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Research Article

Relationship Between Motor Learning Ability and Of Explosive Exercises in University Students: A Perspective Academic Scientific Study

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Abstract

This study investigated the relationship between motor learning aspects with informational and anaerobic exercises in university students. 31 participants (age: 21.8 ± 0.5 years, body mass: 82.5 ± 5.8 kg, height: 1.80 ± 0.05 m, body fat 13.4 ± 0.3%) were recruited for this study. Measurements of T-half test, 15m 30m sprints and agility ZIG-ZAG test were assessed in same groups, which included agility and speed exercise for teaching. Results indicated that a strong correlation between 15m and positive feedback equal to (r= 0.84: p<0.001). In addition, we found a moderate correlation between 30m with the positive feedback delevred by the teachers equal to (r=0.37; p<0.05). In addition, the results indicate a moderate correlation between agility ZIG ZAG test and positive feedback delivered by the teacher (r=0.55; p<0.01). The results demonstrate that motor learning with informational feedback improved performances of linear sprint and ZIG-ZAG change detrition performance. At present, researchers and health professionals are still debating what should be the recommended threshold for sufficient physical activity to achieve anaerobic fitness benefits related to motor learning in university students, but also the role of fitness testing.

Keywords: Student; learning feedback; learning; agility; explosive performance; education-learning

Introduction

Physical education and motor learning is a change, resulting from practice or a novel experience, in the capability for responding (Adams, J. A. 1971; Chiviacowsky, S., and Wulf, G. (2007). However, it often involves improving the smoothness and accuracy of movements and is obviously necessary for complicated complex movements such as speaking language, playing the piano, and climbing trees. But it is also important for calibrating simple movements like reflexes, as parameters of the body and environment change over time (Chiviacowsky, S., and Wulf, G. 2007; Chiviacowsky et al. 2012). In fact, motor learning research often considers variables that contribute to motor program formation, sensitivity of error-detection processes, and strength of complex movement schemas (Adams, 1971). Motor learning is, the capability to respond appropriately is acquired and retained (Chiviacowsky, S., and Wulf, G. 2007). However, feedback is initially it was based on only the actual movement (proprioceptive feedback), which compared the actual and dynamic feedback to the desired goal (Docheff, 1990). The contemporary definition of dynamic feedback is more broadly as any kind of sensory information pertaining to the different movement (Fishwick, 1972). In this direction, classification of feedback on intrinsic or extras feedback is sensory information that comes from producing movements; information may come from outside of the body or within the body (proprioception) (O'Connor, 2008). Likewise, in opposite, extrinsic feedback (augmented feedback) is sensory information provided by sources outside of the body (O'Connor, 2008). Concerning, requirement of initial feedback is typically, there is little or no teaching (Shute, 2008). Success and achievement in running is built on a foundation of aerobic performance capacity developed through years of regular training. This premium placed on aerobic capacity means that the development of anaerobic capacity is often overlooked, particularly outside the ranks of top races.

Despite this complexity, feedback techniques are considered useful to improve ML

(Lauber and Keller, 2014). Indeed, many studies highlighted the feedback effects on subjects' behavior (Chiviacowsky et al., 2012), but as far as we know, no study has investigated the relationship between of verbal instructions regarding motor learning responses and anaerobic capacity. Rarely, coaches and physical education specialist teachers take into account the feedback forms and effective moments of intervention. In fact, it seems that physical education teachers use an inappropriate feedback into the learning process. Consequently, the knowledge assimilation process will be negatively influenced (Nideffer, 1976).

Therefore, the main goal of the study was to investigate the initial association between motor learning and anaerobic and athletic sport activity in university students. The principal question will be focused on evaluating the relationship during the teaching of physical activity of agility and sprint performance in moderately trained athletes.

Materials and Methods

Participants

All participants were university students. A written consent in this study was obtained from all participants after being thoroughly informed about the purpose, benefits and potential risks of this study. This study was approved by the national university institutional review board for human subjects and complied with requirements for Declaration of Helsinki. A questionnaire covering medical history, age, height, body mass, training characteristics, injury history, and performance level was completed before participation. An initial examination by the team physician focused on orthopedic and other conditions that might preclude the physical testing. They did not train between the pre-test and 24 h after performing the testing procedures to avoid any strenuous exercise on the day before testing, and no additional training was conducted on the testing days. Exclusion criteria included the existence of any chronic disease or orthopedic condition that might interfere with the participation in the training program, matches, or experimental tests.

Prior to the start of the study, all participants signed a written informed consent and/or assent in accordance with the Declaration of Helsinki. After initial check of anthropometric measurements, we found that both groups were initially well matched in terms of physical characteristics (31 participants: age: 21.8 ± 0.5 years, body mass: 82.5 ± 5.8 kg, height: 1.80 ± 0.05 m, body fat 13.4 ± 0.3%).

