

Effect of Bungee Unweighting on VO₂, Heart Rate, RPE, and Body Weight While Walking

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ABSTRACT

Unweighting systems are commonly used for rehabilitation and training purposes, and can alter energy expenditure, pain perception, and joint stress. The Lightspeed Lift is a relatively new unweighting system that uses bungees to support the user and is less expensive than more common unweighting systems. This study seeks to explore the difference in energy expenditure during walking while bearing normal body weight compared to when using the Lightspeed Lift at low, intermediate, and high unweighting.

PURPOSE: To explore the effect of using a treadmill bungee support system (Lightspeed lift) on oxygen consumption (VO₂), heart rate (HR), and rating of perceived exertion (RPE and VAS). **METHODS:**

Participants (n=43, age=28.4±7.4 yrs, ht=160.2±7.7 cm, wt=76.6±17.6 kg) walked on a treadmill at three mph while interfaced with an oxygen analyzer without unweighting (NU), unweighted at the manufacturer's recommendation (UI), unweighted at one level above that (UH), and one level below (UL). Participants were weighed on the treadmill with and without support before and after the five-minute walk and sat until heart rate returned to pre-exercise levels or five minutes (whichever came first) between trials. Repeated measures ANOVA were used to identify differences, with Alpha set at .05. **RESULTS:** Heart rates were significantly different between UL (121.1±20.8 b/min) and UH (118.6±22.5 b/min), $p = .003$. Oxygen consumption was significantly higher in NU (13.4±1.4 ml/kg/min) compared to UH (12.4±2.0 ml/kg/min), $p = .003$, and UL (13.3±2.2 ml/kg/min) was also significantly higher than UH, $p = .002$. Participants perceived (Borg's 6-20) unweighting in UL, UI, and UH to significantly reduce effort compared to NU, $p < .05$. Participants felt greater effort in UL compared to UI, as well as UL compared to UH (VAS scale), $p < .05$. Body weight was significantly different between all trials ($p = .001$) as well as pre and post each trial ($p = .001$). **CONCLUSION:** Unweighting at one level higher than recommended (approximately 5 cm) reduces VO₂ and HR compared to one level lower than recommended, which is also consistent with perception of effort. These could be beneficial for rehabilitation or daily activity purposes.