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**THE REDUCTION OF METABOLIC COST  
WHILE USING HANDRAIL SUPPORT  
DURING INCLINED TREADMILL  
WALKING IS DEPENDENT ON THE  
HANDRAIL USE INSTRUCTION**

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*Performed by University of Massachusetts-Lowell and  
Cybex Research Institute*

*Authors: Cory Hofmann, Connor Dougherty, Hagop  
Abkarian, Michele Fox, Paul Juris*

## INTRODUCTION

Treadmill walking at an incline is a common activity used to increase cardiovascular health. Many exercisers hold onto the treadmill's handrails while walking at an incline. Using the handrails while walking may make the workout feel easier, but it is not clear if the effectiveness of the workout is diminished as a result.

## OBJECTIVES

To determine the effect of different handrail usage instructions on calorie burn while inclined walking on a treadmill.

## METHODS

Thirteen healthy subjects were asked to walk on a treadmill at both 5% and 10% inclines with and without holding onto the handrails. When holding onto the handrails, subjects were instructed to either 'remain upright' or 'lean back' (Figure 1). Expired air was measured during all exercise conditions, and all subjects were asked to rate how hard they felt they were working (rating of perceived exertion, RPE). Energy expenditure ('calorie burn', kcal/min) was calculated based on the expired air during exercise.



Figure 1. Handrails used in the present study. Subjects were instructed to either walk unsupported (not holding onto anything) or to grasp at a self-selected location and to use the handrails to either 'lean back' (right) or 'remain upright' (left) during experimental trials.

## RESULTS

Subjects demonstrated a slightly greater calorie burn (Figure 2) when walking at 5% with no handrails (6.32 kcal/min) compared to walking at 10% and using the handrails to lean back (6.02 kcal/min). Interestingly, walking at 10% and leaning back resulted in a higher RPE compared to walking at 5% with no handrail use. Walking at 10% unsupported resulted in a similar calorie burn (10.62 kcal/min) to walking at 10% and using the handrails while remaining upright (11.42 kcal/min).

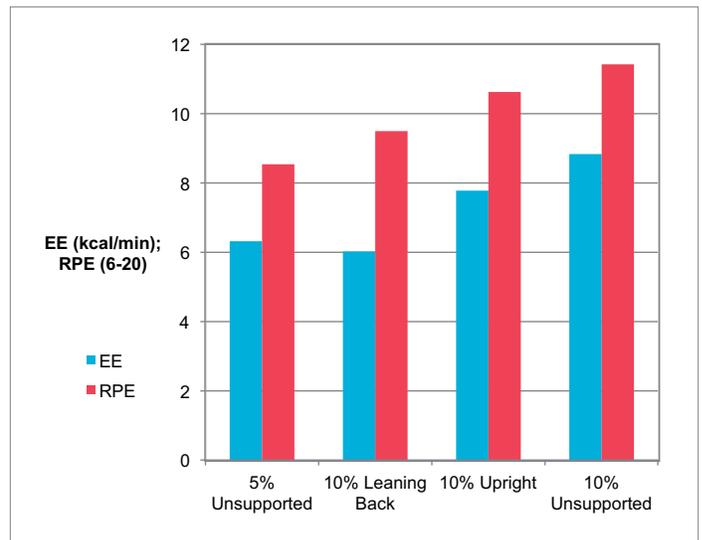


Figure 2. Energy Expenditure (EE) and Rating of Perceived Exertion (RPE, on a scale of 6-20) during four inclined treadmill walking conditions.

## CONCLUSIONS

Using the handrails reduces workout calorie burn by 31.8%, but only if the exerciser is using the handrails to lean back while walking. Using the handrails and remaining upright while inclined walking is an alternative that does not reduce the calorie burn of the workout as drastically as leaning back. These findings also show that walking unsupported at a lower incline might be a superior alternative to walking at a higher incline and leaning back with the handrails. If an exerciser is going to use the handrails for support, then having multiple options that provide the ability to comfortably hold on and remain upright would be desirable.

This study is available in its entirety at:

<http://digitalcommons.wku.edu/ijes/vol7/iss4/10/>