

Firefighter's personal protective equipment and the chronotropic index

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The purpose of this study was to investigate the effects of personal protective equipment (PPE) on cardiovascular and metabolic responses during incremental exercise, and to determine if PPE affects the relationship between heart rate (HR) and oxygen uptake when expressed as the chronotropic index (CI). Ten male participants performed graded exercise tests under three conditions: control (CON), (PPE) and weighted vest (WV) (same weight as PPE). Time to exhaustion was significantly longer in the CON compared to the other conditions ($p < 0.01$). Submaximal oxygen uptake and HR were significantly lower in the CON compared to the PPE and WV conditions. The CI (CON, 32.2 ± 4.5 ; PPE, 31.7 ± 5.7 ; WV, 32.6 ± 4.9) was similar in all three conditions. This study has shown that additional weight and encapsulating clothing leads to elevations in HR and oxygen uptake compared to a control condition, however, the CI remains unaffected.

Practitioner Summary: Firefighters wear personal protective equipment that is designed to protect the wearer; however it also imposes a physiological burden. It is known that work in firefighting PPE increases cardiovascular and metabolic strain. This study has shown that PPE does not alter the relationship between heart rate and oxygen uptake.

Keywords: firefighting; personal protective equipment; heart rate; oxygen uptake; chronotropic index