



Study III

“Training 2.0? Full Body Exergaming in Virtual Reality“

Several studies conducted at German Sports University Cologne, 2016 - 2018

<https://www.youtube.com/watch?v=ODcs1JU2W9Q>



ICAROS VR - Training and Prevention in Virtual Reality
2.095 Aufrufe

👍 12 🗨️ 1 ➦ TEILEN ➦ ...



ICAROS VR - Training and Prevention in Virtual Reality
2.095 Aufrufe

👍 12 🗨️ 1 ➦ TEILEN ➦ ...

Study III

“Effects of Full Body Exergaming in Virtual Reality on Cardiovascular and Muscular Parameters: Cross-Sectional Experiment“

conducted at the Institute of Movement Therapy and Movement-Oriented Prevention and Rehabilitation,
German Sport University Cologne, Cologne, Germany (2019)

Study III

Study Objectives:

The purpose of this study was to investigate the effect of a fully immersive virtual reality (VR)-based training system on cardiovascular and muscular parameters of young adults.

Subjects:

- 33 male participants (mean age 23.90 [SD 4.58] years)
- BMI <25 kg/m²
- Height between 170 and 190 cm

Methods:

A cross-sectional analysis of muscle activity (surface electromyography), heart rate, perceived rate of exhaustion (RPE), cybersickness symptoms, perceived workload, and physical activity enjoyment (PACES) in 33 participants performing two 5-minute flights on a new training device.



Study III

Methodology - Test

Questionnaires:

Simulator Sickness Questionnaire (SSQ)

Physical Activity Enjoyment Scale (PACES)

Borg Scale

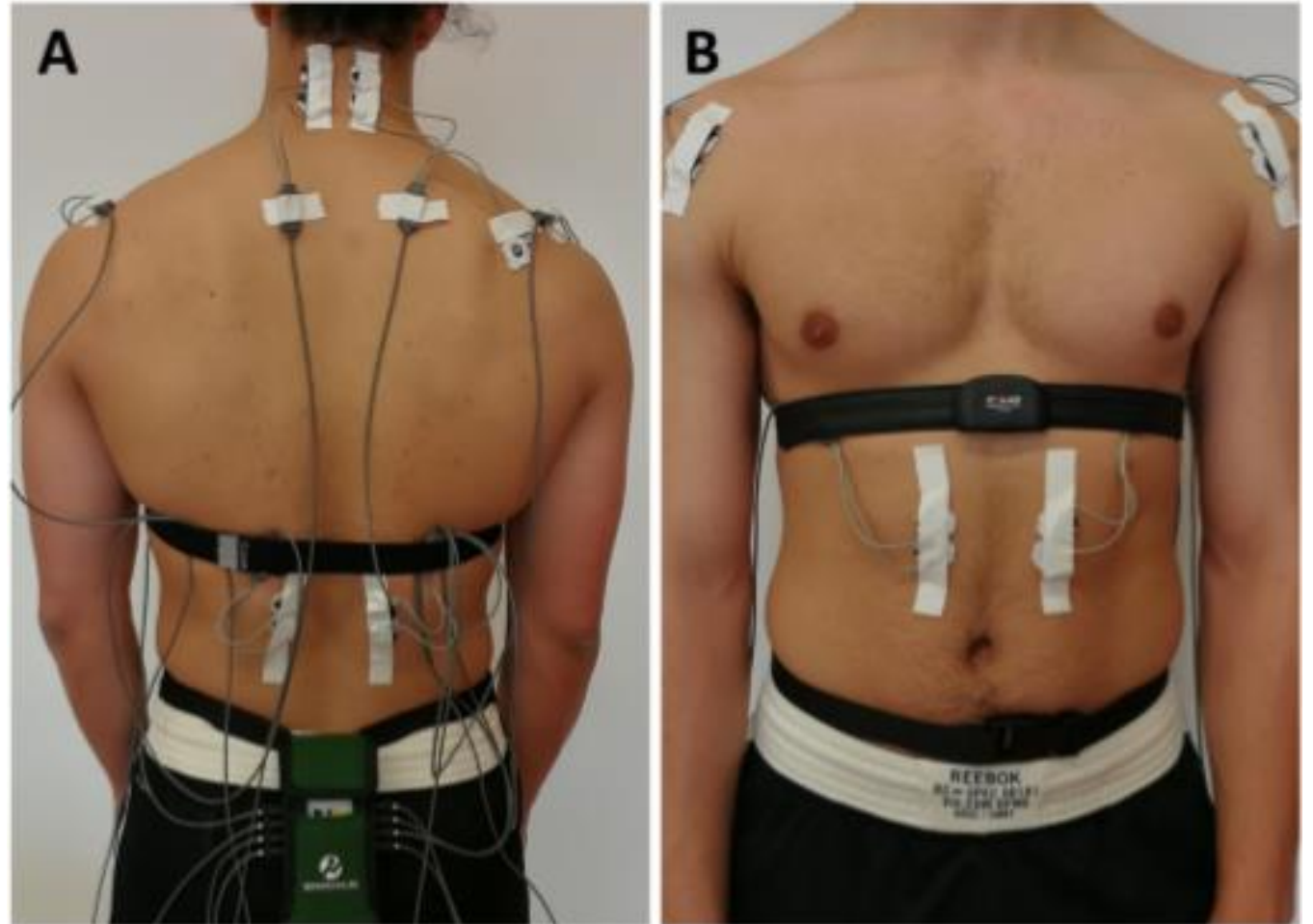
NASA Task Load Index (NASA-TLX)

Heart Rate Monitor:

Participant heart rates were measured continuously using the RS800 heart rate monitor (Polar Electro).

