Responsiveness of the Zephyr BioHarness and Fitbit Charge Devices

We wanted to know if the Zephyr BioHarness and Fitbit Charge are able to detect changes in heart rate, breathing rate and number of steps taken over time.

What is the problem?

Wearable devices such as Zephyr BioHarness and Fitbit Charge provide an easy method of capturing and recording of physiologic measures such as heart rate, breathing rate and number of steps taken. These devices can be used to improve a person's fitness and physical activity levels, but no studies have tested whether the reported changes in scores are valid. We want to know if the Zephyr BioHarness and Fitbit Charge are able to detect changes in heart rate, breathing rate and number of steps taken over time

How did the team study the problem?

A group of 60 healthy participants (30 females, 30 males) across various age groups (range = 20 – 68 years) had their heart rate, breath rate, and number of steps measured by Zephyr BioHarness and Fitbit Charge at the same time while they were sitting (rest and recovery) and performing the Modified Canadian Aerobic Fitness Test. We used statistical analyses to test the two devices' sensitivity to change in heart rate, breath rate, and number of steps taken.

What did the team find?

We found that the Zephyr BioHarness and Fitbit Charge were sensitive to the changes that occurred in heart rate, breath rate, and number of steps taken before, during, and after a fitness test.

How can this research be used?

The FIREWELL team will use the Zephyr BioHarness to monitor firefighters' heart rate while they perform firefighting tasks and explore differences in heart rate responses based on individual factors such as gender, sex, or age. Other researchers may use the Zephyr BioHarness or Fitbit Charge in the same way. Fire services can use the Zephyr BioHarness to help keep firefighters safe by tracking their physical status during training and real fire situations.

Cautions

We tested the Zephyr BioHarness and Fitbit charge in healthy participants so our findings may not be the same in firefighters, although most firefighters are considered healthy participants.

Reference: Nazari G, MacDermid JC. Minimal Detectable Change Thresholds and Responsiveness of Zephyr Bioharness & Fitbit Charge Devices. Journal of Strength and Conditioning Research. 2017 Jul 18. [Epub ahead of print].

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