

Inclusive methods of adaptive training in sprints: a theoretical preliminary study

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Abstract:

Although the WHO (World Health Organization) has developed a new classification tool, the ICF (International Classification of Functioning, Disability and Health) based on the bio-psycho-social model that evaluates the concept of health understood as physical, mental and social well-being, it continues itself to consider different category and separate from that of the normal locution. APA (Adapted Physical Activity) concepts, with the aim of finding alternative solutions and programming physical activities adapted to the needs of everyone, would be a change. But International Paralympic Committee and Italian Paralympic Committee (CIP) applied again the categorization for practice and for completion the sport activities in the same way of non disabled athletes Olympic games. Even more, Special Olympics follow the same way of segregation in sports activities. The difficulties is the different method for different types of athletes (i.e. high level athlete, normal athlete, disabled athlete). The aim is the identification of a new teaching/training method that can develop the skills of disabled and non-disabled athletes, merging the two previously mentioned approaches for sprinter athletes. The methods are meta analysis integrated with systematic review. It shows out the integration of the approaches of learning, ecological and cognitive, which tries to satisfy the physical characteristics of each one, placing everyone on the same level.

Key words: Adapted Physical Activity, IPC, CIP, Special Olympics, teaching/training method.

Introduction

During the years the concept of disability has undergone countless transformations, moving from a mode of approach of total indifference to a process of inclusion aimed at enhancing individual differences and not to diminish them (Altavilla, Di Tore, 2016, Altavilla et al., 2015). However, although the WHO (World Health Organization) has developed a new classification tool, the ICF (International Classification of Functioning, Disability and Health) based on the bio-psycho-social model that evaluates the concept of health understood as physical, mental and social well-being, it continues itself to consider different category and separate from that of the normal locution.

Already in the first decades of the 19th century, they begin to see the first attempts of inclusion of the subjects with disability in the field of sport: blind and visually impaired persons had the possibility to practice physical activity thanks to the birth of the APA (Adapted Physical Activity), with the aim of finding alternative solutions and programming physical activities adapted to the needs of everyone. Later Guttman, neurosurgeon and father of sport for the disabled, opened one of the first rehabilitation centers for people with spinal injuries. In addition to rehabilitation, he introduced a sport-therapy technique that guaranteed muscular and respiratory improvements to his patients. From this initiative were born the first Stoke Mandeville Games for disabled athletes, up to arrive to the current Paralympic Games, governed by the International Paralympic Committee (IPC). In Italy, instead, they are governed by the Italian Paralympic and Experimental Sports Federation (FISPES) regarding physical and sensory disabilities, and by the Italian Paralympic Sports Federation of Relational Intellectuals (FISDIR) regarding intellectual-relational disability. Both are Paralympic Sports Federations affiliated to the Italian Paralympic Committee (CIP). In particular, the Paralympic Athletics in Italy follows the F.I.D.A.L. and I.A.A.F. (Italian Federation of Athletics and International Association of Athletics Federations) regulations, except for those Regulations to which have been made additions or modifications by the IPC. The rules used by the CIP are the result of an integration between the Regulations I.A.A.F., I.P.C. and CIP. In particular, the rules of the CIP are the translation of the current International Regulation of the IPC that has provided to adapt and / or integrate the Technical Regulations of the I.A.A.F. to athletics for the disabled. (CIP, 2006). As regards the Special Olympics, this is an international sports association that organizes the Special Olympic Games and is recognized by the International Paralympic Committee (IPC).

