OCTANE FITNESS: WHITE PAPER

SUBJECT:

Octane Fitness® Zero Runner® is Metabolically Equivalent to Treadmill During Submaximal Exercise

University research examines effects of high-impact vs. low-impact cardiovascular machines

Running as exercise and as a competitive sport has continually grown in the United States due to its effectiveness in training the cardiovascular system and the popularity of recreational races, from 5Ks to marathons. Although it confers multiple physiological and psychological advantages, running is a high-impact activity that can lead to injuries from repetitive stress. Common overuse injuries include patellofemoral stress syndrome, shin splints, plantar fasciitis, iliotibial band syndrome and piriformis syndrome.

While runners have modulated impact by using other exercise modalities, such as ellipticals, cycling and swimming, these do not provide the specificity of running mechanics and muscle activity; thereby limiting the training effect. While the Alter G® anti-gravity treadmill is a viable alternative, it is very expensive and typically only available in some physical therapy clinics, making it somewhat impractical for many runners.

The new Zero Runner from Octane Fitness, however, replicates natural running motion but eliminates the impact, and is widely accessible at health clubs and homes. This study, conducted in the fall 2015 by the Biokinetics Program at Bethel University in St. Paul, Minn., compared the metabolic stress between the Zero Runner and a treadmill at submaximal exercise levels to better understand how each affects the body.

Methods

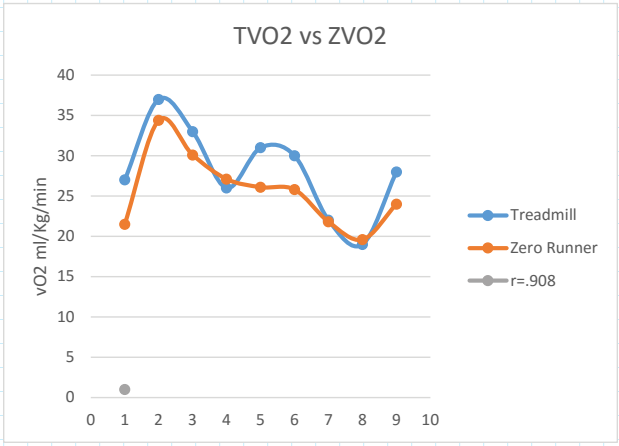
Twelve college students (five male, seven female; mean age 20.2 ± 1.3SD years) who abide by the ACSM cardiorespiratory exercise guidelines of ≥150 minutes of exercise/week participated in this study. All testing was conducted at Bethel University in the Biokinetics Program. Subjects completed two separate 25-minute graded exercise bouts: one on a treadmill (TM), and the other on the Zero Runner (ZR). Each graded exercise test was randomly assigned to participating subjects and separated by 48 hours to maintain reliability.

Subjects performed a five-minute warm-up on a stationary bicycle to become familiar with the metabolic equipment associated with the Oxycon mobile device (including mask and vest), followed by 15 minutes exercising at 60-65 percent of their heart rate maximum (HRM), as determined by 208-.7 x age, and then a cool down. Intensity on the treadmill was controlled by increasing or decreasing the speed to ensure the HR stayed between 60-65 percent. On the Zero Runner, subjects were ordered to increase or decrease their speed to maintain a HR response of 60-65 percent, due to the self-propulsion required to operate the machine. Metabolic response was recorded using the Oxycon mobile device for accurate data collection. Metabolic variables collected included oxygen consumption (VO2), respiratory exchange ratio (RER), volume of carbon dioxide expired (VCO2) and ventilatory equivalents for oxygen (EQO2).

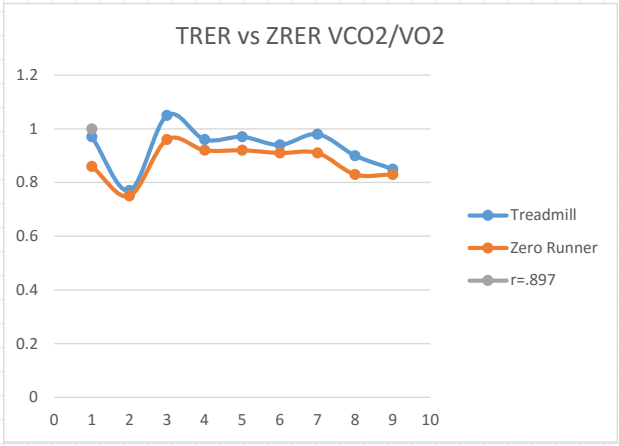
Results

Pearson's correlational analysis displayed significant equivalence between participants on the TM and ZR in these key areas:

