THE ASSESSMENT-PREDICTION CAPACITIES OF TEACHERS DURING PHYSICAL ACTIVITIES IN THE PRIMARY SCHOOL IN ITALY: ANALYSIS OF THE RELATIONSHIP BETWEEN EXPECTED ENERGY EXPENDITURE AND ACTUAL ENERGY EXPENDITURE DURING A LIGHT PHYSICAL ACTIVITY LASTING 15 MINUTES

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Abstract

The present pilot study addresses the need of assessing the existence of significant elements which would justify a more deep following study on how the lack of specific skills training in the areas of physical education assessment and technology for the measurement of physiological parameters involved in the experience of teaching-learning through and about physical and sports activities, could negatively affect the didactics, realizing movement activities in which the intensity level does not correspond to the real intentions of the teacher. Specifically, the aim was to analyze the relationship between expected values of energy expenditure with the actual energy expenditure during a light physical activity lasting 15 minutes, using a portable calorimeter. The methodology of the research required the adoption modalities appropriate to the Italian school context that has some peculiarities that do not allow the use of certain procedures traditionally used in other fields of research on motor-sports activities (Sibilio, 2008). The sample was made of 176 primary school students of Campania Region (Italy), from 11 classes including 2 classes of year one, 2 of year two, 2 of year three, 3 of year four and 2 of year five. The results showed that the teaching methods used by teachers appear not suitable for a light physical activity. In fact, in six classes out of 11 it was reached or exceeded the minimum level corresponding to intense physical activity.

Key words: physical and sports activities, teachers training, didactics, energy expenditure, calorimeter

Introduction

Several studies conducted at the international level in recent years have highlighted the importance of teachers training in physical and sports activities for the development of healthy and effective motor habits in children in the period of primary schooling (Stewart et al., 2004; Fairclough et al., 2006, Bailey et al., 2009). In this respect, the so-called Berlin Declaration has drawn international attention on the need “to recognize that quality Physical Education depends on well-qualified educators and scheduled time within the curriculum” (Penny et al., 2009). Italy has responded to this need for qualification of teachers in the physical education field, emerged on the international level, with an increasing attention to the physical and sport practice, even if without reaching a final resolution of the problem of the professional primary school teachers training, which has to consider methodological and assessment knowledge that should be part of a qualified professional. The delineation of the training path of primary school teachers in Italy has in fact followed a long process that has begun to produce its effects only in 1998, when the Ministerial Decree 26/05/98 (G.U. 3/07/98) no. 153 with the establishment of the Degree course in Sciences of Primary Education, started the new university teachers formation targeted, for the first time, to the academic qualification of teachers of infant and primary school, building up at the same time, a decent and institutionally recognizable training dimension of physical education. In most university curricula for the teaching profession, also in the training of teachers of different orders and degrees of study, have been away didactics, teaching methodology, laboratory experiences and practical training that are crucial in the building of a portfolio of skills, that can be considered a synthesis of theory and teaching practice (Sibilio & Gomez-Paloma, 2004). The new model of university education, proposed by the Ministerial Decree of 1998, has placed new emphasis on the need for a greater specialization in the teaching of physical activities during infancy and preadolescence, including in the degree course physical and sports disciplines, exercises, practical training courses and training laboratory, which have, for the first time, represented a privileged and indispensable area for the qualification of the university curricula of will-be teachers. In parallel, there has been a growing need to start new experimentations aimed at defining the training needs of teachers who sometimes apply teaching methods in the field of physical and sports activities in an absolute unawareness of the physiological effects produced on students. At the same time, the focus on procedures and assessment tools to
promote quality physical education at international level (Shepard, 2000; Hay, 2006) imposes a necessary testing of instruments not traditionally used in school settings, that are, for their characteristics of handling and measurement accuracy (Jakičić, 2004; Arvidsson, 2007), valid aids in verifying the results of the adopted teaching methodologies. In this regard, the present pilot study addresses the need of assessing the existence of significant elements which would justify a more deep following study on how the lack of specific skills training in the areas of physical education assessment and technology for the measurement of physiological parameters involved in the experience of teaching-learning through and about physical and sports activities, could negatively affect the didactics, realizing movement activities in which the intensity level does not correspond to the real intentions of the teacher.

