

# Study IV

“Cardiopulmonary and metabolic stress during ICAROS Cloud training“

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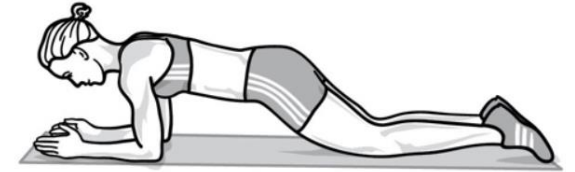
# Study IV

## Aim

To compare differences between exercising on the ICAROS Cloud and exercising on a mat in terms of cardiopulmonary and metabolic parameters.

## Findings

- Training on the ICAROS Cloud leads to an increase in cardiopulmonary and metabolic parameters compared to training on a training mat.
- The energy expenditure on the ICAROS Cloud is about 5% higher than on training on a mat.
- The lactate concentration after training on the ICAROS Cloud is 7 % higher than training on the mat. Similarly, the heart rate is also about 1 % higher on The ICAROS Cloud.
- Exercising on the ICAROS Cloud is more fun than exercising on a training mat.
- The findings clearly show that despite the tendency to be more demanding, there is a higher willingness to train on the ICAROS Cloud than the mat.



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## Methods

- Cross Sectional examination of exercising on the cloud vs exercising on a training mat.
- ICAROS Cloud and Training Mat are the independent variables
- All participants performed both the trainings ordered randomly and the below mentioned variables were measured.

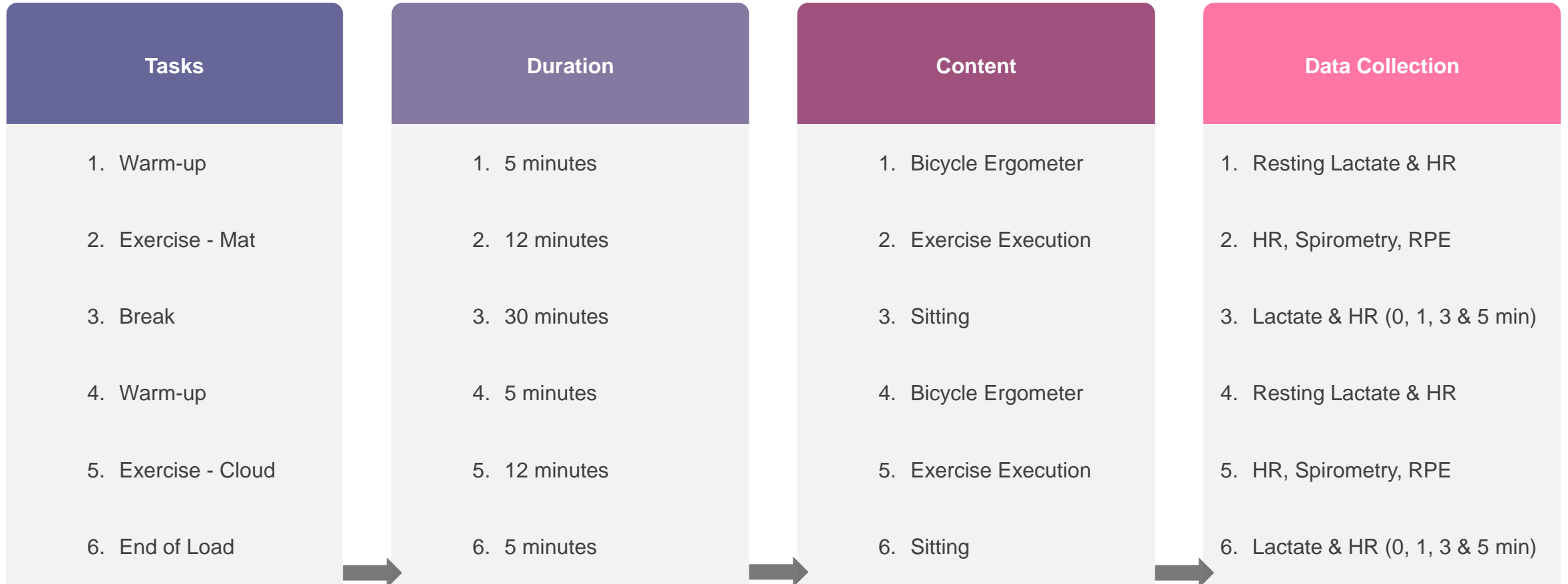
## Subjects

Participants	Mean Age	Mean Height	Mean Weight
N = 16 (5 females, 11 males)	24 ± 1.5 years	176 ± 6.8 cm	71.3 ± 10.3 kg

