

## Evaluation of physiological parameters riding the Me-Mover

### Methods

The evaluation was performed as a case study with a young male subject (83.6 kg) riding the Me-Mover on a large treadmill (Woodway Pro Series). Oxygen uptake, heart rate and lactate measurements were acquired continuously at three distinct intensities; easy, moderate and maximal. The two lowest intensities were compared to equivalent intensities during normal walking and running.

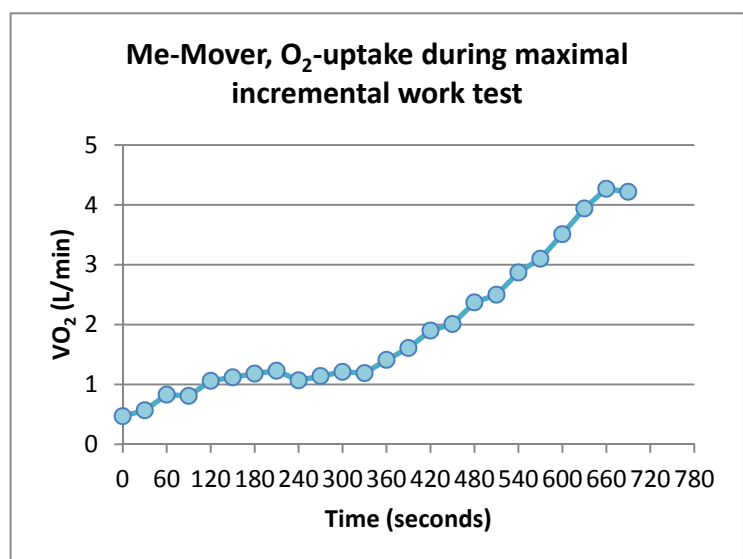


### Results

Modality	Speed km/h	Incline %	VO <sub>2</sub> L/min	HR bpm	Lactate mmol/L	VE L/min	RER
Walking	4.5	0	0.95	78	-	-	-
Running	12.0	0	3.61	145	2.46	-	-
Me-Mover	7.5	0	1.10	105	-	25.0	0.75
Me-Mover	26.0	3	3.50	145-150	-	101.4	1.06
Me-Mover	26.0	6	4.27	176	9.35	144.5	1.23

Riding the Me-Mover at a pace of 7.5 km/h elicited an oxygen uptake of 1.1 L/min and a heart rate of 105 bpm. This was slightly higher than normal walking on the treadmill at 4.5 km/h which elicited an oxygen uptake of 0.95 L/min and a heart rate of 78 bpm. These results indicate that the Me-Mover at low speed has a movement efficiency that is equivalent to or slightly higher than walking. It is however likely, that actual movement efficiency is higher than these numbers indicate, as some additional effort went into riding the Me-Mover precisely in the center of the treadmill.

Comparing Me-Mover to running at 12 km/h, we found that the equivalent oxygen uptake on the Me-Mover was reached at 26 km/h and an incline of 3 % on the treadmill

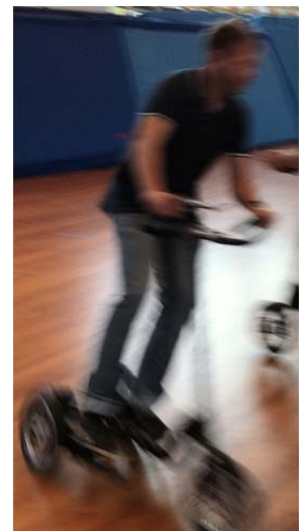


(running: 3.5 L/min, Me-Mover : 3.6 L/min). For both work modes, heart rate was 145-150 bpm. Thus, the movement efficiency of the Me-Mover is significantly higher than normal running and comparable to bicycling at higher speeds.

Exhaustion of the test subject riding the Me-Mover occurred at 26 km/h and a 6 % incline.  $VO_2$  was 4.27 L/min, lactate 9.35 mmol/L and RER 1.23. These observations clearly indicate that maximal training intensities can be achieved on the Me-Mover, suggesting that the Me-Mover can be utilized as an alternative to conventional modalities (e.g., running, rowing, bicycling) used to stimulate aerobic exercise capacity.

### **Evaluation of muscle usage**

Riding the Me-Mover involves using large muscle groups especially in the lower body. This is evident from the high oxygen uptake that was achieved during the maximal test. By observing usage of the Me-Mover during non-restricted conditions, it is obvious that upper body muscles are also engaged depending on riding patterns. Especially arms and core muscles can be highly activated in fast turning and slalom-like movements.



### **Evaluation of impact on joints and posture**

Riding the Me-Mover is a low impact activity. People with typical running injuries such as knee- or Achilles tendon problems should be able to ride the Me-Mover without provoking these conditions. The upright riding position combined with the low impact nature of the movement creates a back-friendly exercise mode. Using the Me-Mover involves a very low risk for injuries (excluding impact accidents) and could be a good candidate for an alternative exercise mode for people suffering from injuries from other activities.

### **Conclusions**

The movement efficiency of the Me-Mover at low speed is close to higher than in walking.

At higher speeds, the Me-Mover has a movement efficiency that is much higher than running and comparable to normal bicycling. This is evident as the oxygen costs associated with riding the Me-Mover at 26 km/h and 3 and 6 % grades were similar to the estimated oxygen cost for bicycling at the same speed and grade without air resistance (calculator: <http://www.tribology-abc.com/calculators/cycling.htm>).

Collectively, these results show that it is possible to reach maximal exercise intensities riding the Me-Mover. Further, the exercise stimulus attained during maximal effort on the Me-Mover is comparable to the exercise intensities reached during maximal running.

Using the Me-Mover is a low impact activity with low risk of injuries to joints and tendons. Muscle involvement is relatively large and distributed to most important muscle groups such as legs, core and arms.

Overall, the Me-Mover can be recommended as healthy exercise modality for either daily transport or specific training.

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