The official rules of the Special Olympics regulate all the special Olympic competitions. As an international sports program, Special Olympics has created these rules based upon IAAF rules for athletics (Special Olympics, 2018). In the Special Olympics Italy, association of the CONI, the local teams follow the training of the athletes in the respect of the international programs and through agreements stipulated with some

of the major Italian sports promotion bodies. Hand in hand with the changes occurred over time to regulations, also the training methods of athletics, particularly sprints, have undergone variations and innovations that are still now subject of study, as in this research. It is natural that each category of disability provides a different type of training that meets their needs and it is for this reason that anyone who decides to take care of teaching/training of motor and sport activities must be able to make appropriate methodological-educational decisions (D'Isanto, Di Tore, 2016, Raiola 2015b). The aim is the identification of a new teaching/training method that can develop the skills of disabled and non-disabled athletes all together. According to inclusive approach in sports activities (Raiola, 2015a), it has to pursue the highest possible goal.

Research method

The research method used is descriptive (not experimental), also defined correlational. In particular, the type of research adopted is archive research (or historical research) consisting in the analysis of collected data obtained from the already existing scientific literature, not having the possibility to manipulate the object of study nor to have direct contact with observational data. However, it can only respond to a few hypotheses, that is, only to those that are reflected in the archived data, which generally contain partial information. It consists of:

- Search in archive documents if was already written something inherent to the research topic. This serves to understand both people who may have produced documents useful for research, and to understand which documents on the subject have already been identified by other researchers;
- The documents are ordered according to the order given by the institution or the person who created them;
- There are research tools (like censuses, guides and inventories) that help to identify the archival funds of interest;
- The inventory is the main tool that shows the overall picture of the deeds for a given topic;
- Register where there is given a description of the documents and a brief summary of the contents.

To remedy the impossibility of manipulating data, was adopted the meta-analysis (Adams, Lawrence, 2018, Walker et al., 2008) and systematic review (Liberati et al., 2008) consisting of a quantitative approach that compares research related to the same topic, and integrates the results of comparable research into a global result, combining the different results of the various studies. It consists of:

- Systematic and exhaustive research of available evidence (published and not published);
- Explication of the inclusion and exclusion criteria of the studies considered;
- Bibliographic research and identification of the studies to be included;
- Evaluation of the quality of the included studies;
- Extraction of included study data;
- Sensitivity analysis.

Results

From the research carried out, the teaching methods found in the literature are the cognitive approach and the ecological approach. Respectively, the first consists in prescribing to the student the mode of exercises aimed at stabilizing and perfecting motor programming and minimizing the variability of the performance. The teacher must apply in a planned manner the means and methods of teaching facilitation suitable for each type of subject, for a specific task and in a particular context. If the motor task is particularly complex, partial practice techniques are applied to reduce the difficulty, that is, the action is fragmented/segmented and then gradually recomposed (Raiola, Di Tore, 2017). The main technical strategies for structuring the exercise, so as to obtain optimal learning results, are:

Partial exercise: it consists in exercising a complex motor skill initially in a simplified form. Thus complex movements can be simplified by fractionating them (exercise lower and upper limb movements separately and then recombine them once they have been automated in simultaneous form), segmenting them (perform the various segments separately and then reconcile them until the entire motor sequence is recomposed) or reducing their speed or demands for executive precision (using larger tools or targets);

Randomized exercise: it consists in performing various different motor tasks without a precise sequential order, minimizing the consecutive repetitions of each individual task;

Varied exercise: it consists in making several movements belonging to the same class, that is, multiple executive variants of the same generalized motor program;

Feedback delivery techniques: it consists in providing additional information to those deriving from the execution of the movement, that is, adding the extrinsic feedback to the intrinsic feedback;

Mental repetition: it consists of an indirect exercise that predisposes to improvement through skill techniques without putting them into practice through mental training and mental representation (Raiola 2017).

Regarding the second approach, the teacher must assist the student in the independent search for motor solutions. If the learning task is too complex, constraints must not be imposed by prescribing in a prescriptive way how to simplify the motor execution, but constraints must be applied to the environment. The subject is able to perceive what the environment allows him to do according to his physical and motor skills, his age, his size, his level of

experience. This is because people have resources that allow them to cope with environmental challenges. The results of the task derive from specific relationships between the individual and the environment, such as changing a position from one point in space to another or crossing a distance. The aim of a task can be determined by the individual or imposed by environmental stimuli such as teaching or education.