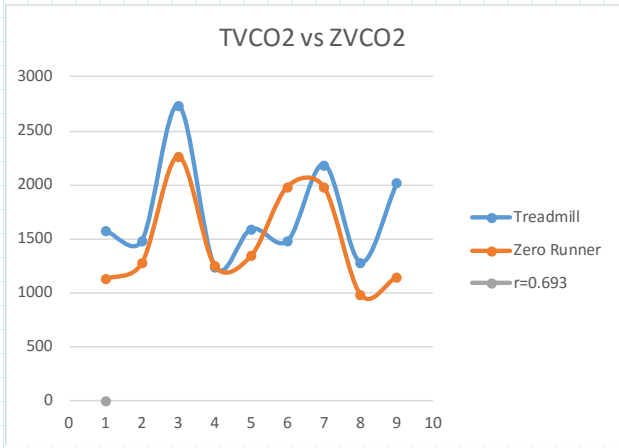
- Oxygen Consumption (VO2):
  TM $\bar{x}$ = 28.1 ml/Kg/min ± 5.45ml/Kg/min
  ZR $\bar{x}$ = 25.1 ml/Kg/ min ± 4.6 ml/Kg/min
  (r = 0.908, p = 0.001)



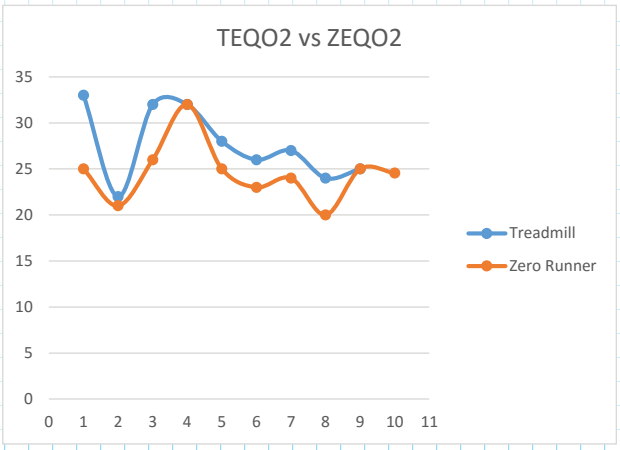
- Respiratory Exchange Ratio (RER):
  TM $\bar{x}$ = 0.92 ±0.08
  ZR $\bar{x}$ = 0.87 ±0.06 (r = 0.897, p = 0.001)



- Volume of Carbon Dioxide Expired (VCO2):
  TM $\bar{x}$ = 1734.5 ±451.3
  ZR $\bar{x}$ = 1484.2 ±462.3 (r = 0.693, p = 0.038)



- Ventilatory Equivalents for Oxygen (EQO2):
  TM $\bar{x}$ = 27.6 ±3.98
  ZR $\bar{x}$ = 24.4 ±3.46 (r = 0.756, p = 0.019)



Conclusion

The data indicates that ***the Zero Runner is metabolically equivalent to a treadmill during submaximal exercise.*** The Zero Runner is a self-propelled cardiovascular exercise machine, and this enables it to compare to outdoor running training, as opposed to running upon a treadmill in which the belt moves during exercise. As the Zero Runner focuses on proper running form, like full gait strides, heel flares and striking with the balls of the feet instead of heel striking, it has similar muscle recruitment to running outdoors. Therefore, the Zero Runner has the physiological basis to serve as an appropriate exercise modality to solicit the metabolic adaptations observed during traditional running.

Implications and Practical Application

Recognizing that high-impact exercise can lead to injury, and is not well-tolerated by some exercisers, the fitness industry has created new cardiovascular machines that are low-impact, such as ellipticals, stairclimbers and alternate motion trainers. Previous research (Mercer, 2001.) has compared the peak oxygen consumption and heart rate during exercise on high-impact and low-impact cardiovascular exercise machines (a treadmill and elliptical), and found no differences between machines for any of the peak variables, VO2 and/or HR.

However, none of these modalities truly replicate running until the Zero Runner. Now, aspiring runners, injured runners, aging runners and competitive runners have a valuable, no-impact option with training specificity and relevant muscular recruitment patterns that delivers metabolic equivalence to high-impact cardiovascular running machines such as treadmills and physiological equivalence to running outdoors.

Multiple benefits are conferred by the Zero Runner, as it eliminates repetitive impact but still provides specific running conditioning effects. It is a viable alternative to the treadmill in reducing stress to the joints and better replicating natural running strides used outdoors than those used on a moving belt. It can help runners safely add miles, focus on perfecting their form, perform active recovery, eliminate junk miles, incorporate cross training and reduce their risk of injuries during race preparation.

Ultimately, the Zero Runner provides a means for runners to maintain cardiovascular endurance and log additional miles safely, without losing any valuable training effects, and without harmful pounding – all of which can help maximize the longevity of a running career.

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