The American College of Sports Medicine Exercise Intensity Guidelines for Cardiorespiratory Fitness: Theoretical or Practical?

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Abstract

Cardiorespiratory fitness is the collective ability of the cardiovascular and pulmonary systems to deliver oxygenated blood to contracting skeletal muscle. Cardiorespiratory fitness can be used as a good indicator of overall health, low levels of cardiorespiratory fitness have been associated with an increased risk for cardiovascular disease and premature death, while moderate to high levels of cardiorespiratory fitness have been attributed to longevity and a decreased risk for cardiovascular disease. The American College of Sports Medicine (ACSM) currently recommends 20-60 minutes of aerobic exercise 3-5 days/week at an intensity of 40-85% of heart rate reserve (HRR) or oxygen uptake reserve (VO2R) [calculated from the difference in resting and maximal oxygen levels], as the ratio of HRR to VO2R is more ideal. Prior to 1990 exercise was prescribed in terms of VO2max, however, in 1998 the ACSM revised the exercise intensity guidelines based on the discrepancy between HRR and VO2max, with increased levels of accuracy among sedentary or low-fit individuals exercising at lower intensities (illustrated in Figure 1 - Lounana et al. 2007). Despite the shift from prescribing exercise in terms of VO2max to VO2R, many researchers continue to refer to and/or apply the out-of-date and inaccurate guidelines.

Purpose

The purpose of this study was to quantify the misinterpretation and misapplication of the current American College of Sports Medicine (ACSM) exercise intensity guidelines, based on exercise prescription in terms of %VO2max rather than HRR or VO2R. Misinterpretation refers to a misunderstanding of the guidelines while misapplication consists of incorrectly applying the guidelines.

Methods

• MEDLINE search (2000-2007) performed: Exercise Intensity (independent variable), Cardiovascular fitness (dependent variable). Key words: Cardiovascular fitness, aerobic fitness, endurance training, exercise training, maximal oxygen uptake, and %VO2max.

• Reference list of articles obtained and were cross-referenced for additional studies.

• 2001-2007 MSSE (Medicine & Science in Sports & Exercise) issues were perused for exercise training studies with prescribed intensity in %HRR, %VO2R, and %HRmax (ACSM recommended), as well as %VO2max (not-recommended).

• Lounana, J., Campion, F. Noakes, T.D., & Medelli, J. Relationship between %HRmax, %HR Reserve, %VO2max, and %VO2Reserve in Elite Cyclists. Medicine and Science in Sports and Exercise, 32(12), 2106-2112.

• Asikainen et al. 2005.10152025(% VO2R)


• McArdle, W.D., Katch, F.I., & Katch, V. Exercise Physiology Textbook (6th ed). Figure 2. MSSE publications (2001-2007) of training studies and the method of exercise intensity prescribed

• Summary and Conclusions

Cardiorespiratory fitness has been attributed to longevity and a decreased risk for cardiovascular disease. Specific guidelines have been set by the ACSM on how to maintain and improve this physiological parameter.

Based on the review of many research studies, there is considerable misinterpretation and misapplication of the current ACSM exercise intensity guidelines for cardiorespiratory fitness.

• The utilization of %VO2R allows for an equal adjustment from resting VO2 to target VO2 among individuals with unequal fitness levels, while exercise prescription in terms of %VO2max does not allow for an equal adjustment. Therefore, when prescribing the same exercise intensity to individuals among different fitness levels, the results will inevitably be unequal adjustment from rest to target VO2.

• Referring to %VO2max rather than %HRR or %VO2R perpetuates an outdated recommendation, adds a confounding variable in research, leading to invalid recommendations and inappropriate standardization of exercise; and potentially creates confusion among the general population.

• Based on our current findings, we conclude that there is considerable misinterpretation and misapplication of the current ACSM exercise intensity guidelines. We recommend exercise professionals integrate the current guidelines into both research and practice.

Table 1. Brief summary of sources misinterpreting the current ACSM exercise intensity guidelines

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Publication</th>
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<tbody>
<tr>
<td>Branch et al.</td>
<td>2010</td>
<td>Journal of Women's Health &amp; Gender-Based Medicine</td>
</tr>
<tr>
<td>Askarzadeh et al.</td>
<td>2002</td>
<td>British Journal of Sports Medicine</td>
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<tr>
<td>Tek &amp; Are</td>
<td>2002</td>
<td>Medicine &amp; Science in Sports &amp; Exercise</td>
</tr>
<tr>
<td>Menn et al.</td>
<td>2004</td>
<td>Medicine &amp; Science in Sports &amp; Exercise</td>
</tr>
<tr>
<td>Pintner et al.</td>
<td>2006</td>
<td>Medicine &amp; Science in Sports &amp; Exercise</td>
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<tr>
<td>Mackinnon et al.</td>
<td>2003</td>
<td>Exercise Management Textbook</td>
</tr>
<tr>
<td>McArdle, Katch, &amp; Katch</td>
<td>2007</td>
<td>Exercise Physiology Textbook (6th ed)</td>
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Figure 1. Regression lines for predicted values of %VO2max and %VO2R at a given value of %HRR

Seven instances of misinterpretation were identified; discussing exercise intensity in VO2max terms and referring to them incorrectly as the current ACSM exercise intensity guidelines. Twenty-two instances of misapplication were identified in which training studies prescribed exercise intensity by means of %VO2max rather than in HRR or VO2R. Table 1 displays the seven sources of misinterpretation of the current ACSM exercise intensity guidelines. Figure 2 summarizes the method of exercise intensity prescribed in training studies from MSSE publications from 2001-2007.

References