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The main strategies adopted by this approach are:

Degrees of freedom: they are the possibilities of movement of a body in space. A rigid body in space has 6 degrees of freedom: 3 of translation and 3 of rotation. Motor learning consists in the progressive motor control of the degrees of freedom that passes through three stages: reduction, exploration and capitalization (D'Isanto, Di Tore, 2016, Gaetano 2012ab,);

Motor Imagery: it is defined as a dynamic state during which a subject mentally simulates an action, that is, a reactivation of the kinesthetic memory occurs allowing to "relive" the motor experience (Di Tore et al., 2018, Di Tore et al., 2016, di Tore, 2016)

Regarding the training methods, those currently used are as following.

Steady State Training (SST): also said Continuous training (CT), is a method that plans to maintain a constant heart rate, generally within a period ranging from moderate to medium-high intensity (approximately between 60 and 80% of the maximum heart rate or between 50 and 75% of the maximum oxygen consumption VO₂ max). This strategy represents the classic way in which resistance activity is carried out, also for this it can be defined Endurance training (Altavilla et al., 2018abc, Altavilla et al., 2017);

Intermittent work: it is a training method that allows to train different motor qualities like resistance and strength at the same time. It is characterized by an alternation of maximal effort and active recovery. Moreover, it is carried out with short effort and recovery times and this allows, during the recovery phase, not to cause the heart rate to drop too much. In particular, it consists in performing an exercise or a stretch of run at a maximum intensity for 30 seconds, followed by an active recovery in slow run for another 30 sec, and then resume work at high intensity for another 30 sec. The training can last from 9 to 15min in total and the heart rate goes from 160 to 180 beats per minute (D'isanto et al., 2018);

High Intensity Endurance Training (HIET): this training method is useful for improving cardiovascular, cardiorespiratory and aerobic power. It is performed between 85 and 95% of the maximum heart rate and between 85% of VO₂ max for athletes or 60% of VO₂ max for non-athletes. For this training methodology it is necessary to avoid medical support that is linked to abusive training practices (Mazzeo, Raiola, 2018, Mazzeo et al., 2018))

Interval Training (IT): the athlete performs physical performance for a certain period of time at a higher intensity and heartbeat, interrupted by periods of recovery, before returning to perform physical performance. This recovery can be active or passive. In active recovery the interval period is carried out keeping the physique moving or in activity, while in the passive recovery there is a complete stoppage of the physical activity (Gaetano, Rago, 2014)

High Intensity Interval Training (HIIT): it is an advanced form of Interval Training, which involves alternating between high and low intensity work, that is, on the variation of the heart rate through a continuous passage from moderate frequencies to high frequencies, and vice versa, during the same exercise (Raiola, d'Isanto, 2016).

Because it's about sports performance, the guide of the coach is fundamental, so it necessarily needs to use a cognitive approach, which implies a "prescriptive teaching" type of teaching/learning. However, it is also necessary to resort to an ecological approach, which is a "heuristics learnings" type, aimed at stimulating the emergence of spontaneous solutions, that is, it implements a process of search for motor solutions that passes through the continuous variation of the motor gestures (it happens through a first attempt that can be exact or wrong, then a second attempt is made, always casual, if the result is better than the previous one, it is reinforced). Consequently, the aim is the identification of a new teaching/training method that can develop the skills of disabled and non-disabled athletes, merging the two previously mentioned approaches.