Independent Variables	Dependent Variables (Measured Variables)
<ul style="list-style-type: none"><li>• ICAROS Cloud – Unstable training surface</li><li>• Training Mat – Stable training surface</li></ul>	<ul style="list-style-type: none"><li>• Energy Expenditure</li><li>• Heart Rate (HR)</li><li>• Lactate Concentration (MetaMax 3B Spirometer)</li><li>• Rate of Perceived Extraction (RPE)</li><li>• PACES Questionnaire</li></ul>



## Study Design



# Study IV

## RESULTS

### • Energy Expenditure (kcal/17min)

Energy expenditure within the exercise time and five-minute post load was about 5% higher for exercising on the ICAROS Cloud compared to exercising on the training mat albeit the effect size being small (Wilcoxon Test (p. = 0.005/ d.= 0.9/ 95% CI [1.5; 6.4]) ).

- Mean values :
  - ICAROS Cloud : 83 ± 15 kcal /17 min
  - Training Mat : 79 ±16 kcal / 17 min

### • Heart Rate (bpm)

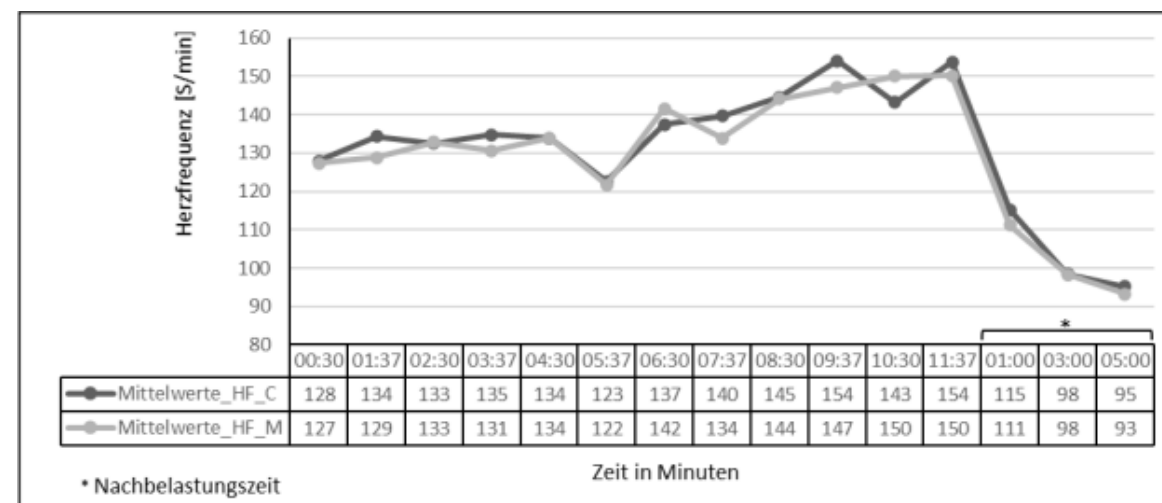
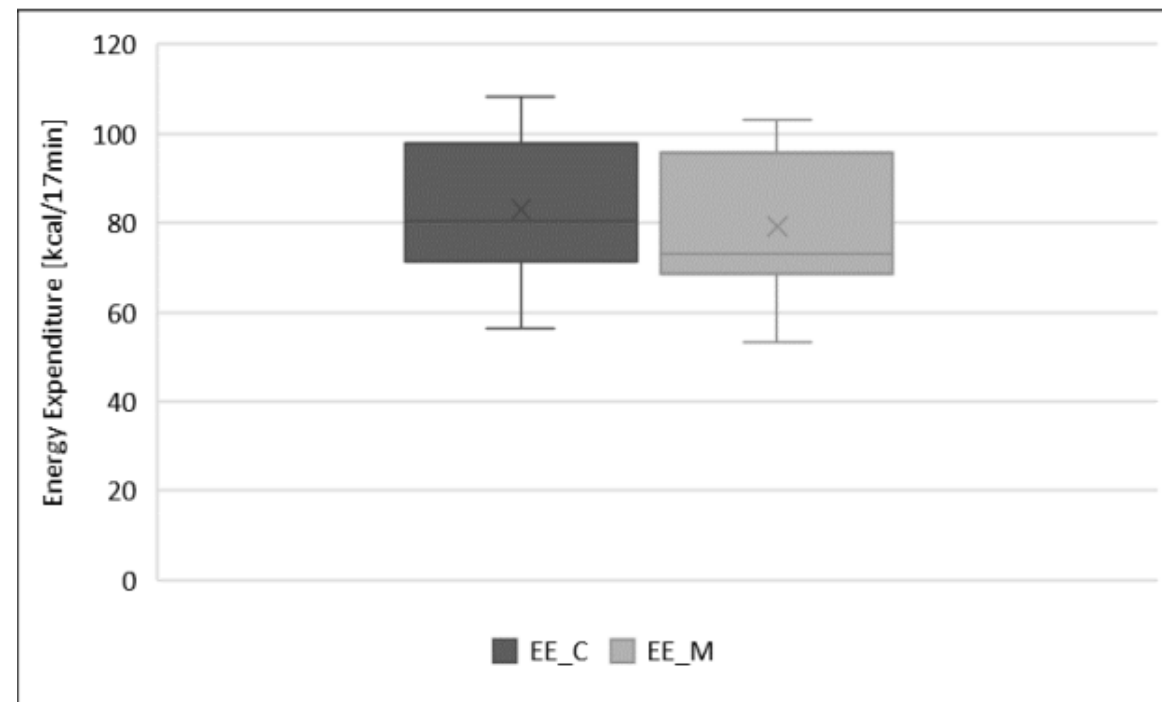
T-tests for dependent samples also reveal no significance (p. = 0.209/ 95% CI [-1.7; 7.1]).