Testing Schedule

Three similar sets of tests were integrated into the weekly training schedules. All measurements were made on a regular indoor court, under similar ambient conditions (temperature 20.5 ± 0.5°C; relative humidity 60 ± 5%), at the same time of day (5:00 p.m. to 7:00 p.m.). To prevent effects of fatigue, intensive training was avoided for 24 h prior to testing. Participants also fasted for at least 3 hours. A standardized battery of warm-up exercises (5-minute of low intensity running, 3 x 30m progressive accelerations, and a maximal 30 m sprint, interspersed with 3-minute periods of passive recovery) preceded all maximal efforts. However, the first set of tests, completed two weeks before the intervention, familiarized participants with the testing procedures, and allowed assessment of the 2-week test-retest reliability of measurements. The second test was giving between the intervention and third sets were completed immediately following the intervention.

Short Sprints 15 m and 30 m

Linear sprint testing began with standardized dynamic warm-up (~15 min) followed by sub maximal 30-m shuttle runs at intensity of 60% to 70% of their maximum heart rate and 4 acceleration sprints, during the runs. Participants ran 40 m from a standing position, with the front foot 0.2-m behind the starting photocell beam. Times at ‘’15 and 30 m’’ were recorded by paired photocells (Microgate, Bolzano, Italy) that were located 1 m above the ground at the starting and finishing lines. The timing was measured in hundreds of seconds. Three trials were separated by 6-8 min of recovery, with the fastest times being used in analyses.

Ability to Change Direction (T-half test)

A standard, a 15-minute warm-up included jogging, lateral displacements, dynamic stretching, and jumping. Standard T-half tests (Sassi et al., 2009) were performed in random order; except that the total distance covered was reduced from 36.56 to 20 m., Data were recorded using an electronic timing system (Globus, Microgate SARL, Bolzano, Italy). However, electronic timing sensors were set 0.75 m above the floor, 3 m apart and facing each other at the starting line (Sassi et al., 2009). Testing began with both feet placed behind the starting line A. Participants sprinted forward to cone B and touched the base of it with their right hands. Facing forward and without crossing feet, they then shuffled to the left to cone C and touched its base with their left hands. They then shuffled to the right to cone D and touched its base with their right hands, subsequently shuffling back to the left to cone B and touching its base. Finally, they ran backwards as quickly as possible, returning to line A. Anyone who crossed one foot in front of the other, failed to touch the base of a cone, and/or failed to face forward throughout had to repeat the test. Three minutes of rest was allowed between trials (Sassi et al., 2009). Criteria for an acceptable test were as in the T-test, with recording of the better of two definitive trials. The timing was measured in hundreds of seconds.

ZIGZAG test

During the ZIGZAG test, the test course consisted of four 5-m sections set at ≥1008 angles. The ZIGZAG test was chosen because it requires the acceleration, deceleration, and balance control facets of agility, and the familiarity of the Participants with the test and its relative simplicity minimized learning effects. The timing began on a sound signal and stopped when the subject passed through timing gate. The time was measured in hundreds of seconds.

Statistical Analyses

Statistical analyses were performed using SPSS version 25.0 for Windows (SPSS Inc., IBM, Armonk, NY, USA). Descriptive statistics (mean, standard deviations (SD), minimum, maximum (range), 95% confidence intervals (95% CI) were calculated for all parameters. Pearson`s product moment correlations and linear regression analysis (method: inclusion) determined relationships between feedback parameters and performance parameters (e.g., ZIG ZAG test, T-Half test and sprint 15 and 30 m). The 95% confidence intervals were calculated for each of the linear regression equations. Criteria adopted for interpreting the magnitude of correlations (r) between measures were Criteria adopted for interpreting the magnitude of correlations (r) between measures were: <0.1 as trivial; 0.1–0.3 as small; 0.3–05 as moderate; 0.5–0.7 as large; 0.7–0.9 as very large; and 0.9–1.0 as almost perfect as described by Portney and Watkins (Hartmann et al. 1992).

Results

We found string strong correlation between 15m and positive feedback equal to r= 0.84 p<0.001.

In addition, we found a moderate correlation between 30m positive feedback equal to r=0.37 p<0.05.

In addition, the results indicate a moderate correlation between agility ZIG ZAG test and positive feedback r=0.55 p<0.01.

In addition, the results indicate a moderate correlation between agility T-half test and positive feedback r=0.50 p<0.01.