Methods

The research required the adoption of instruments and methodologies appropriate to the Italian school context that has some peculiarities that do not allow the use of certain procedures traditionally used in other fields of research on motor-sports activities (Sibilio, 2008). The methodology included the following steps:

- setting of a university-school working group made of researchers of the University of Salerno and teachers of primary school (school that in Italy is attended by 6-11 aged students);
- an integrated school-university plan to share the aims of the research, the methods and the procedures;
- arrangement of an informative report to collect data on age, weight, height, diets, or any sports done as well as information about students' lifestyles;
- training to teachers how to use the portable multi sensor monitoring system (calorimeter);
- request to the students to perform a physical activity of warm-up lasting 15 minutes;
- application of the required physical activity, collecting data of the caloric consumption of each student;
- Analysis and processing of data related to the calorimetric recordings made with the production of a vertical bar graph of the average total energy expenditure and of the average expenditure for the physical activity performed.

Sample

The research was carried out using as a sample students attending the primary school of Campania Region (Italy) formally agreed with the Department of Educational Sciences of the University of Salerno for a total of 176 students from 11 classes 2 classes of year one, 2 of year two, 2 of year three, 3 of year four and 2 of year five.

Results

Graphs 1 and 2 shows the average values of energy consumption respectively in kcal / kg and METs for each examined class, while Table 1 and 2 show respectively the values in METs of standard consumption for various physical activities and the processed data collected by the observations. Table 1 and in Graph 2 show energy expenditure above the expected average consumption in METs for a light physical activity such as warm-up. Graph 3 shows the comparison between the total average of expended METs and expected METs. Graph 3 shows a clear difference in consumption between the standard for a light physical activity such as warm-up and the average expenditure values actually detected. In particular, in 97% of the observations the expenditure of METs appears to be greater than that required by a light physical activity that is 3 METs, whereas in 52% of the observations the value of METs consumed exceeds the standard in METs required for a moderate physical activity, reaching average values of expected consumption in intense physical activity.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>METs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light physical activity</td>
<td>&lt; 3.0</td>
</tr>
<tr>
<td>Moderate physical activity</td>
<td>3.0-6.0</td>
</tr>
<tr>
<td>Intense physical activity</td>
<td>&gt; 6.0</td>
</tr>
</tbody>
</table>

Analysis and processing of data related to the calorimetric recordings made with the production of a vertical bar graph of the average total energy expenditure and of the average expenditure for the physical activity performed.

Instruments

As a calorimetric monitoring system was used the portable metabolic holter BodyMedia enables the recording and analysis of accurate data on energy expenditure, physical activity and lifestyle. The system is made of a clinically validated portable calorimeter, the SenseWear Armband, and software for viewing and analyzing data. The Armband continuously records a series of physiological data of the body. The collected data are then analyzed, graphically displayed and presented by the software on a report that clearly shows the energy expenditure of the subject.

Units of measurement

The units of measurement used for the detection of calorie consumption are kcal and METs, and in particular it was chosen to place greater emphasis on the use of METs as standard unit of measurement widely used for the evaluation of calorie expenditure. MET (Metabolic Equivalent of Tasks) is the unit of measurement used to describe the intensity of physical effort and is based on multiples of oxygen consumption at rest - MET = kcal / kg / h.

Table 1. Intensity and METs

<table>
<thead>
<tr>
<th>Intensity</th>
<th>METs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light physical activity</td>
<td>&lt; 3.0</td>
</tr>
<tr>
<td>Moderate physical activity</td>
<td>3.0-6.0</td>
</tr>
<tr>
<td>Intense physical activity</td>
<td>&gt; 6.0</td>
</tr>
</tbody>
</table>
Table 1. Data for 11 classes (1a - 5b)