Following meta-analysis of the data found in the literature, it is hypothesized the creation of a common training method for the categories of disability according to sprint specialties 100, 200 and 400m. From the cognitive-prescriptive point of view, to avoid creating standardization situations, the varied exercise is used. The means of training, therefore, must be varied in such a way as to allow the subject to always engage the nervous and muscular system as much as possible without these determining standard "mechanical speeds". The succession of the coaching means during the preparation follows the following progression: uphill race, stroke with the tow, stroke with the ballasted jacket, running flat in conditions similar to the race, downhill race, towed run, run behind the open-air screen. In this way, the ecological approach is exploited by not taking into consideration the aspects of motor coordination within the individual but, by applying constraints to the environment, we take into consideration the complex interaction between the individual and the environment and the circular relationship between perception and action. The athlete uses only those exercises that he is able to perform perfectly after a training to reduce the degrees of freedom consisting of: reduction, exploration and capitalization. These stages lead to the improvement of the technique and its economy. The various running specialties vary according to characteristics, therefore different training methods are established.

In particular are as following.

100 meters: the main feature is the speed and its improvement must be done with exercises performed on the maximum and sub-maximal frequencies, on joint amplitudes that can be maximum or reduced, always performed in the shortest possible absolute time. Being a race of absolute speed, it's important to consider factors such as strength, reactivity, coordination and technique. The methodology used for this specialty is the interval training, in which the athlete performs a physical performance in the shortest possible time, lasting a few seconds and in series of repetitions with adequate recoveries, which allow to perform the tests and following series with the same dynamic characteristics of the previous ones. The recoveries are medium-long (about 5 min) to allow the nervous system not to be fatigued by the recovery of the exercise, and therefore to the movement to always be dynamic to the maximum. Training, therefore, cannot be achieved in a state of fatigue because the athlete would not be able to be quick.

200 meters: in addition to speed, the characteristics that must be trained in this specialty are explosive strength, power and endurance. The most appropriate training method for this specialty is High Intensity Endurance Training, a method that plans to maintain a constant heart rate between 85 and 95% of the HRmax and 85% of the $\dot{V}O_2$ max and is useful for improving cardiovascular, cardiorespiratory and aerobic power.

400 meters: the characteristic of this specialty is resistance, that is the ability to be able to maintain a certain performance for a longer period of time possible. It depends on: technical economy, energy metabolism, oxygen consumption capacity, optimal body weight, willingness to hold on, resistance capacity due to natural qualities. For its improvement it is necessary that the load is based on duration works. The most appropriate methodology is the Intermittent work, which allows training at the same time resistance and strength and it is characterized by an alternation of maximal effort and recovery done actively. It consists of performing a maximum intensity stroke of travel for 30 seconds, followed by 30 seconds of recovery for a total training time that can vary from 9 to 15 minutes in total. In this way the cardiovascular system and the aerobic system of the athlete are urged, in fact during the whole exercise period the heart rate remains at quite high levels. The recovery phase is of equal, if not greater, importance to that of effort. It must never be more than 30 seconds to prevent the heart rate from falling too low. The advantage of this training is to allow the muscles to function in a long-lasting aerobic regime, minimizing the formation of lactic acid, thus avoiding muscle pain or soreness.

Discussion

From the analysis carried out on the teaching / learning methodologies currently used, a new methodology has been hypothesized given by the integration of the two approaches, ecological and cognitive, which tries to satisfy the physical characteristics of each one, placing everyone on the same level (Raiola 2013, 2014, 2011ab). This choice proves to be the most appropriate in order to compare people who have particular attitudes or not and to discover how such people tend to behave / relate to one another without directives. However, the intertwining of the two approaches is fundamental, because the presence of a competent person is necessary to improve, in an equal way, the performance of all the participants but also the maximum will of the subject.

Conclusions

Ultimately, the present research aims to demonstrate how, through a new approach, it is conceivable an adapted performance training, which is indistinctly valid for disabled and non-disabled subjects. In this way it is affirmed the principle of equality of opportunities, offering the same competitive opportunities to all, the same programs, the same times, the same methodologies. Proximally it is useful to design the hypothesis that involving teacher and trainer (D'elia et al., 2018) and researchers study epistemological aspects (Raiola et al. 2018)

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