Parameters	15 m sprint (s)	30 m sprint (s)	Agility T test (s)	ZIGZAG test (s)
Mean	2.38	4.33	7.38	7.38
SD	0.1	0.3	0.6	0.6

Table 1. Mean and SD of all physical parameters

Parameters	Feedback of Motors Learning	
	Negative	Positive
Mean	1.90	4.23
SD	0.9	3.0

Table 2. Mean and SD of Feedback of Motors Learning

Parameters	Feedback of Motors Learning	
	Positive	Negative
15 m sprint (s)	*r= 0.85 p< 0.001*	*r= 0.06*
30 m sprint (s)	*r= 0.55< 0.05*	*r=-0.18*
Agility T test (s)	*r= 0.44< 0.05*	*r= 0.03*
ZIG-ZAG test (s)	*r= 0.551 <0 .05*	*r=-016*

Table 3. Correlation between physical parameters and feedback of motors learning

Discussion

The main findings of this study were reported the relationships between dynamics feedback, motor learning and anaerobic excretes capacity related fitness; and muscle strength. The results that we found indicate strong correlation between 15m and positive feedback. In addition, we found a moderate correlation between 30m positive feedback. In addition, the results indicate a moderate correlation between agility ZIG ZAG test and positive feedback. The results confirmed significant correlation for all variables of motor competence and anaerobic fitness. The regression models supported these results for motor competence all fitness variables. For the other fitness components, Malian (2001) did not find an association between physical activity (PA) of muscle strength related to anaerobic capacity exercice and motor learning, even though one of the outcomes considered to be developed with physical activity is muscle strength. In fact, the correlations between fitness variables were also modest (except for the flexibility measures), indicating that each variable is measuring a relatively unique aspect of fitness testing. However, the inverse relationship between motors learning and anaerobic fitness has also been observed in younger children aged between 7 and 12 years old (Raudsepp & Jurimae, 1996; Castelli & Valley, 2007) and adolescents (Carnethon et al., 2005)

In fact, the greater agility measures recorded by the low active and low fit groups may reflect the type and variety of activities typically undertaken by participants that are more sedentary. On the other hand, high-intensity, repetitive activities often required when participating in competitive, anaerobic sports like agility and ZIG ZAG activity may reduce the range of motion around joints if regular stretching exercises are not undertaken (Wang et al., 2000). It is probable that few participants, unless engaged in elite sports, routinely undertake effective stretching exercises Futhemore, the positive correlation between short sprinting of 15 and 30 m sprint test and motors learning related to feedback is not surprising. However competitors often have higher muscle mass that contributes to a higher activity. On the other hand, a lower limb was advantageous for performing the agility and was associated with higher motor competence for male's athletes.

The failure to detect a significant relationship between physical activity and motor learning could be attributed to the physical activity measure. In this study, physical activity was determined by a anaerobic tests and therefore it was not possible to report the intensity, type or frequency of the activity. Pedometers primarily record locomotor movement that may or may not be the result of skillful activity. A relationship between aerobic fitness and physical activity may be observed if time spent in moderate and vigorous levels of physical activity is determined. The high competence group in this study were not less active but were less aerobically fit than their high competence counterparts. Consequently, it is possible that the participants with low competence will have recorded a similar number of steps per day to other members of the cohort, but at a reduced intensity.

It exist a strong empirical evidence that anaerobic physical activity rather than physical fitness or motor learning is of primary importance to fitness among athletes is lacking (Rowland, 2005; Harris & Cale, 2006). While it is not possible to determine the directional nature of the relationships observed in this study, the results challenge the current emphasis by fitness interventions on boosting merely physical activity among children and adolescents. Given the regression models reported above, anaerobic fitness should be considered to be of prime importance for several reasons. Firstly, anaerobic fitness was related to both the attribute of motor competence and physical activity behavior. Secondly, valid and reliable objective measures of aerobic fitness for children and adolescents are available, whereas the measurement of physical activity in this age group is still problematic. While it is important to establish healthy levels of habitual physical activity among athletes, it is debatable whether this is of greater importance than focusing on fitness (Cale et al., 2007).

Finally, while the anaerobic tests is an appropriate tool for population-based studies, it does not record the intensity, type and duration of activity. Further, anaerobic tests do not accurately register some common activities such as cycling or skateboarding.

Practical Applications and perspective

Physical activity, motor learning and physical fitness are all related to better feedback outcomes in students. The current focus on physical activity with children appears inadequate as the three constructs are only partly related. Given the difficulty to objectively measure physical activity in athletes (Welk et al., 2000), it may be more useful to measure and monitor anaerobic fitness. Such measures are more objective and less prone to misclassification. Further, more opportunities need to be provided for children and adolescents to develop other fitness components such as muscle strength and flexibility.

Limitations

Current study findings should be interpreted and used with caution since results are based on a small sample size In addition, it is important to extend investigation to students with different categories of age and gender to confirm the effectiveness of this method. Further, there is a need to assess gains in terms of anaerobic exercises with and without motor learning tasks based on the number of the feedback into all training sessions.

Conclusion

The current study confirmed the important role of feedback during motor learning in explosive and anaerobic exercises. It suggested that feedback manipulation is the best way to enhance body awareness during movements. However, further studies are necessary to evaluate the frequency, volume and type of feedback well in order to define the specific or interactive effects on motor learning skills in physical education.

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