- Mean values :
  - ICAROS Cloud : 156 ± 16 bpm
  - Training Mat : 154 ± 18 bpm

### • Lactate Concentration (mmol/l)

Lactate concentration in the blood is more while exercising on the ICAROS Cloud (T-test (p. = 0.314/ 95% CI [-0.4; 1.2])).

- Mean values :
  - ICAROS Cloud : 5.8 ± 1.9 mmol/l
  - Training Mat : 5.4 ± 2.1 mmol/l



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## RESULTS

### • Rate of Perceived Exertion (Borg Scale)

- The t-test for dependent samples does not show significance (p. = 0.909/ 95% CI [- 0.7; 0.6])

- Mean values :

- ICAROS Cloud :  $12.9 \pm 1.7$
- Training Mat :  $12.9 \pm 2.0$

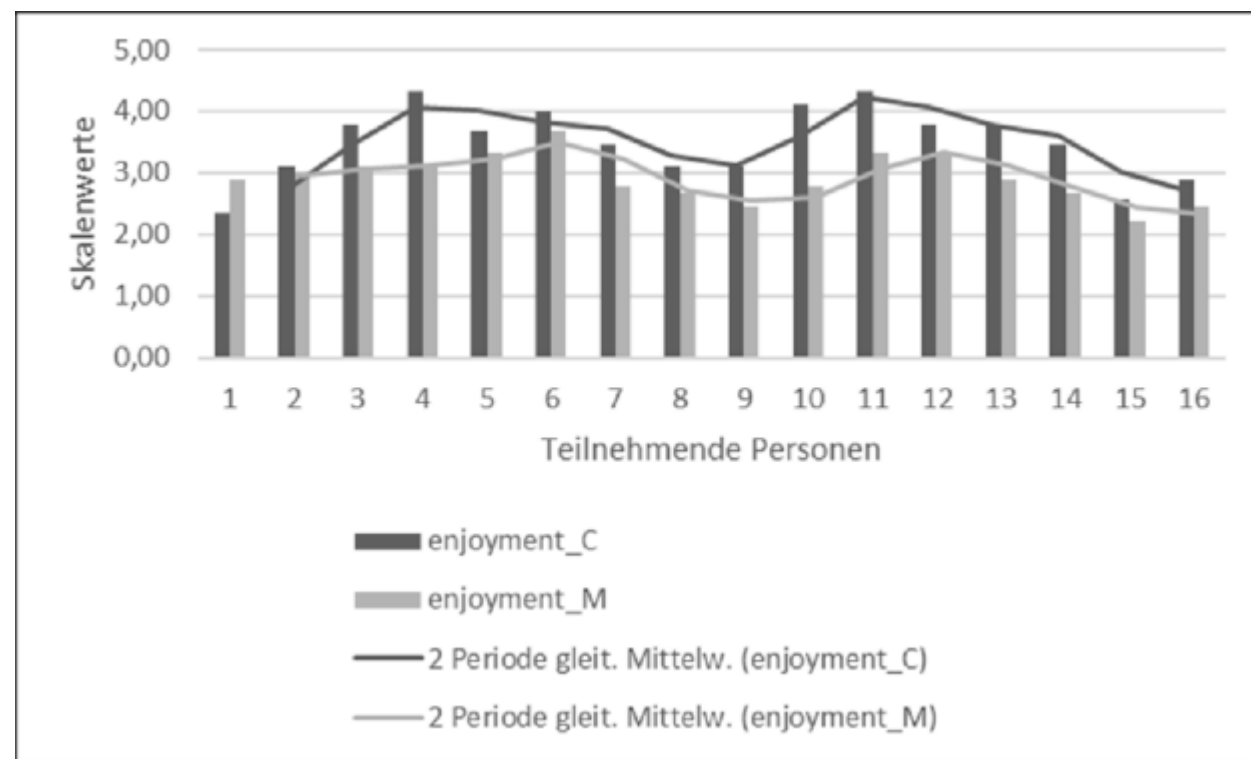
### • PACES Questionnaire

- Training on the ICAROS CLOUD is significantly better than training on the training mat in terms of fun factor( T-test (p. = 0.000/ 95% CI [0.3; 0.8]), with Cohen's d = 1.2.

- Mean Values :

- ICAROS Cloud :  $3.5 \pm 0.6$
- Training Mat :  $2.9 \pm 0.4$

	Mean $\pm$ standard deviation	Paired differences				Sig. (2- sided)
		Mean value	Standard deviation of the mean	95% confidence interval of the difference		
				At	Upper	
RPE_CLOUD	12,9 $\pm$ 1,7	-,03571	1,22835	-,69026	,61883	,909
RPE_MATTE	12,9 $\pm$ 2,0					



## Conclusions

- Training on the ICAROS Cloud leads to an increase in cardiopulmonary and metabolic parameters compared to training on a training mat as is evident in the absolute values of all the measured variables even though the differences were not significant.
- The energy metabolism on the ICAROS Cloud is about 5% higher than on training on a mat. Since the trainings on both the ICAROS Cloud and Mat mirror each other, the higher calorie consumption can directly be attributed to the effectiveness of ICAROS Cloud.
- The lactate concentration after training on the ICAROS Cloud is 7 % higher than training on the mat. Similarly, the heart rate is also about 1 % higher on The ICAROS Cloud.
- In terms of 'fun factor', there is a clear and significant difference between training on the Cloud and on the mat as it is more fun to train on the ICAROS Cloud.
- The findings show that despite the tendency to be more demanding, there is a higher willingness to train on the ICAROS Cloud than the mat. This would also imply a higher willingness to train on the ICAROS Cloud and therefore a potential to increase the intensity as well as the quantity of training sessions.