Fatigue	Pearson R	Fatigue	Pearson R
Subjective Fatigue (1-7)	0.28***	Subjective Fatigue (1-7)	-0.29***	Subjective Fatigue (1-7)	-0.30***
Post Shift Mean RT	0.34***	Post Shift Median RT	-0.25***	Post Shift Median RT	-0.23**
Sleepiness (1-7)	0.17*	Sleepiness	-0.13*	Mean 1/RT	0.16*
Stress		Stress		Stress	
Perceived Stress (1-4)	0.30***	Perceived Stress (1-4)	-0.17**	HF Power (n.u.)	0.32**
pNN50	-0.02*	HF Power (ms2)	-0.21*	Max HR	-0.24*

Note. *= p<.05, **= p<.01, *** = p< .001

Conclusions

Post shift subjective fatigue was significantly correlated to all three of the measured working conditions. Various indices of stress and cognitive function were also significantly correlated to certain working conditions, thus warranting further investigation.

References

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