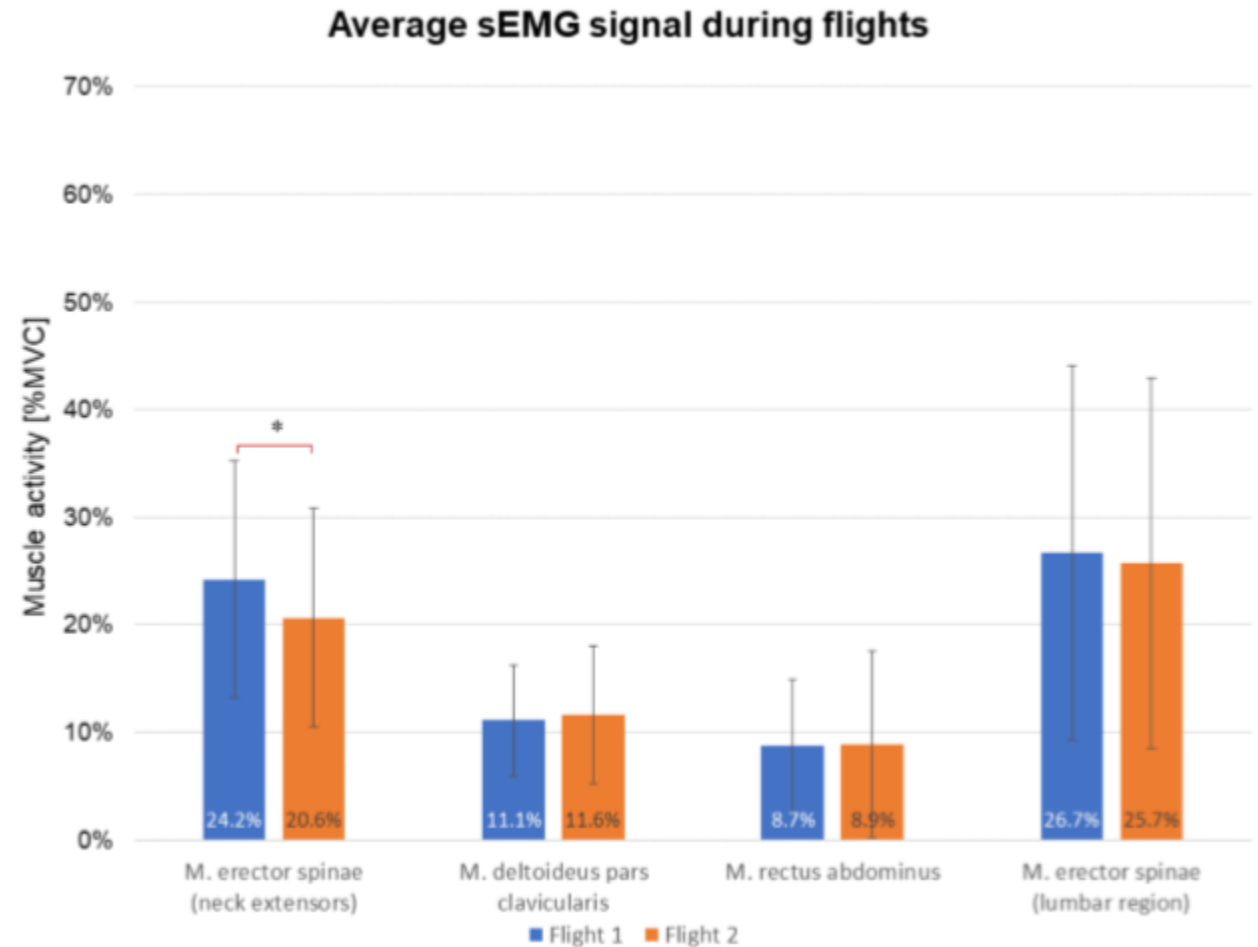
Muscle Activity:

Muscle activity was measured based on sEMG using the TeleMyo 2400T G2 (Noraxon USA).



Findings

- Dorsal muscle chain activity (neck extensors and lumbar region of m. erector spinae) shows higher levels of activation, with values reaching or crossing the 30% threshold in some cases.
- Participants position on the ICAROS device resembles the well-established plank exercise. The only difference is the device's shin holders, which provide additional support for user.
- The similarity between the average muscle activations seems to indicate the potential reliability of the ICAROS VR system. Being able to reproduce the physiological muscle activation in a consecutive flight suggests that familiarization effects do not reduce muscle activity straight away.
- Improved intermuscular coordination from reintroducing and sustaining body balance on the device after pitch and roll movements could explain why the significantly smaller range of motion did not correspond to significantly lower muscle activation during the second flight.



Results

- The lower back's muscle activation corresponds to plank variations with instability devices
- Fully immersive VR training systems can contribute to muscle-strengthening activities
- ICAROS can provide improved muscle strength, especially for the dorsal muscle chain. Differentiated muscle activation can be achieved requiring the user to spend more time in a pitch down position, thereby shifting the body's center of gravity on the pitch axis
- Training on Icaros provides a moderate cardiovascular activity (108 bpm \pm 18.69)
- The ICAROS exercise is perceived as a moderate to vigorous activity (RPE 14.6 [SD 1.82])
- The exercise is perceived as an enjoyable experience (PACES 3.74 [SD 0.16])

