2012

Energy Cost of Locomotion During Partial Bodyweight Support

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Background

Partial bodyweight support devices have applications in clinical rehabilitation, sports medicine[3,4], and have been further used as ground-based models to simulate microgravity[1]. In the context of sports medicine and exercise science, bodyweight support devices lower the weight of the individual which in turn reduces the forces acting on the musculoskeletal system[2,5]. This allows individuals that are recovering from a lower body injury/ surgical procedure to recover faster and maintain physical fitness[3,4]. There are, however, some limitations concerning the use of body weight support equipment. In order to accomplish an appropriate training stimulus, the relationship between the metabolic cost of locomotion and various speeds and extent of bodyweight support (BWS) must be determined and validated.

Purpose

The purpose of this study was to validate the relationship between the extent of partial body weight support (BWS) with the metabolic cost of locomotion at various running velocities in humans exercising on an AlterG® treadmill.

Figure 1. An individual running on the AlterG® treadmill

Results

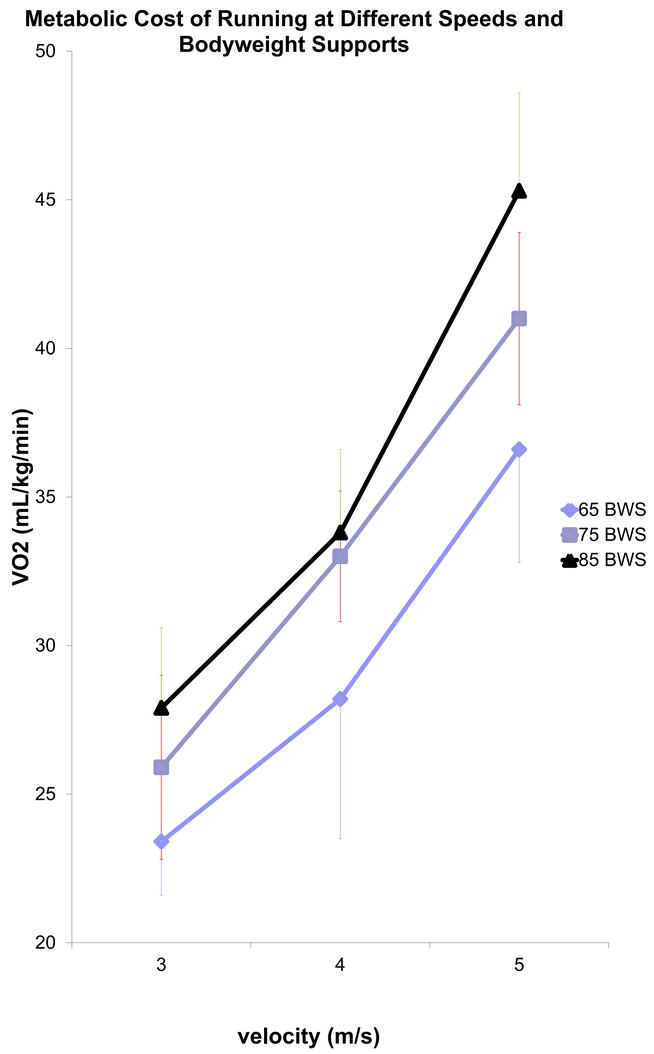

Figure 2. The metabolic cost of running at different speeds (3m/s, 4m/s, 5m/s) and different bodyweight supports (65, 75, 85)

* Velocity and bodyweight support (BWS) were significant predictors of metabolic cost) ($p>\alpha$)

Materials and Methods

Subjects

Six apparently healthy college aged males and females that ran 30 or more miles per week were recruited for the study.

Method:

The study consisted of two sessions that lasted one hour. The sessions were conducted at 3Dimensional Physical Therapy & Sports Conditioning Clinic. In each session subjects ran randomized combinations of speeds and body weight supports on the AlterG® treadmill. There were a total three speeds (3 m/s, 4 m/s, 5m/s) and three body weight supports (65, 75, 85) that made up nine possible combinations. Metabolic cost was evaluated through a portable metabolic analyzer (Oxycon Mobile).

Figure 3. The Oxycon Moblie , a portable metabolic analyzer.

Conclusion

Both velocity and bodyweight support were significant predictors of metabolic cost. All of the responses were considered physiological.

References

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Acknowledgements

The research was funded by the University of Puget Sound 2012 General Summer Research Grant and by a grant funded by the University Enrichment Committee.