<table>
<thead>
<tr>
<th>Class</th>
<th>Weight</th>
<th>Kcal</th>
<th>Kcal/weight</th>
<th>st. dev. Kcal/weight</th>
<th>Max</th>
<th>Min</th>
<th>Range</th>
<th>st. dev. Kcal</th>
<th>cff Var %</th>
<th>METs average</th>
<th>st. Dev. METs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>24.6</td>
<td>38.73</td>
<td>1.586</td>
<td>0.359</td>
<td>57</td>
<td>16</td>
<td>41</td>
<td>11.50</td>
<td>29.69</td>
<td>6.34</td>
<td>1.43</td>
</tr>
<tr>
<td>1b</td>
<td>29.7</td>
<td>35.29</td>
<td>1.177</td>
<td>0.258</td>
<td>67</td>
<td>16</td>
<td>51</td>
<td>12.04</td>
<td>34.13</td>
<td>4.71</td>
<td>1.03</td>
</tr>
<tr>
<td>2a</td>
<td>30.0</td>
<td>40</td>
<td>1.352</td>
<td>0.212</td>
<td>50</td>
<td>32</td>
<td>18</td>
<td>4.73</td>
<td>11.85</td>
<td>5.41</td>
<td>0.85</td>
</tr>
<tr>
<td>2b</td>
<td>39.28</td>
<td>39.28</td>
<td>1.409</td>
<td>0.370</td>
<td>54</td>
<td>23</td>
<td>31</td>
<td>7.19</td>
<td>18.31</td>
<td>5.64</td>
<td>1.48</td>
</tr>
<tr>
<td>3a</td>
<td>34.8</td>
<td>62.5</td>
<td>1.791</td>
<td>0.132</td>
<td>99</td>
<td>37</td>
<td>62</td>
<td>14.62</td>
<td>23.41</td>
<td>7.17</td>
<td>0.53</td>
</tr>
<tr>
<td>3b</td>
<td>34.4</td>
<td>52.47</td>
<td>1.514</td>
<td>0.321</td>
<td>92</td>
<td>19</td>
<td>73</td>
<td>15.94</td>
<td>30.40</td>
<td>6.06</td>
<td>1.28</td>
</tr>
<tr>
<td>4a</td>
<td>45.2</td>
<td>75.64</td>
<td>1.653</td>
<td>0.217</td>
<td>107</td>
<td>42</td>
<td>65</td>
<td>22.70</td>
<td>30.01</td>
<td>6.61</td>
<td>0.87</td>
</tr>
<tr>
<td>4b</td>
<td>37.5</td>
<td>58.42</td>
<td>1.568</td>
<td>0.282</td>
<td>77</td>
<td>25</td>
<td>52</td>
<td>12.65</td>
<td>21.67</td>
<td>6.27</td>
<td>1.13</td>
</tr>
<tr>
<td>4c</td>
<td>39.3</td>
<td>63.33</td>
<td>1.621</td>
<td>0.266</td>
<td>88</td>
<td>43</td>
<td>45</td>
<td>12.93</td>
<td>20.43</td>
<td>6.48</td>
<td>1.06</td>
</tr>
<tr>
<td>5a</td>
<td>64.36</td>
<td>64.36</td>
<td>1.510</td>
<td>0.250</td>
<td>115</td>
<td>24</td>
<td>91</td>
<td>22.42</td>
<td>34.83</td>
<td>6.04</td>
<td>1.00</td>
</tr>
<tr>
<td>5b</td>
<td>41.0</td>
<td>49.23</td>
<td>1.21</td>
<td>0.22</td>
<td>76</td>
<td>29</td>
<td>47</td>
<td>13.95</td>
<td>28.34</td>
<td>4.84</td>
<td>0.89</td>
</tr>
<tr>
<td>Tot</td>
<td>35.14</td>
<td>52.41</td>
<td>1.488</td>
<td>0.32</td>
<td>115</td>
<td>16</td>
<td>99</td>
<td>19.08</td>
<td>21.50</td>
<td>5.95</td>
<td>1.28</td>
</tr>
</tbody>
</table>
Conclusion
The data collected showed that the teaching methods used by teachers appear not homogeneous and not suitable for a light physical activity. In fact, in six classes out of 11 it was reached or exceeded the minimum level corresponding to intense physical activity. This highlights the lack of knowledge by teachers of the effects produced by the used teaching methods and the proposed activities, providing the possibility of a further deepening of the analysis of training needs of teachers that nowadays, despite the attention given to their training at academic level, is still very weak in terms of methodology and assessment skills and not very interested in the physiological outcomes that contribute to the effectiveness of physical education teaching.

References

PROCJENA PREDIJKJE KAPACITETA UČITELJA ZA VRIJEME TJELESNIH AKTIVNOSTI U OSNOVNOJ ŠKOLI ITALIJE: ANALIZA ODNOSA OČEKIVANE I STVARNO UTROŠENE ENERGIJE LAGANIH TJELESNIH AKTIVNOSTI POSLIJEDNJIH 15 MINUTA

Sažetak

Ključne riječi: tjelesne i sportske aktivnosti, priprema učitelja, didaktika, potrošnja energije, kalorimetar

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