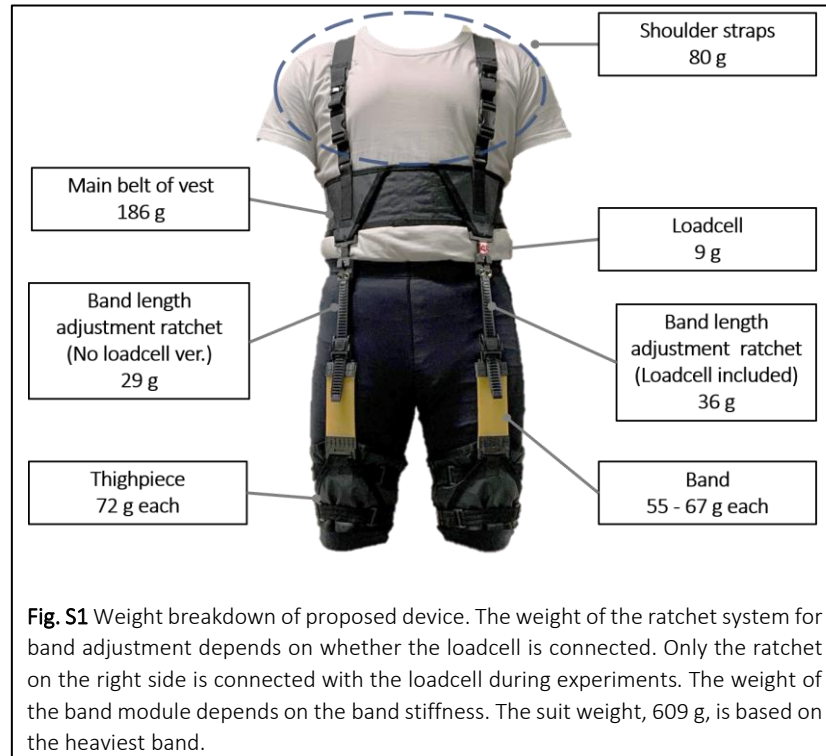


Supplementary information

Device weight breakdown

The mass of each device component is shown in Fig. S1.



Participant inclusion/exclusion criteria

When recruiting participants that could effectively undergo the protocol, we used the following inclusion/exclusion criteria:

1. Inclusion criteria

- 1.1. Age / sex: Adult male/female (aged 20–50 y)
- 1.2 The person must be responsive and not exhibit any communication difficulties to ensure that s/he can understand the test process.
- 1.3 The person must be healthy to ensure that his/her physical capabilities can be evaluated.
- 1.4 The person must not have suffered any musculoskeletal injuries in the past year.
- 1.5 The person must provide written consent.

2. Exclusion criteria

- 2.1. The person has an ongoing musculoskeletal illness.
- 2.2. The person has observable gait abnormalities when walking 10 m.

- 2.3. The person has a record of musculoskeletal illness, such as bone fracture or ligament tear.
- 2.4. The person has an ongoing illness related to the neurological/cardiovascular systems.
- 2.5. The person has observable abnormalities when performing object manipulation.

Individual reduction graphs

Figure S2 shows the metabolic rate bar graph of each participant in all test conditions.

